

FACULTY OF AGRICULTURE, ENGINEERING  
& NATURAL SCIENCES

School of Agriculture  
& Fisheries Sciences



UNAM  
UNIVERSITY OF NAMIBIA



**PROSPECTUS 2023**

**FACULTY OF AGRICULTURE, ENGINEERING AND  
NATURAL SCIENCES**

**SCHOOL  
OF  
AGRICULTURE  
AND  
FISHERIES SCIENCES**



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University of Namibia, Windhoek

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## NOTE

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This School Prospectus is valid for 2023 only. Regulations and curricula may be amended without prior notice. **General regulations and information appear in the General Information and Regulations Prospectus.**

Although the information contained in this School Prospectus has been compiled as accurately as possible, Council and Senate accept no responsibility for any errors and omissions that may occur. The University retains the right to amend any regulation or condition without prior notice.

The information is correct up to 31 October 2023.

The fact that particulars of a specific programme, subject or module have been included in this School Prospectus does not necessarily mean that such a programme, subject or module will be offered in 2023 or any subsequent year.

This School Prospectus must be read in conjunction with the **General Information and Regulations Prospectus.**

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## SCHOOL PREAMBLE

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## MISSION

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The Mission of the School of Agriculture and Fisheries Sciences is to promote sustainable agricultural and natural resource development and management in Namibia through teaching, research and extension services to communal and commercial farming communities.

## OBJECTIVES

The objectives of the School are:

- to provide education and training, aimed at producing degree level graduates in the fields of Agriculture and Natural Resources, who will be well equipped with knowledge, skills and attitudes that will help improve agricultural productivity and promote sustainable agricultural development, wise use of resources and increase Namibia's food security;
- to conduct research aimed at extending the frontiers of knowledge relevant to Namibia's environment, natural resources and agriculture.
- to provide advisory, consultancy and extension services on the proper and sustainable use of Namibia's agricultural and natural resources to the communities.
- to catalyze increased production and productivity of Namibia's natural resources.
- to help create meaningful employment in both the public and private sector including self-employment; and
- to promote an environment that will enhance equity and access to education and training in Agriculture and Natural Resources development and management.

**“Training & Research to Feed the Nation”**

## UNAM CORE DATES 2023

<b>FIRST SEMESTER:</b>	
12 January	University Opens
24 January	Academic staff resumes office duties
30 January	Lectures commence for CORE SEMESTER – New Curriculum Students) (Until 3 March)
15 February	Lectures commence for FIRST SEMESTER – Old Curriculum Students (Until 17 May)
06 March	Lectures commence for FIRST SEMESTER – New Curriculum Students (Until 7 June)
04 May	Long Week for students commence (Until 7 May)
08 May	Classes resume after long weekend
17 May	Lectures end for the FIRST SEMESTER – Old Curriculum Students
22 May	First opportunity examinations commence – Old Curriculum Students (Until 9 June)
7 June	Lectures end for the SEMESTER 1– New Curriculum Students
9 June	First opportunity examinations end – Old Curriculum Students
12 June	First opportunity examinations commence – New Curriculum Students (Until 23 June)
12 June	Second opportunity examinations commence – Old Curriculum Students (Until 27 June)
23 June	First opportunity examinations end – New Curriculum Students
26 June	Second opportunity examinations commence – New Curriculum Students (Until 5 July)
27 June	Second opportunity examinations end – Old Curriculum Students
05 July	Second opportunity examinations end – New Curriculum Students
07 July	End of first semester
10 July – 14 July	Mid-year Break
<b>SECOND SEMESTER</b>	
19 July	Lectures commence for SECOND SEMESTER – Old curriculum Students (until 13 October)
24 July	Lectures commence for SECOND SEMESTER – New Curriculum Students (until 20 October)
04 September	Second semester BREAK starts for New Curriculum Students (Until 10 September)
06 September	Second semester BREAK starts for Old Curriculum Students (Until 10 September)
08 September	Institutional Holiday
11 September	Lectures resume after second semester break
13 October	Lectures end for SECOND SEMESTER – Old Curriculum Students
18 October	First opportunity examinations commence – Old Curriculum Students (Until 7 November)
20 October	Lectures end for SECOND SEMESTER – New Curriculum students
26 October	First opportunity examinations commence – New Curriculum Students (Until 10 November)
07 November	First Opportunity Examinations end – Old Curriculum Students
08 November	Second Opportunity Examinations commence – Old Curriculum Students (Until 24 November)
10 November	First Opportunity Examinations end – New Curriculum Students
13 November	Second opportunity examinations commence – New Curriculum Students (Until 24 November)
24 November	Second Opportunity Examinations end
01 December	End of SECOND SEMESTER
15 December	End of ACADEMIC YEAR
12 January 2024	University opens (2024 academic year)
24 January 2024	Academic staff resumes office duty

## DUE DATES FOR THE 2023 ACADEMIC YEAR

DATE	GENERAL DATES
20 January	Last day for registration of senior students – Faculty of Health Sciences and Veterinary Medicine
31 January	Last day for appeals (Semester 2 and Double modules of Regular and Supplementary/Special examinations of November 2022)
03 February	Last day for application of retention of continuous assessment (CA) mark and to sit for Promotional Examinations Last day for late registration of new curriculum students (Late fee payable)
08 February	Last day for schools to approve the retention of continuous assessment (CA) mark and promotional examination applications
10 February	Last day for application of module(s) exemptions – New Curriculum Students
17 February	Last day for registration of senior students (Late fee payable) Last day for application of module(s) exemptions – Senior Students Last day for approval of module(s) and qualification changes – Senior Students
22 February	Promotion Examination
24 February	Last day for approval of module(s) exemptions – New Curriculum Students
10 March	Last day for approval of module(s) exemptions – Senior Students
12 April	Last day to change offering types and examinations centres – distance students
30 April	Last day to submit thesis for the October 2024 graduation
04 August	Last day for appeals (First and second opportunity examinations of the First Semester 2023)
31 August	Last day to submit outstanding documentation
12 September	Last day to change offering types and examinations centres – distance students
31 October	Last day to submit thesis for the April 2024 graduation
DATE	CANCELLATION DUE DATES
28 April	Last day to cancel Semester 1 modules
29 September	Last day to cancel Semester 2 modules
29 September	Last day to cancel Double modules (module that extends over one academic year)
DATE	FINANCE DUE DATES
6 February	Last day to cancel Core Semester modules with 100% credit
15 February	Last day to cancel Core Semester modules with 50% credit
1 March	Last day to cancel Semester 1 and year modules with 100% credit – Old Curriculum Students
20 March	Last day to cancel Semester 1 and year modules with 100% credit – New Curriculum Students
29 March	Last day to cancel Semester 1 modules with 50% credit – Old Curriculum Students
17 April	Last day to cancel Semester 1 modules with 50% credit – New Curriculum Students
7 July	Last day to cancel year modules with 50% credit – Old and New Curriculum Students
2 August	Last day to cancel Semester 2 modules with 100% credit – Old Curriculum Students
9 August	Last day to cancel Semester 2 modules with 100% credit – New Curriculum Students
1 September	Last day to cancel Second Semester modules with 50% credit – All Students

# STRUCTURE AND PERSONNEL OF THE SCHOOL

## OFFICE OF THE ASSOCIATE DEAN

### EXECUTIVE DEAN: FACULTY OF AGRICULTURE, ENGINEERING & NATURAL RESOURCES

Prof. NM. Nickanor: BSc (UNAM), PGD, M.A (Univ of Botswana), (PhD (UCT)

 (+264 61) 206 3890 or (+264 61) 206 3791  nnickanor@unam.na  Private Bag 13301, Windhoek, Namibia

### ASSOCIATE DEAN: SCHOOL OF AGRICULTURE & FISHERIES SCIENCES

Dr S T Angombe: BSc (Unam), PDipNaReM (Autralian) National University, Canberra – Australia), MSc (Autralian National University, Canberra -Russia)

 (+264 61) 206 3023/3180 or (+264 61) 206 3100  sangombe@unam.na  Private Bag 13301, Windhoek, Namibia

### FACULTY MANAGER: FACULTY OF AGRICULTURE, ENGINEERING & NATURAL RESOURCES

Mr John Erastus:

 (+264 61) 206 3890 or (+264 61) 206 3791  @unam.na  Private Bag 13301, Windhoek, Namibia

### FACULTY COORDINATOR POSTGRADUATE STUDIES: FACULTY OF AGRICULTURE, ENGINEERING & NATURAL RESOURCES

Ms. RM Shilongo: MPhil in Development Finance( University of Stellenbosch) MSc in Accounting & Finance (University of Namibia) Bachelor of Accounting (University of Namibia)

 (+264 61) 206 4111 or (+264 61) 206 3791  rmshilongo@unam.na  Private Bag 13301, Windhoek, Namibia

### OFFICE OF THE ASSOCIATE DEAN (NEUDAMM CAMPUS)

 (+264 61) 2064111   P.O. Box 13188, Windhoek, Namibia

<b>Faculty Officer:</b>	Ms Belinda Bock: Bachelor in Business Administration (Hons) (UNAM), Dipl.in Information Administration (NUST)
<b>Examinations Officer:</b>	Vacant
<b>Faculty Librarian:</b>	Ms M T Tjituka: B.A. (Hons) Public Admin (Polytechnic of Wales); Postgraduate Dipl in Library & Info Studies (University College London); MA. Library & Info Studies (University of London); Cert. Advanced Studies in Library & Info. Sci (Long Island Univ, New York)
<b>Subject Librarian:</b>	Ms N S T Uugwanga: Diploma Information Studies (UNAM); B A Library Science & Records Management & History (UNAM); Postgraduate Diploma in Library & Information Studies (UCT); Master in Library and Information Studies (UCT)
<b>Senior Library Assistant:</b>	Mr T Ntesa: Dipl Information Studies (UNAM); B Arts: Information Science (UNISA)
<b>Library Assistant:</b>	Ms E Nguvauva: Dipl Records Management (Southern Business School); BArts: Information Science (UNISA)
<b>Library Assistant:</b>	Mrs M Kaahangoro: Dipl Records Management (Southern Business School); B Arts: Information Science (UNISA)
<b>Administrative Assistant:</b>	Vacant

### CAMPUS AND FARM STAFF: (NEUDAMM CAMPUS)

 (+264 61) 206 4111 reception or (+264 61) 206 4063  smudabeti@unam.na  Private Bag 13188, Windhoek, Namibia

<b>Campus Administrator:</b>	Mrs. S. Juliet Mudabeti: BPsych. Hons (UNAM), M. Leadership and Change Management(NUST),Public Management Certificate(UNISA)
<b>Student Support Officer:</b>	Mr. A. Kandjimi: BA (UNAM), Dip. Local Government Studies(UNAM), Certificate in Procurement( AMAD University)
<b>Farm Manager:</b>	Mr E Beukes: National Dipl. Agric (Tsumis)
<b>IT Support Technician:</b>	Mr. Mwetulamba Ipangelwa Diploma in Computer Science (UNAM); Bachelors in Computer Science Majoring in System Administration (Namibian University of Science and Technology)
<b>Administrative Assistant:</b>	Vacant

<b><u>Student Finance Officer:</u></b>	Ms M Mubukwanu: Degree Finance Manager (Hons) (IUM)
<b><u>Estates Officer:</u></b>	Mr D Tiboth: National Dipl. Public Administration (Polytechnic of Namibia).
<b><u>Supervisor Workshop:</u></b>	Mr. M Nambala: Certificate in Diesel Mechanic
<b><u>Supervisor:</u></b>	Mr P Beukes: National Dip. Agric (Tsumis)
<b><u>Supervisor:</u></b>	Mr B M Matomola: Bachelor Degree in Agricultural Management; National Dip. Agric (Neudamm)
<b><u>Supervisor:</u></b>	Mr J Ngavetene: National Dip. Agric (Neudamm); B.Ed (UNAM); B.Agric Hons (Polytechnic of Namibia)
<b><u>Supervisor</u></b>	Mr G Sheehama: National Dip. Agric(Ongongo), Higher Diploma in Education (North West University), B. Hons Agric Extension (University of Pretoria)
<b><u>Supervisor Intensive Section:</u></b>	Vacant
<b><u>Assistant Supervisor:</u></b>	Mr G /Gomxob: Trade Dip. Diesel Mechanic
<b><u>Assistant Supervisor:</u></b>	Mr. A. Tjiriange: Dip. Agric (Dooringboom)
<b><u>Assistant Supervisor:</u></b>	Mr R Fredericks
<b><u>Assistant Supervisor:</u></b>	Mr R Kandjou
<b><u>Assistant Supervisor:</u></b>	Mr I Lisias

#### OGONGO CAMPUS

 (+264 65) 223 5000 reception or (+264 65) 223 5323 Assistant Faculty Officer (onhaludilu@unam.na)  Private Bag 5520, Oshakati, Namibia

<b><u>Campus Director</u></b>	Dr C. Mberema: B.Sc. Agric (UNAM); M.Sc. Animal Science, (University of Arizona USA); PhD, Molecular Genetics and Meat science (Newcastle University, UK)
<b><u>Head of Academic Affairs:</u></b>	Dr.B. Thomas Bsc agric (UNAM); Msc Agri Econ (Stellenbosch); PhD Agric Econ (Stellenbosch)
<b><u>Campus Administrator:</u></b>	Mr. M. Nghihangwa: B-Tech (Unisa) Master in Public Admin (Univ Western Cape)
<b><u>Farm Manager:</u></b>	Mr. S. Martin: National Dipl Agric (Neudamm); B Sc Agric (Univ Free State, Bloemfontein)
<b><u>Assistant Faculty Officer:</u></b>	Mr. O Haludilu: Bachelor in Business Administration (Hons) (UNAM),
<b><u>Student Support Officer:</u></b>	Mr Willem Amutenya: B.Ed (Science), (Unam), M.Ed Leadership and Management Policy (IUM)
<b><u>IT Support Technician</u></b>	Mr .M. Nyambe: ICDL, CompTIA+, N+, Security+, Project+, Microsoft Certified Systems Administrator(MCSA), MCITP, Diploma in Computer Science(UNAM), Bachelor of Business Administration(UNAM),PG Dip MIS(UCT), MBA(Regent Business School)
<b><u>Examinations Officer:</u></b>	Ms J Amupolo: B. Econ (Unam); B.Econ (Hons) Univ Western Cape
<b><u>Librarian:</u></b>	Mrs. C. N. Nakanduungile: Dipl Information Studies (UNAM), BA Library Science and Record Management (UNAM), PGDip Library and Information Studies (UCT), and Master in Library and Information Studies (UCT)
<b><u>Senior Library Assistant:</u></b>	Mr J Kambuta
<b><u>Library Assistant:</u></b>	Ms T N Andowa
<b><u>Library Assistant:</u></b>	Ms S Shiimbi: Dipl Information Studies
<b><u>Library Assistant:</u></b>	Ms Christaline Handura: Dipl in Library Science
<b><u>Secretary to the Campus Director</u></b>	Ms H.T. Utoni: International Computer Driving Licence ICDL, (UNAM) Certificate in HIV/AIDS counselling (UNAM), Diploma in Public Relations (UNAM)Certificate in IT (SchoolNet Namibia), Certificate in Marketing (SME Compete)
<b><u>Campus Security Officer</u></b>	Ms J. Saul: Certificate: Crime Prevention and Security Design (ARC International Ltd), Diploma: Police Management (Namibia Business School) (Idilio Rodriguez –Technical Institute, Cuba)
<b><u>Supervisor:</u></b>	
<b><u>Dairy and Food Processing</u></b>	Mr. A. Malyenge: Dipl Agric (Ogongo); Dipl in total quality Management production (UNISA); BSc (Hons) Food Science and Technology (Putra University, Malaysia)

<b><u>Supervisor: (Horticulture)</u></b>	Mr. M. Shishwandu; Dipl Agric (Ogongo); Bachelor of Agric Management (Polytechnic of Namibia)
<b><u>Acting Supervisor: Nursery &amp; Orchards</u></b>	Ms. T. Muhama: Certificate in HIV Counselling (UNAM); Diploma in (Natural Resource) Agronomy (Sovhoz-technicum.V.I Lenin, USSR).
<b><u>Supervisor: Livestock and Game</u></b>	Mr. D. Shikola: Dipl Agric (Ogongo); Bachelor of Agric Management (Livestock) (Polytechnic of Namibia)
<b><u>Supervisor: Workshop</u></b>	Mr. J. Kangulu: Certificate in Automobile (German Technical Institute; Sri Lanka); Certificate in measuring and testing (Mbabane University; Swaziland)

## ACADEMIC STAFF BY DEPARTMENTS

**DEPARTMENT OF ANIMAL PRODUCTION, AGRIBUSINESS & ECONOMICS (NEUDAMM CAMPUS)**

 (+264 61) 206 4039   
 (+264 61) 206 4027   
  tamushendje@unam.na   
  Private Bag 13188, Windhoek, Namibia

<b><u>Head of Department:</u></b>	Dr T. O. Amushendje
<b><u>Professor:</u></b>	Prof. J. Mupangwa (B.Sc. Animal Science, University of Zimbabwe; M.Sc. Grassland Science (with Distinction), University of Reading, United Kingdom; PhD Animal Science (Animal Nutrition), University of Zimbabwe).
<b><u>Associate Professor:</u></b>	Prof H. J. Sartorius von Bach, B.Sc. Agric Economics (cum laude) (University of Pretoria); B.Sc. (Hons) Agric Economics (cum laude) (Pretoria); M.Sc. Agric Economics (Pretoria); PhD Agric Economics (Pretoria)
<b><u>Associate Professor:</u></b>	Vacant
<b><u>Senior Lecturer</u></b>	Dr T. O. Amushendje: B.Sc. (Hons), Molecular Biology (Murdoch University, Western Australia); PhD, Molecular Genetics and Wool Science (Lincoln University, New Zealand).
<b><u>Senior Lecturer:</u></b>	Dr E. Lutaaya: B.Sc. Agric. (Makerere); M.Sc. Animal Breeding (Texas A & M); PhD Animal and Dairy Science [Quantitative Genetics] (University of Georgia, USA).
<b><u>Senior Lecturer:</u></b>	Dr N. P. Petrus: B. Agric. (Animal Science) University of Nigeria Nsukka, Nigeria; M.Sc. (CIRAD-Montpellier (France), Animal production in the tropics; PhD Poultry (Nutrition and Genetic characterization) (UNAM).
<b><u>Senior Lecturer:</u></b>	Dr S. P. Muteka: B.Sc. (Concordia, Minnesota, USA), M.Sc. (Reproductive Biology) [University of Pretoria, RSA], PhD (Reproductive Biology) [University of Pretoria, RSA]
<b><u>Senior Lecturer:</u></b>	Dr C. N. Jona: B.Sc. Agric (UNAM); B.Sc. (Hons) (Pretoria); M.Sc. Agric Extension (Pretoria); PhD Agric Extension (Pretoria)
<b><u>Senior Lecturer:</u></b>	Dr M. N. T. Shipandeni: National Dip Agric (Ogongo), B.Sc. Agric (UNAM); M.Sc. Animal Nutrition (University of Wageningen, Netherlands), PhD Animal Science (Stellenbosch University, SA)
<b><u>Senior Lecturer:</u></b>	Dr A. Kahumba: National Diploma Agric (Ogongo), B.Sc. Education Science (UNAM), M.Sc. Rangeland Resources Management (UNAM), PhD Agriculture (Pasture Science) (University of Fort Hare, RSA)
<b><u>Lecturer:</u></b>	Dr T. Uushona: B.Sc. Agric. (UNAM); M.Sc. Agric (cum laude) (University of Stellenbosch)
<b><u>Biostatistician:</u></b>	Dr V. Charamba: B.Sc. Hon. Statistics (UZ); M.Sc. Statistics (UZ); PhD Statistics (UNAM)
<b><u>Lecturer:</u></b>	Vacant
<b><u>Lecturer:</u></b>	Mr S. K. Kalundu: Nat Dip Agric (Neudamm); B.Sc. Agric (UNAM); M.Sc. Agric Econ (Arkansas, USA)
<b><u>Lecturer:</u></b>	Mr M. N. Angula: Nat Dip Agric (Ogongo); B.Sc. Agric (UNAM); M.Sc. (Michigan, USA)
<b><u>Lecturer:</u></b>	Mr M. M. Eiseb: Dip Agric (Polytechnic); B.Sc., M.Sc. Agric Econ (Fort Hare)

<b><u>Lecturer:</u></b>	Mr J N Muzanima: B Sc Agric Economics (UNAM); M Sc Agric Economics (IARI, India) PDHE (UNAM)
<b><u>Lecturer:</u></b>	Mr T. Maharero: B.Sc. Agric (Natal), MBA (MANCOSA), South Africa
<b><u>Lecturer:</u></b>	Ms L. Haluendo: B.Sc. Zoology, Botany & Psychology (UNAM); B.Sc. Hons Crop Protection (Pretoria); M.Sc. Crop Protection (Pretoria); Professional Diploma in Education (UNAM)
<b><u>Lecturer:</u></b>	Biochemistry – Vacant
<b><u>Senior Technologist:</u></b>	Dr S. Shihepo: B.Sc. Agric. (UNAM); M.Sc. Agric. (Animal Nutrition) (UNAM); PhD Agric. (Animal Nutrition) (UNAM)
<b><u>Technologist:</u></b>	Ms. A. Nambahu: National Diploma Agric; B.Sc. Agric. (Hons) (UNAM)
<b><u>Technologist:</u></b>	Molecular Genetics – Vacant
<b><u>Technician:</u></b>	Animal Science - Vacant

**DEPARTMENT OF ANIMAL PRODUCTION, AGRIBUSINESS & ECONOMICS (OGONGO CAMPUS)**

 (+264 61) 206 4039     (+264 61) 206 4027     tamushendje@unam.na     Private Bag 13188, Windhoek, Namibia

<b><u>Head of Department:</u></b>	Dr T. O. Amushendje
<b><u>Departmental Coordinator:</u></b>	Dr B. Gorejena
<b><u>Associate Professor:</u></b>	Vacant
<b><u>Senior Lecturer</u></b>	Dr B. Thomas: BSc Agric (UNAM); MSc Agric Econ (Stellenbosch) PhD Agric Econ (Stellenbosch)
<b><u>Senior Lecturer:</u></b>	Mr C. Togarepi: B.Sc. Agric (UNAM); PGDE (UNAM), M.Sc. Agric Econ (UNAM)
<b><u>Lecturer:</u></b>	Dr B. Gorejena: BVSc (University of Zimbabwe); MBA (Assam Don Bosco University)
<b><u>Lecturer:</u></b>	Dr C. Mberema: B.Sc. Agric (UNAM); M.Sc. Animal Science, (University of Arizona USA); PhD, Molecular Genetics and Meat science (Newcastle University, UK).
<b><u>Lecturer:</u></b>	Dr O. K. Mbango: BSc. Agric (UNAM); MSc. RRM (UNAM); PhD Agricultural Sciences (cum laude) Humboldt Universität zu Berlin, Germany.
<b><u>Lecturer:</u></b>	Mr L. T. Kaholongo: National Diploma Agric. (Ogongo); B.Sc. Agric. (UNAM); M.Sc. Animal Science. (UNAM)
<b><u>Lecturer:</u></b>	Mrs M. M. Hangula: Nat Dip Agric (Ogongo); B.Sc. Agric (UNAM); M. Sc. Agric & Resource Econ (Alberta, Canada)
<b><u>Lecturer:</u></b>	Mrs S. Shivolo-Useb: Nat Dip Agric (Neudamm); B. Econ (UNAM); MBA-Finance (UNAM)
<b><u>Assistant Lecturer:</u></b>	Ms E. R. Sheehama: B.Sc. Agric (UNAM); B.Sc. (Hons) Free State Univ.
<b><u>Technician:</u></b>	Animal Science – Vacant

**DEPARTMENT OF CROP PRODUCTION AND AGRICULTURAL TECHNOLOGIES (OGONGO CAMPUS)**

 (+264 65) 223 5200     skawala@unam.na     Private Bag 5520 Oshakati, Namibia

<b><u>Head of Department</u></b>	Dr S K Awala: National Dip Agric (Neudamm); B.Sc. Agric (UNAM), M. Agric. Sc. (Nagoya Univ., Japan); PhD Agric. Sc. (Kindai Univ., Japan).
<b><u>Professor</u></b>	Prof O D Mwandemele: B.Sc. Hons; M.Sc. (Dar-es-Salaam); PhD (Sydney); Elected Fellow (ISGPB), Member UNU/INRA College of Res. Associates.
<b><u>Associate Professor</u></b>	Prof. R J Birech: Dip Agric, BSc (Egerton Univ., Kenya); MPhil Moi Univ., Kenya); PhD (Vienna, Austria)
<b><u>Lecturer</u></b>	Dr P I Nanhapo: B.Sc. Agric (UNAM); M. Agric. Sc. (Nagoya Univ., Japan); PhD (Kindai Univ., Japan).

<b><u>Lecturer</u></b>	Mr. K Elungi: B.Sc. Agric (UNAM); M.Sc. Plant Pathology (UKZN); MBA (NUST Harold Graduate School of Business)
<b><u>Lecturer</u></b>	Mr F Shinombedi: M.Sc. Agric Eng (Czechelsovakia)
<b><u>Lecturer</u></b>	Mr G Hatutale: B.Sc. Agric (UNAM), M.Sc. Horticulture (Free State Univ).
<b><u>Lecturer</u></b>	Mr J Chigariro: Dipl Agric (Gwebi, Zim); PGDipl Grain Storage Management (UK); M Sc Grain Storage Management (Greenwich University, UK)
<b><u>Lecturer</u></b>	Mr L Nuugulu: B.Sc Agric Crop (UNAM); B Sc (Hons) Agronomy (Univ of Free State); Msc Horticulture (University of Free State) Study Leave (Botswana)
<b><u>Lecturer</u></b>	Dr B Mudamburi: Dip Agric (Chibero, Zim); B.Sc. Hons (Cranfield, UK); MSc. (Wageningen University- The Netherlands); PhD Agric Engineering (UNAM)
<b><u>Lecturer</u></b>	Mr P A Ausiku: National Dip Agric (Ogongo); B.Sc. Agric (UNAM); M Sc Agric (Kinki Univ., Japan), Study Leave (Univ. of Pretoria).
<b><u>Lecturer</u></b>	Ms C K Kamburona-Ngavtene: B.Sc. Agric (UNAM); MSc. Genetics (Pretoria).
<b><u>Lecturer</u></b>	Ms H Kandongo: B.Sc. Agric Mechanisation (Karl Marx University); MSc Agric (UNAM).
<b><u>Senior Technologist</u></b>	Ms A N Aluvilu: National Dip. Agric (Polytechnic of Namibia); B. Tech Agric (Cape Technikon), M. Agric (University of Limpopo).
<b><u>Technologist</u></b>	Mr R Shou: National Diploma in Agric (Ogongo); B Sc in Agric (Hon) Crop Science (UNAM)
<b><u>Laboratory Manager</u></b>	Ms Johanna S Valombola: Nat Diploma in Agriculture (Ogongo); B Sc in Agric (Hon) Crop Science, MSc Agric (UNAM).

**DEPARTMENT FISHERIES AND OCEAN SCIENCES (SAM NUJOMA CAMPUS)**



(+264 64) 502 600



euahindua@unam.na



P.O. Box 462, Henties Bay, Namibia

<b><u>Campus Director:</u></b>	Dr S K Mafwila: B.Sc. (UNAM); PGDE (UNAM); B.Sc.Hons (Rhodes); M.Sc. (UCT) PhD (UCT)
<b><u>Head: Academic Affairs</u></b>	Dr J A Iitembu: B.Sc. (UNAM), M.Sc. (Univ. of Tromso), PhD (Rhodes), LLB (UNAM)
<b><u>Office Administrator:</u></b>	Ms E Uahindua: Secretarial Certificate (CCOSA - Zimbabwe)
<b><u>Assistant Faculty officer:</u></b>	Ms. S Shapumba: BA: Industrial Psychology and Sociology Hons (UNAM), MA in Development Studies (UNAM)
<b><u>Assistant Librarian:</u></b>	Ms L lipinge: B.A. Library Science and Resource Management (UNAM)
<b><u>Library Assistant:</u></b>	Mr E Thaniseb: Dipl Library and Information Studies (Univ of Botswana)
<b><u>Estates Officer:</u></b>	Mr M Dominicus: Dipl (WVTC)
<b><u>Campus Security Officer</u></b>	Mr. G C Nowaseb
<b><u>Campus Administrator:</u></b>	Mr. B Evaristus BEco Hons (UNAM), PGDBA (NBS)
<b><u>Student Records Officer &amp; Examination Officer:</u></b>	Mr M Kangootui: Adult Basic Education & Training Certificate (ABET), UNISA; Dipl Public Management (Polytechnic of Namibia)
<b><u>IT Officer:</u></b>	Mr. Fillemon Nime
<b><u>Senior Lecturer:</u></b>	Dr. NN Gabriel: B.Sc. (UNAM), M.Sc (NAU, China), PhD (UNAM)
<b><u>Senior Lecturer:</u></b>	Dr. M Wilhelm: B.Sc (Hons), M.Sc, PhD (UCT, South Africa)
<b><u>Lecturer:</u></b>	Mr. L Kandjengo: B.Sc (UNAM), B.Sc Hons (UCT), M.Sc (UCT)
<b><u>Lecturer:</u></b>	Mr M Tjipute: M.Sc (ASTU), PGC (UNU), PDHE (UNAM)
<b><u>Lecturer:</u></b>	Ms. D N Jacobus: B.Sc (UNAM), M.Sc UNAM & Humboldt University.
<b><u>Senior Technologist:</u></b>	Mr. M Hanghome: Nat.Dipl. - Natural Resource Management (NUST), B. Cert.- Environmental Engineering (CPUT), M.Sc - Environmental Management (UFS)
<b><u>Technologist</u></b>	Ms. VK Kapula: B.Sc (Hons), M.Sc (UNAM)

**DEPARTMENT OF FOOD SCIENCE AND SYSTEMS (NEUDAMM CAMPUS)**

**(+264 61) 206 4003 (+264 61) 206 3013  semvula@unam.na  Private Bag 13301, Windhoek, Namibia**

<b><u>Head of Department:</u></b>	Mr. S Emvula
<b><u>Associate Professor:</u></b>	Prof K K M Nantanga: B Sc (UNAM); B Sc Hons (Rhodes Univ); M Sc (Univ. Pretoria); PhD (Univ Guelph, Canada)
<b><u>Senior Lecturer:</u></b>	Dr M NNN Shikongo-Nambabi: B Sc Hons Biochemistry (Kent Univ); M Sc Applied Immunology (Brunel Univ); PhD Microbiology (Univ. Pretoria)
<b><u>Senior Lecturer:</u></b>	Dr P Hiwilepo-van Hal: B Sc Agric, Food Science & Technology (UNAM); M Sc, PhD Food Science (Wageningen)
<b><u>Lecturer:</u></b>	Mr C Samundengu: B Eng.(UNZA); B Eng. Hons, M Eng.(Univ Pretoria); Postgraduate Dipl Bus Admin (UNAM); M Sc Acc & Finance (UNAM)
<b><u>Lecturer:</u></b>	Dr S C Barrion: B Sc Agric, Food Science & Technology (UNAM); B Sc Hons Food Science (Univ Pretoria); M Sc (Distinction) Food Science & Technology (Univ Pretoria); PhD in Nutritional Sciences (University of Surrey)
<b><u>Lecturer:</u></b>	Ms M J Kandjou: B Sc Agric, Food Science & Technology (UNAM); M Sc Dairy Science & Technology (Univ Zimbabwe)
<b><u>Lecturer:</u></b>	Mr S Emvula: B Sc Agric Food Science & Technology (Unam); M Sc Food Science (Stellenbosch); Postgraduate Diploma in Higher Education (UNAM)
<b><u>Senior Technologist:</u></b>	Ms W V Kanime: National Dipl Agric (Ogongo); B Sc Agric, Food Science & Technology (UNAM); M Sc Food Science (Stellenbosch)
<b><u>Senior Technologist:</u></b>	Ms M H Hamunyela: B Sc Microbiology & Biochemistry (UNAM); MSc Biology (UNAM)

General enquiries regarding the programmes offered by the School of Agriculture and Fisheries Sciences should be directed to:

The Faculty Officer  
School of Agriculture and Fisheries Sciences  
University of Namibia  
Private Bag 13301  
WINDHOEK  
Namibia  
Tel: (061) 206 3890  
Fax: (061) 206 3013 / 206 4027  
E-mail: [bbock@unam.na](mailto:bbock@unam.na)  
Website: [www.unam.na](http://www.unam.na) → (School of Agriculture & Fisheries Sciences)

OR

The Assistant Faculty Officer  
School of Agriculture and Fisheries Sciences  
University of Namibia  
Private Bag 5520  
OSHAKATI  
Namibia  
Tel: (065) 223 5000  
Fax: (061) 223 5294  
E-mail: [onhaludilu@unam.na](mailto:onhaludilu@unam.na)  
Website: [www.unam.na](http://www.unam.na) → (School of Agriculture & Fisheries Sciences)  
Enquiries regarding specific subjects and departments must be addressed to the relevant Head of Department

## REGULATIONS

The regulations of the School of Agriculture and Fisheries Sciences should be read in conjunction with and subject to the General regulations of the University of Namibia contained in the **General Information and Regulations Prospectus**.

### A. QUALIFICATIONS OFFERED BY THE SCHOOL

The School may offer the following diploma and degree programmes:

#### A.1 DIPLOMA PROGRAMMES

(Code)	Diploma	Minimum Duration
(31DLP)	Diploma in Livestock Production	3 years full-time
(17HDAG)	Diploma in Agriculture	3 years full-time

#### A.2 DEGREE PROGRAMMES

(Code)	Degree	Minimum Duration
<b>(New Curriculum)</b>		
(31BFOS)	Bachelor of Science in Fisheries and Ocean Sciences (Level 7)	3 years full-time
(31BSAS)	Bachelor of Science in Animal Science (Hons)	4 years full-time
(31BHAE)	Bachelor of Science in Agricultural Engineering (Hons)	4 years full-time
(31BHFT)	Bachelor of Science in Food Science and Technology (Hons)	4 years full-time
<b>(Old Curriculum)</b>		
(17BSAE)	Bachelor of Science in Agricultural Economics (Hons)	4 years full-time
(17BSAS)	B.Sc in Agriculture (Animal Science) (Hons)	4 years full-time
(17BSCS)	Bachelor of Science in Agriculture (Crop Science)	4 years full-time
(17BSFS)	B.Sc in Agriculture (Food Science) (Hons)	4 years full-time
(17BSFA)	Bachelor of Science in Aquatic Sciences(Hons)	4 years full-time

#### A.3 POSTGRADUATE PROGRAMMES

(Code)	Degree	Minimum Duration
(17MSRR)	Master of Science in Rangeland Resources Management	2 years full-time
(17MSAG)	Master of Science in Agriculture (By Thesis)	2 years full-time
(17MSFA)	Master of Science in Fisheries and Aquatic Science (By Thesis)	2 years full-time
(17DPAG)	Doctor of Philosophy in Agriculture	3 years full-time
(17DPFA)	Doctor of Philosophy in Fisheries and Aquatic Science	3 years full-time

#### A.4 GENERAL ADMISSION CRITERIA FOR UNDERGRADUATE PROGRAMMES:

##### A.4.1 DIPLOMA PROGRAMMES

A.2.1.1 To be admitted into the **Diploma in Livestock Production (level 6)**, a candidate should have obtained the following grades at NSSCAS/NSSCO level, or equivalents from a recognized qualification:

Subject to School Specific Regulations, the normal basic requirement for entrance to the **Diploma in Livestock Production programme** shall be:

A pass in five different subjects as below with the combination of the following subjects including English: Agriculture, Biology, Mathematics, Chemistry, Physics or Physical Science

2 subjects on NSSCAS level and obtained a "e" or higher,

- 3 subjects on NSSCO level with a D or higher,
- English must be at minimum D grade on NSSCO level

A.2.1.2 Admission criteria based on school leaving certificate prior to 2021.

Subject to school special regulation, the normal basic requirement for entrance to Diploma in Livestock Production shall be:

A pass in five different subjects as follows:

(i) On ordinary level (NSSCO) with a minimum of 24 points on the UNAM Evaluation Scale, with English at a minimum D at NSSCO level.

OR

(ii) With a combination of ordinary (NSSCO) and higher (NSSCH) level with a minimum of 24 points on the UNAM Evaluation Scale with English at a minimum D at NSSCO level.

In both (i) and (ii) English must be a minimum of a D symbol at NSSCO level with the following subject combination: Mathematic, Agriculture/Biology, Physics/Chemistry/Physical Science and any other subjects.

A.2.1.3 To be admitted into the **Diploma in Sustainable Crop Production and Technologies (Level 6) programme**, a candidate should have obtained the following grades at NSSCAS/NSSCO level or equivalents from a recognized qualification:

Subject to School-Specific Regulations, the normal basic requirement for entrance to the **Diploma in Sustainable Crop Production and Technologies** programme shall be:

A pass in five different subjects as follows:

- 2 subjects on NSSCAS level and obtained an “e” or higher, including Agriculture/Biology and one of Mathematics, Physics/Chemistry,
- 3 subjects on NSSCO level with a D or higher, and should include Mathematics, and Agriculture/Biology.
- English must be at minimum D grade on the NSSCO level

A.2.1.4 Admission criteria based on school leaving certificate before 2021

Subject to school special regulation, the normal basic requirement for entrance to Diploma in Sustainable Crop Production and Technologies shall be:

A pass in five different subjects as follows:

- On the ordinary level (NSSCO) with a minimum of 24 points on the UNAM Evaluation Scale, with English at a minimum D at the NSSCO level.
- OR
- With a combination of the ordinary (NSSCO) and higher (NSSCH) level with a minimum of 24 points on the UNAM Evaluation Scale with English at a minimum D at the NSSCO level.

In both (a) and (b) English must be a minimum of a D symbol at the NSSCO level and the following subject combination: Mathematic, Agriculture/Biology, Physics/Chemistry/Physical Science and any other subjects.

A.2.1.5 Mature Age Entry Scheme

Candidates may also be admitted into the above Diploma Programmes through the Mature Age provision if they meet the following conditions:

- They should be at least 25 years old on the first day of the academic year in which admission is sought;
- They should have successfully completed junior secondary school education (i.e. grade 10);
- They should have proof of at least five years of relevant work experience;
- They should pass all papers of the prescribed Mature Age Entry tests with a minimum of 50%.

A.2.1.6 Meeting the minimum admission requirements does not necessarily ensure admission. Admission is based on the number of places available and is awarded on the basis of merit after a rigorous selection process. The School reserves the right to interview candidates before admission.

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## **A.4.2 UNDERGRADUATE DEGREE PROGRAMMES**

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A.4.2.1 Subject to School Specific Regulations, the normal basic requirement for entrance into the **Bachelor of Science in Agricultural Economics degree** programme shall be:

- A pass in five different subjects as follows:
  - Two (2) subjects on NSSCAS level with an average “d” or higher including one of Mathematics, Biology, or Agriculture
  - Three (3) subjects on NSSCO level with a “C” or higher in Mathematics, Biology and Agriculture.
  - English must be a minimum “C” at the NSSCO level
  - The five subjects must include English and Mathematics.

Or

(ii) A pass in five different subjects as follows:

- Three (3) subjects on NSSCAS level with an average “d” or higher including Mathematics, Biology, or Agriculture
- Two (2) subjects on NSSCO level with a “D” or higher including Mathematics, Biology and Agriculture
- English must be a minimum “C” at the NSSCO level
- The five subjects must include English and Mathematics.

- Candidates with a three-year Diploma in Agriculture or other related fields at NQF Level 5 from a recognized and accredited institution may be granted admission to the Bachelor of Science in Agricultural Economics degree programme. Such candidates may be exempted from certain modules in the degree programme provided that the equivalent module(s) was/were passed with an average of 60% or higher.
- Candidates with a relevant Diploma at NQF level 6, maybe exempted from certain modules in the degree programme provided that the equivalent module(s) successfully completed.

A.4.2.2 To be admitted into the **Bachelor of Crop Production degree**, a candidate should have obtained the following grades at NSSCAS/NSSCO level or equivalents from a recognized qualification:

Subject to School-Specific Regulations, the normal basic requirement for entrance to the **Bachelor of Crop Production Degree** programme shall be:

- Two (2) subjects on the NSSCAS level and obtained a “d” or higher, including Agriculture/Biology and one of Mathematics, Physics/Chemistry,
- Three (3) subjects on NSSCO level with a C or higher and should include at least one of Mathematics, and Agriculture/Biology.
- English must be at minimum C grade on the NSSCO level

OR

- Three (3) subjects on NSSCAS level with a “d” including Biology and one of Mathematics, Physics/Chemistry.
- Two (2) subjects on NSSCO level with a D or higher and should include at least one of Mathematics, and Agriculture/Biology.
- English must be at minimum C grade on the NSSCO level

- (i) Applicants in possession of a Diploma in Sustainable Crop Production and Technologies or an equivalent qualification at NQF Level 6 are eligible to apply for the Bachelor of Science in Crop Production degree programme. The applicants will be admitted based on a pass at the diploma level and will be exempted from 147 (37%) of the 395 total credits of the Bachelor of Science in Crop Production degree programme.

A.4.2.3 Subject to School Specific Regulations, the normal basic requirement for entrance to the **Bachelor of Science in Fisheries and Ocean Sciences** programmes shall apply.

1. Notwithstanding the above, students may be recruited into the Bachelor of Science in Fisheries and Ocean Sciences via two paths:

i. A pass in five different subjects as follows:

- (a) 2 subjects on NSSCAS level with an average d or higher
- (b) 3 subjects on NSSCO level with a C or higher
- (c) English must be at minimum C at NSSCO level
- (d) Five subjects should include Mathematics, Biology, Physics or Chemistry.

Or

ii. A pass in five different subjects as follows:

- (a) 3 subjects on NSSCAS level with an average d or higher
- (b) 2 subjects on NSSCO level with a D or higher
- (c) English must be at minimum C at NSSCO level
- (d) Five subjects should include Mathematics, Biology, Physics or Chemistry.

2. Admission criteria based on school leaving certificate prior to 2021 shall be:

i. A pass in five different subjects as follows:

- (a) 2 subjects on higher level (NSSCH) with a 4 or higher
- (b) 3 subjects on ordinary level (NSSCO) with a C or higher
- (c) English must be at minimum C at NSSCO level
- (d) Five subjects should include Mathematics, Biology, Physics or Chemistry.

Or

ii. A pass in five different subjects as follows:

- (a) 3 subjects on higher level (NSSCH) with a 4 or higher
- (b) 2 subjects on ordinary level (NSSCO) with a D or higher
- (c) English must be at minimum C at NSSCO level
- (d) Five subjects should include Mathematics, Biology, Physics or Chemistry.

#### Articulation Options

The graduate of this program will articulate into the various NQF level (8) Bachelor of Science qualification honours in related fields (marine science/biology, ocean governance, aquaculture, etc).

A.4.2.4 To be admitted into the **Bachelor of Science in Animal Science Honours**, a candidate should have obtained the following grades at NSSCAS/NSSCO level, or equivalents from a recognized qualification:

Subject to School Specific Regulations, the normal basic requirement for entrance to the **Bachelor of Science in Animal Science Honours** shall be:

(i) A pass in five different subjects as follows:

- (a) 2 subjects on NSSCAS level and obtained a "d" or higher, including Mathematics and at least any one of Biology or Agriculture.
- (b) 3 subjects on NSSCO level with a C or higher, and should include Mathematics and at least any two of Biology, Agriculture or Physical Science (Physics/Chemistry).
- (c) English must be at minimum C grade on NSSCO level

Or

(ii) A pass in five different subjects as follows:

- (a) 3 subjects on NSSCAS level with a "d" or higher, including Mathematics and at least any two of Biology, Agriculture or Physical Science (Chemistry/Physics)
- (b) 2 subjects on ordinary level (NSSCO) with a D or higher, including Mathematics and at least any one of Biology or Agriculture.
- (c) English must be at minimum C grade on NSSCO level

2. For applicants with school leaving certificates obtained prior to 2021, the requirements of the UNAM admission, students' recruitment and registration policy will apply: Subject to School Special Regulations, the normal basic requirement for entrance to the Bachelor of Science in Animal Science Honours shall be:

(iii) A pass in five different subjects as follows:

- (a) 2 subjects on higher level (NSSCH) with a 4 or higher including Mathematics and Biology
- (b) 3 subjects on ordinary level (NSSCO) with a C or higher in Mathematics and Biology, and at least a "D" symbol in either Physical Science, Chemistry or Physics
- (c) English must be at minimum C at NSSCO level

Or

(iv) A pass in five different subjects as follows:

- (a) 3 subjects on higher level (NSSCH) with a 4 or higher including Mathematics and Biology
- (b) 2 subjects on ordinary level (NSSCO) with a D or higher symbol in either Physical Science, Biology, Chemistry or Physics.
- (c) English must be at minimum C at NSSCO level.

A.4.2.5 To be admitted into the **Bachelor of Science in Agricultural Engineering Honours**. A candidate should have obtained the following grades at NSSCAS/NSSCO level or equivalence from a recognized qualification.

Subject to school specific regulation, the normal basic requirement for entrance to the **Bachelor of Science in Agricultural Engineering Honours** program shall be:

- (a) 3 subjects (Mathematics, Physics and Chemistry) on NSSCAS level with an average grade of "c" in each subject or higher
- (b) 2 subjects on NSSCO level with "C" average or higher, and
- (c) English must be at minimum "C" at NSSCO level.

2 For applicants with school leaving certificates obtained prior to 2021, the requirements of the UNAM admission, students recruitments and registration policy will apply:

Subject to school specific regulation, the normal basic requirement for entrance to the Bachelor of Science in Agricultural Engineering Honours program shall be a pass in 5 different subjects as follows:

- (a) 2 subjects (Mathematics, Physical Science) on NSSCAS level with an average grade of "2" in each subject or higher
- (b) 3 subjects on NSSCO level with "C" average or higher, and
- (c) English must be at minimum "C" at NSSCO level.

3. Alternative Pathways to Admission

3.1 Successful Completion of Pre-Engineering Program

Students who do not meet the minimum admission entry requirements into the Bachelor of Science in Mechanical Engineering can opt to enroll into the Pre-Engineering Program offered at the University of Namibia. A student from the Pre-Engineering program will be admitted in to the Bachelor of Science in Electrical Engineering if they meet the following requirements:

- (a) A minimum average of 60% in all Chemistry support modules
- (b) A minimum average of 60% in all Physics Support modules
- (c) A minimum average of 60% in all Mathematics support modules

A.4.2.6 To be admitted into the **Bachelor of Science in Food Science and Technology Honours**, a candidate should have obtained the following grades at National Senior Secondary Certificate Advanced Subsidiary Level (NSSCAS)/ National Senior Secondary Certificate Ordinary (NSSCO) level, or equivalents from a recognized qualification:

Subject to School Specific Regulations, the normal basic requirement for entrance to the **Bachelor of Science in Food Science and Technology Honours** programmes shall be:

- (i) A pass in five different subjects as follows:
  - (a) 2 subjects on NSSCAS level and obtained a "d" or higher, including Biology and one of Mathematics, Physics/Chemistry
  - (b) 3 subjects on NSSCO level with a C or higher, and should include at least one of Mathematics, and Physics/Chemistry.
  - (c) English must be at minimum C grade on NSSCO level

Or

- (ii) A pass in five different subjects as follows:
  - (a) 3 subjects on NSSCAS level with a "d" including Biology and one of Mathematics, Physics/Chemistry.
  - (b) 2 subjects on NSSCO level with a D or higher, and should include at least one of Mathematics, and Physics/Chemistry.
  - (c) English must be at minimum C grade on NSSCO level

(2) For applicants with school leaving certificates obtained prior to 2021, the requirements of the UNAM admission, students recruitment and registration policy will apply: Subject to School Special Regulations, the normal basic requirement for entrance to bachelor of Science in Food Science and Technology Honours programme shall be:

- (iii) A pass in five different subjects as follows:
  - (a) 2 subjects on higher level (NSSCH) with a 4 or higher including Mathematics and Biology
  - (b) 3 subjects on ordinary level (NSSCO) with a C or higher in Mathematics and Biology, and at least a "D" symbol in either Physical Science, Chemistry or Physics
  - (c) English must be at minimum C at NSSCO level

Or

- (iv) A pass in five different subjects as follows:
  - (a) 3 subjects on higher level (NSSCH) with a 4 or higher including Mathematics and Biology
  - (b) 2 subjects on ordinary level (NSSCO) with a D or higher symbol in either Physical Science, Biology, Chemistry or Physics.
  - (c) English must be at minimum C at NSSCO level.

(iv) Extended enrolment:

- (a) Candidates that qualify for admission to the University but lack the appropriate subjects on NSSCAS (or grades), as outlined above, for admission to the programme can opt to rather enrol for the Extended mode of this programme that will take one year longer.
- (b) Candidates in possession of a valid Namibian Senior Secondary Certificate (NSSC) issued prior to 2021 (only) and has a pass in 5 different subjects, as outlined below, can enrol in the Extended mode of this programme:

A.4.2.7 Mature Age Entry Scheme

Applicants aspiring for admission to the Degree programmes through the Mature Age Entry Scheme must satisfy the following conditions:

Applicants aspiring for admission to the degree programme through the Mature Age Entry Scheme must satisfy the following conditions:

- (1) They should be at least 25 years old on the first day of the academic year in which admission is sought;
- (2) Applicants should have completed at least junior secondary education for admission into the degree programme
- (3) They should normally have proof of at least five years of relevant work experience.

The Mature Age Entry Examination will consist of three / four papers:

- a) Paper 1: An English Proficiency Paper;
- b) Paper 2: A General Knowledge Paper;

- c) Paper 3: A Numerical Ability Paper;
- d) Paper 4: A Faculty-Specific Paper (where applicable).

Subject to Programme Specific Regulations Mature Age Entry applicants seeking admission into the degree programme shall score an average of at least 50% with no paper less than 50%. Applicants who meet the Mature Age Entry qualifying requirements and passed the Mature Age Entry examination may be called for an additional interview before the final selection is made.

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#### **A.5 MATURE AGE ENTRY SCHEME FOR UNDERGRADUATE DEGREE AND DIPLOMA PROGRAMMES**

- A.5.1 Admission can also be considered for persons who qualify through the Mature Age Entry Scheme upon successful completion of the relevant examinations as set out in the General Information & Regulations Prospectus.
- A.5.2 Candidates who, in the opinion of the examiners, merit further consideration, may be called for an oral interview before the final selection is made.

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#### **A.6 CONDUCT OF THE PROGRAMMES**

- A.6.1 First year **BSc** in Agricultural Economics, **BSc** in Animal Science, **BSc** in Fisheries and Ocean Sciences, **BSc** in Crop Production students admitted into the School will start their first to fourth year at Neudamm or Ogongo or Sam Nuuyoma Campus. **BSc** in Food Science and Technology Honours students admitted into the School will spend the first year at the University's Main Campus. The students will continue with their professional training in the second year at Neudamm. **BSc** in Agricultural Engineering students admitted into the School will spend the first and second year at José Eduardo dos Santos Campus. The students will continue with their professional training in the third year at Ogongo Campus.
- A.6.2 A student may, with the approval of the Dean and after consultation with the Head of the Department, change his/her study option for which he/she is registered. As specified in the General Regulations, a student may not change qualifications or study options later than the dates specified.
- A.6.3 A student may, with the approval of the School and Department, take modules from other Schools provided that doing so will not affect his or her programme of study.
- A.6.4 The following undergraduate Diploma programmes may be offered:
  - Diploma in Sustainable Crop Production and Technologies
  - Diploma in Livestock Production (Ogongo Campus);
- A.6.5 The following undergraduate degree programmes may be offered:
  - Bachelor of Science in Agricultural Economics (Level 7)
  - Bachelor of Science in Crop Production (Level 7)
  - Bachelor of Science in Fisheries and Ocean Sciences (Level 7)
  - Bachelor of Science in Animal Science (Hons)
  - Bachelor of Science in Agricultural Engineering (Hons)
  - Bachelor of Science in Food Science and Technology (Hons)
- A.6.6 The following M Sc and Phd degree programme may be offered:
  - Master of Science in Rangeland Resources Management (course work);
  - Master of Science in Agriculture (by Thesis);
  - Master of Science in Fisheries and Aquatic Science (By Thesis)
  - Doctor of Philosophy in Agriculture
  - Doctor of Philosophy in Fisheries and Aquatic Science
  - Doctor of Philosophy in Agriculture

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#### **A.7 DURATION OF STUDY (UNDERGRADUATE PROGRAMMES)**

- A.7.1 Subject to the provisions of School Special Regulations the minimum duration of full-time study for a Bachelor's degree (Hons) shall normally be four years, and that of the Bachelor's degree (Level 7) /Diploma normally three years.
- A.7.2 The maximum period of full-time study for a Bachelor's degree or a Diploma, is the minimum full-time period of study for that Degree or Diploma plus two years.

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#### **A.8 FIELD ATTACHMENT REGULATIONS**

- A.8.1 Diploma students will be required to go for their Field Attachment after successful completion of their second year of study. Degree students will be required to go for their first Field Attachment after successful completion of their second year, whereas they will go for their second Field Attachment after successful completion of their third year.
- A.8.2 Attached students should be punctual at all times, must keep and leave accommodation provided to them clean, and report any breakages and damages caused to properties to their site supervisors, as well as maintain a positive attitude towards others and their work.
- A.8.3 Students are required to stay on duty till the last day of the attachment period. Failure to do so may result in the repetition of the attachment at student's own cost. Absence from the site of duty may only be authorized by the site management in writing. Weekends should be considered part of the attachment period, therefore students on attachment may be required to report for duty during weekends should the need arise.
- A.8.4 Field Attachment will be assessed based on i) written attachment report and ii) an oral presentation.

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**A.9 ASSESSMENT:**

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- A.9.1 General Examination Regulations as set out in the General Information & Regulations Prospectus shall apply.  
A.9.2 Unless otherwise stipulated in these regulations, module assessment for the diploma and undergraduate degree programmes will be as follows:

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**A.9.1 DIPLOMA PROGRAMMES**

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Continuous assessment mark will constitute a weighting of 60% of the final mark while examination will constitute a weighting of 40% of the final mark for modules consisting of lectures and practicals.

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**A.9.2 UNDERGRADUATE DEGREE PROGRAMMES**

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Continuous assessment mark will constitute a weighting of 40% of the final mark while examination will constitute a weighting of 60% of the final mark for modules consisting of the lectures and practicals  
Continuous Assessment will include at least 2 written tests and 1 assignment, including practical reports.

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**A.10 MINIMUM REQUIREMENTS FOR RE-ADMISSION INTO THE SCHOOL**

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To be re-admitted into the School, a student must have passed the minimum number of credits as indicated below  
By programmes:

**DIPLOMA IN LIVESTOCK PRODUCTION**

To be re-admitted into the **Diploma in Livestock Production**, a student must have successfully completed the following minimum number of credits as indicated below:

- (a) 38 credits (of which 24 must be non-core) by the end of the first year of registration.
- (b) 128 credits by the end of the second year of registration.
- (c) 217 credits by the end of the third year of registration.
- (d) 321 credits by the end of the fourth year of registration
- (e) The Diploma in Livestock Production must be completed after a maximum of 5 years of registration unless a student applies and got approval for deferment by the University.

**DIPLOMA IN AGRICULTURE**

- (a) 48 credits by the end of the 1st Year; of which 16 is non-Unam core;
- (b) 128 credits by the end of the 2nd Year;
- (c) 216 credits by the end of 3rd Year;
- (d) 280 credits by the end of the 4th Year.

**BACHELOR OF SCIENCE IN AGRICULTURAL ECONOMICS (Level 7)**

To be re-admitted into the programme, a student must have passed the minimum number of credits as indicated below:

- (a) 40 credits (of which 24 must be non-core) by the end of the First Year of registration
- (b) 126 credits by the end of the Second Year of registration
- (c) 216 credits by the end of the Third Year of registration
- (d) 327 by the end of the Fourth Year of registration.

The programme must be completed after a maximum of 5 years of registration

**BACHELOR OF SCIENCE IN CROP PRODUCTION (LEVEL 7)**

To be re-admitted into the Bachelor of Science in Crop Production programme, a student must have passed at least:

- (a) 40 credits (of which 24 must be non-core) by the end of the first year of registration
- (b) 137 credits by the end of the second year of registration
- (c) 236 credits by the end of the third year of registration
- (d) 354 credits by the end of the fourth year of registration

The programme must be completed after a maximum of 5 years of registration

**BACHELOR OF SCIENCE IN FISHERIES AND OCEAN SCIENCES (Level 7)**

To be re-admitted into the programme, a student must have passed the minimum number of credits as indicated below:

- (a) 39 credits (of which 24 must be non-core) by the end of the First Year of registration
- (b) 133 credits by the end of the Second Year of registration
- (c) 230 credits by the end of the Third Year of registration
- (d) 343 by the end of the Fourth Year of registration.

The programme must be completed after a maximum of 5 years of registration

**BACHELOR OF SCIENCE IN ANIMAL SCIENCE HONOURS**

To be re-admitted into the Bachelor of Science in Animal Science Honours, a student must have successfully completed the following minimum number of credits as indicated below:

- (a) 40 credits (of which 24 must be non-core) by the end of the first year of registration.
- (b) 133 credits by the end of the second year of registration.
- (c) 230 credits by the end of the third year of registration.
- (d) 340 credits by the end of the fourth year of registration.
- (e) 437 credits by the end of the fifth year of registration.

The programme must be completed after a maximum of 6 years after registration.

**BACHELOR OF SCIENCE IN AGRICULTURAL ENGINEERING HONOURS**

To be re-admitted into the Bachelor of Science in Agricultural Engineering Honours, a student must have successfully completed the following minimum number of credits as indicated below:

- (a) 48 credits (of which 24 must be non-core) by the end of the first year of registration.
  - (b) 161 credits by the end of the second year of registration.
  - (c) 284 credits by the end of the third year of registration.
  - (d) 415 credits by the end of the fourth year of registration.
  - (e) 564 credits by the end of the fifth year of registration.
  - (f) 588 credits by the end of the sixth year of registration.
- The programme must be completed after a maximum of 6 years after registration.

#### **BACHELOR OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY HONOURS**

##### **Normal enrollment**

To be re-admitted into the Bachelor of Science in Food Science and Technology Honours, a student must have successfully completed the following minimum number of credits as indicated below:

- (a) 40 credits (of which 24 must be non-core) by the end of the first year of registration.
  - (b) 130 credits by the end of the second year of registration.
  - (c) 228 credits by the end of the third year of registration.
  - (d) 341 credits by the end of the fourth year of registration.
  - (e) 433 credits by the end of the fifth year of registration.
- The programme must be completed after a maximum of 6 years of registration

##### **Extended enrollment**

The following re-admission regulations will apply to students enrolled for the extended programme:

To be re-admitted, the student must have successfully completed the following minimum number of credits as indicated below:

- (a) 32 credits (of which 26 must be non-core) by the end of the first year of registration
  - (b) 106 credits by the end of the second year of registration
  - (c) 190 credits by the end of the third year of registration
  - (d) 287 credits by the end of the fourth year of registration
  - (e) 350 credits by the end of the fifth year of registration
  - (f) 397 credits by the end of the sixth year of registration.
- The programme must be completed after a maximum of 7 years of registration

#### **BACHELOR OF SCIENCE IN AGRICULTURE (AGRICULTURAL ECONOMICS) HONOURS**

To be re-admitted into **BSc (AE) programme**, a student must have passed at least:

- (a) 56 credits by the end of the 1st Year, of which 16 is non-Unam core;
- (b) 144 credits by the end of the 2nd Year;
- (c) 248 credits by the end of the 3rd Year;
- (d) 336 credits by the end of the 4th Year;
- (e) 400 credits by the end of the 5th Year

#### **BACHELOR OF SCIENCE IN AGRICULTURE (ANIMAL SCIENCE) HONOURS**

To be re-admitted into the **BSc (AS) programme**, a student must have passed at least:

- (a) 48 credits by the end of the 1st Year, of which 16 is non-Unam core;
- (b) 144 credits by the end of the 2nd Year;
- (c) 248 credits by the end of the 3rd Year;
- (d) 352 credits by the end of the 4th Year;
- (e) 416 credits by the end of the 5th Year.

#### **BACHELOR OF SCIENCE IN AGRICULTURE (CROP SCIENCE) HONOURS**

To be re-admitted into the **BSc (CS) programme**, a student must have passed at least:

- (a) 56 credits by the end of the 1st Year, of which 16 is non-Unam core;
- (b) 152 credits by the end of the 2nd Year;
- (c) 256 credits by the end of the 3rd Year;
- (d) 344 credits by the end of the 4th Year;
- (e) 400 credits by the end of the 5th Year.

#### **BACHELOR OF SCIENCE IN AGRICULTURE (FOOD SCIENCE & TECHNOLOGY) HONOURS**

To be re-admitted into the **BSc (FST) programme**, a student must have passed at least:

- (a) 56 credits by the end of the 1st Year, of which 16 is non-Unam core;
- (b) 152 credits by the end of the 2nd Year;
- (c) 248 credits by the end of the 3rd Year;
- (d) 336 credits by the end of the 4th Year;
- (e) 400 credits by the end of the 5th Year.

#### **BACHELOR OF SCIENCE IN FISHERIES & AQUATIC SCIENCES (HONOURS)**

To be re-admitted into the **BSc (FAS) programme**, a student must have passed at least:

- (a) 48 credits by the end of the 1st Year, of which 16 is non-Unam core;
- (b) 152 credits by the end of the 2nd Year;
- (c) 256 credits by the end of the 3rd Year;
- (d) 352 credits by the end of the 4th Year;

- (e) 416 credits by the end of the 5th Year.

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## **A.11 ACADEMIC ADVANCEMENT REGULATIONS**

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A student advances to the following academic year of study have to fulfill the following criteria as stated by programs below. In all cases, pre-requisites for modules have to be passed before a student can proceed to register for modules that require prerequisites.

### **DIPLOMA IN LIVESTOCK PRODUCTION**

#### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed At least 90 credits by the end of the First Year (2/3 of total first-year credits).
- (b) A student who has obtained at least 56 credits, but less than 89 credits will be allowed to register for a maximum of 61 credits in the second year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) To proceed to third year a student must have passed At least 213 credits by the end of the Second Year (all first-year modules plus 85 credits of the Second Year).
- (b) A student who has obtained at least 54 credits but less than 84 credits of Year 2, will be allowed to register for a maximum of 58 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

### **DIPLOMA IN SUSTAINABLE CROP PRODUCTION AND TECHNOLOGIES**

#### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed At least 91 credits by the end of the First Year (2/3 of total first-year credits). A student who has obtained at least 60 credits, but less than 90 credits will be allowed to register for a maximum of 52 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) To proceed to second year, a student must have passed At least 217 credits by the end of the Second Year (all first-year modules plus 81 (2/3) credits of the second year).
- (b) A student who has obtained at least 60 credits but less than 80 credits of year 2, will be allowed to register for a maximum of 60 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

### **BACHELOR OF SCIENCE IN AGRICULTURAL ECONOMICS (Level 7)**

#### **First Year to Second Year**

A student advances to the subsequent academic year of study when the following conditions have been met:

- (a) At least 84 credits by the end of the First Year (2/3 of total first-year credits).
- (b) A student who has obtained at least 60 credits, but less than 83 credits will be allowed to register for a maximum of 52 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) At least 214 credits by the end of the Second Year (all first-year modules plus 88 (2/3) credits of the second year).
- (b) A student who has obtained at least 60 credits but less than 87 credits of year 2, will be allowed to register for a maximum of 60 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

### **BACHELOR OF SCIENCE IN CROP PRODUCTION (LEVEL 7)**

A student advances to the subsequent academic year of study when the following conditions have been met:

#### **First Year to Second Year**

- (a) At least 88 credits by the end of the First Year (2/3 of total first-year credits).
- (b) A student who has obtained at least 60 credits, but less than 87 credits will be allowed to register for a maximum of 52 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) At least 224 credits by the end of the Second Year (all first-year modules plus 91 (2/3) credits of the second year).
- (b) A student who has obtained at least 60 credits but less than 90 credits of year 2, will be allowed to register for a maximum of 60 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

### **BACHELOR OF SCIENCE IN FISHERIES AND OCEAN SCIENCES (Level 7)**

A student advances to the subsequent academic year of study when the following conditions have been met:

#### **First Year to Second Year**

- (a) At least 83 credits by the end of the First Year (2/3 of total first-year credits).
- (b) A student who has obtained at least 59 credits, but less than 82 credits will be allowed to register for a maximum of 55 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) At least 222 credits by the end of the Second Year (all first-year modules plus 92 credits of the second year).
- (b) A student who has obtained at least 62 credits but less than 91 credits of year 2, will be allowed to register for a maximum of 60 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

### **BACHELOR OF SCIENCE IN ANIMAL SCIENCE HONOURS**

A student advances to the subsequent academic year of study when the following conditions have been met:

#### **First Year to Second Year**

- (a) At least 89 credits by the end of the First Year (2/3 of total first-year credits).
- (b) A student who has obtained at least 54 credits, but less than 88 credits will be allowed to register for a maximum of 61 credits in the second year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) At least 219 credits by the end of the Second Year (all first-year modules plus 86 credits of the second year).
- (b) A student who has obtained at least 55 credits but less than 85 credits of year 2, will be allowed to register for a maximum of 58 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

#### **Third Year to Fourth Year**

- (a) At least 354 credits by the end of the Third Year (all first and second year-modules plus, plus 92 credits of the third year).
- (b) A student who has obtained at least 57 credits but less than 91 credits of year 3, will be allowed to register for a maximum of 59 credits in the fourth year in addition to the failed modules of the third year provided that the relevant pre-requisites have been passed.

### **BACHELOR OF SCIENCE IN AGRICULTURAL ENGINEERING HONOURS**

A student advances to the subsequent academic year of study when the following conditions have been met:

#### **First Year to Second Year**

At least 121 credits by the end of the First Year of which 78 must be none-core.

#### **Second Year to Third Year**

At least 283 credits by the end of the Second Year

#### **Third Year to Fourth Year**

All first-year credits and at least 445 total credits

### **BACHELOR OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY HONOURS**

#### **Extended Enrolment**

A student advances to the subsequent academic year of study when the following conditions have been met:

#### **First Year to Second Year:**

- (a) At least 86 credits by the end of the First Year (2/3 of total first-year credits).
- (b) A student who has obtained at least 54 credits, but less than 85 credits will be allowed to register for a maximum of 61 credits in the second year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year:**

- (a) At least 223 credits by the end of the Second Year (all first-year modules plus 93 credits of the second year).
- (b) A student who has obtained at least 55 credits but less than 92 credits of year 2, will be allowed to register for a maximum of 58 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

#### **Third Year to Fourth Year:**

- (a) At least 343 credits by the end of the Third Year (all first and second year-modules plus, plus 83 credits of the third year).
- (b) A student who has obtained at least 57 credits but less than 82 credits of year 3, will be allowed to register for a maximum of 59 credits in the fourth year in addition to the failed modules of the third year provided that the relevant pre-requisites have been passed.

#### **Normal Enrolment:**

A student advances to the subsequent academic year of study when the following conditions have been met:

#### **First Year to Second Year:**

At least 71 credits by the end of the First Year (2/3 of total first-year credits).

#### **Second Year to Third Year:**

At least 186 credits by the end of the Second Year (all first-year modules plus 80 credits of the second year).

#### **Third Year to Fourth Year:**

At least 289 credits by the end of the Third Year (all first and second year-modules plus, plus 71 credits of the third year).

#### **Fourth Year to Fifth Year:**

At least 383 credits by the end of the Third Year (all first, second and fourth year-modules plus, plus 58 credits of the fourth year).

### **DIPLOMA IN AGRICULTURE**

#### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed at least 88 credits prescribed in first year (67% of the total 132 credits in first year).
- (b) A student who has obtained at least 48 but less than 56 credits by the end of first year, shall not progress to the second year, but re-register for all outstanding modules in the first year. Such student will not register for any modules in the second year.

- (c) A student who has obtained at least 56 credits but less than 88 credits by the end of first year shall repeat the first year, but will be allowed to register for a maximum of 48 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) To proceed to third year, a student must have passed all 132 credits prescribed in the first year, and at least 83 credits of second year (67% of the total 124 credits in second year) to be able to register for Third Year.
- (b) A student who has not cleared all first year modules by the end of the second year will not be allowed to register for any third year modules.
- (c) A student who has passed all first year modules and obtained at least 48 but less than 80 credits in the second year shall repeat the second year, but will be allowed to register for a maximum of 48 credits in the third year in addition to the failed modules provided that the relevant pre-requisites have been passed.

### **BACHELOR OF SCIENCE IN AGRICULTURE (AGRICULTURAL ECONOMICS) HONOURS**

#### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed at least 96 credits prescribed in the first year (67% of the total 136 credits in first year).
- (b) A student who has obtained a minimum of 48 but less than 56 credits by the end of the first year shall not progress to second year, but re-register for all outstanding first year modules. Such student will not be allowed to register for any modules in the second year.
- (c) A student who has obtained at least 56 credits but less than 96 credits by the end of first year shall repeat the year, but will be allowed to register for a maximum of 48 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) To proceed to third year, a student must have passed at least 50% of the remaining first year credits and at least 96 credits in the second year (75% of the total 128 credits in second year).
- (b) A student who has obtained at least 48 but less than 56 second year credits shall repeat the second year and re-register for all outstanding modules. Such student will not be allowed register for any modules in the third year.
- (c) A student who has obtained at least 56 but less than 96 second year credits shall repeat the second year, but will be allowed to register for a maximum of 48 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

#### **Third Year to Forth Year**

- (a) To proceed to fourth year, a student must pass all first year modules, and at least 50% of the remaining second year credits. In addition, the student must have passed at least 104 third year credits (75% of the total 140 credits in third year).

#### **Third Year to Forth Year**

Proceed to fourth year, a student must have passed all first year modules, and at least 50% of the remaining second year credits. In addition, the student must have passed at least 104 third year credits (75% of the total 138 credits in third year).

### **BACHELOR OF SCIENCE IN AGRICULTURE (ANIMAL SCIENCE) HONOURS**

#### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed at least 96 credits prescribed in the first year (67% of the total 136 credits in first year).
- (b) A student who has obtained a minimum of 48 but less than 56 credits by the end of the first year shall not progress to second year, but re-register for all outstanding first year modules. Such student will not be allowed to register for any modules in the second year.
- (c) A student who has obtained at least 56 credits but less than 96 credits by the end of first year shall repeat the year, but will be allowed to register for a maximum of 48 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) To proceed to third year, a student must have passed at least 50% of the remaining first year credits and at least 96 credits in the second year (75% of the total 128 credits in second year).
- (b) A student who has obtained at least 48 but less than 56 second year credits shall repeat the second year and re-register for all outstanding modules. Such student will not be allowed register for any modules in the third year.
- (c) A student who has obtained at least 56 but less than 96 second year credits shall repeat the second year, but will be allowed to register for a maximum of 48 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

#### **Third Year to Forth Year**

To proceed to fourth year, a student must pass all first year modules, and at least 50% of the remaining second year credits. In addition, the student must have passed at least 104 third year credits (75% of the total 140 credits in third year).

### **BACHELOR OF SCIENCE IN AGRICULTURE (CROP SCIENCE) HONOURS**

### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed at least 104 credits prescribed in the first year (67% of the total 152 credits in first year).
- (b) A student who has obtained at least 56 but less than 64 credits by the end of the first year shall not progress to second year, but re-register for all outstanding modules. Such student will not be allowed to register for any modules in the second year.
- (c) A student who has obtained at least 64 but less than 104 credits by the end of the first year shall repeat the year, but will be allowed to register for a maximum of 48 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

### **Second Year to Third Year**

- (a) To proceed to third year, a student must have passed at least 50% of the remaining first year credits, and at least 104 credits in second year (75% of the total 132 credits in second year).
- (b) A student who has obtained at least 48 but less than 56 second year credits shall repeat the year and re-register for all outstanding modules. Such student will not be allowed to register for any modules in the third year.
- (c) A student who has obtained at least 56 but less than 104 second year credits shall repeat the year, but will be allowed to register for a maximum of 48 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

### **Third Year to Fourth Year**

To proceed to fourth year, a student must pass all first year modules and at least 50% of the remaining second year credits. In addition, the student must have passed at least 104 third year credits (75% of the total 136 credits in third year).

## **BACHELOR OF SCIENCE IN AGRICULTURE (FOOD SCIENCE & TECHNOLOGY) HONOURS**

### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed at least 104 credits prescribed in the first year (67% of the total 152 credits in first year).
- (b) A student who has obtained a minimum of 56 but less than 64 credits by the end of the first year shall not progress to second year, but re-register for all outstanding modules in the first year. Such student will not be allowed to register for any modules in the second year.
- (c) A student who has obtained at least 64 but less than 104 credits by the end of the first year shall repeat, but will be allowed to register for a maximum of 48 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

### **Second Year to Third Year**

- (a) To proceed to third year, a student must have passed at least 50% of the remaining first year credits and at least 104 credits in second year (75% of the total 136 credits in second year).
- (b) A student who has obtained at least 48 but less than 56 second year credits shall repeat the year and re-register for the outstanding modules. Such student will not be allowed to register for any modules in the third year.
- (c) A student who has obtained at least 56 credits but less than 104 second year shall repeat the year, but will be allowed to register for a maximum of 48 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

### **Third Year to Fourth Year**

To proceed to fourth year, a student must pass all first modules and at least 50% of the remaining second year credits. In addition, the student must have passed at least 96 third year credits (75% of the total 122 credits in third year).

### **Minimum requirements for re-admission into the Bachelor of Science in Food Science and Technology Honours**

#### **Normal enrollment**

To be re-admitted into the Bachelor of Science in Food Science and Technology Honours, a student must have successfully completed the following minimum number of credits as indicated below:

- 40 credits (of which 24 must be non-core) by the end of the first year of registration.
- 130 credits by the end of the second year of registration.
- 228 credits by the end of the third year of registration.
- 341 credits by the end of the fourth year of registration.
- 433 credits by the end of the fifth year of registration.

The programme must be completed after a maximum of 6 years of registration

#### **Extended enrollment**

The following re-admission regulations will apply to students enrolled for the extended programme:

To be re-admitted, the student must have successfully completed the following minimum number of credits as indicated below:

- 32 credits (of which 26 must be non-core) by the end of the first year of registration
- 106 credits by the end of the second year of registration

190 credits by the end of the third year of registration  
287 credits by the end of the fourth year of registration  
350 credits by the end of the fifth year of registration  
397 credits by the end of the sixth year of registration.

The programme must be completed after a maximum of 7 years of registration

### **32 Advancement and progression rules.**

#### **Normal Enrolment**

A student advances to the subsequent academic year of study when the following conditions have been met:

#### **From Year 1 to 2:**

At least 86 credits by the end of the First Year (2/3 of total first-year credits).

A student who has obtained at least 54 credits, but less than 85 credits will be allowed to register for a maximum of 61 credits in the second year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **From Year 2 to 3:**

At least 223 credits by the end of the Second Year (all first-year modules plus 93 credits of the second year).

A student who has obtained at least 55 credits but less than 92 credits of year 2, will be allowed to register for a maximum of 58 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

#### **From Year 3 to 4:**

At least 343 credits by the end of the Third Year (all first and second year-modules plus, plus 83 credits of the third year).

A student who has obtained at least 57 credits but less than 82 credits of year 3, will be allowed to register for a maximum of 59 credits in the fourth year in addition to the failed modules of the third year provided that the relevant pre-requisites have been passed.

#### **Normal Enrolment**

A student advances to the subsequent academic year of study when the following conditions have been met:

**From Year 1 to 2:** At least 71 credits by the end of the First Year (2/3 of total first-year credits).

**From Year 2 to 3:** At least 186 credits by the end of the Second Year (all first-year modules plus 80 credits of the second year).

**From Year 3 to 4:** At least 289 credits by the end of the Third Year (all first and second year-modules plus, plus 71 credits of the third year).

**From Year 4 to 5:** At least 383 credits by the end of the Third Year (all first, second and fourth year-modules plus, plus 58 credits of the fourth year).

### **BACHELOR OF SCIENCE IN FISHERIES & AQUATIC SCIENCES (HONOURS)**

#### **First Year to Second Year**

- (a) To proceed to second year, a student must have passed at least 96 credits prescribed in the first year (67% of the total 136 credits first year).
- (b) A student who has obtained at least 48 but less than 56 credits by the end of the first year shall not progress second year, but re-register for all outstanding modules in the first year. Such student will not be allowed to register for any modules in the second year.
- (c) A student who has obtained at least 56 but less than 96 credits by the end of the first year shall repeat the year, but will be allowed to register for a maximum of 48 credits in the 2nd year in addition to the failed modules provided that the relevant pre-requisites have been passed.

#### **Second Year to Third Year**

- (a) To proceed to third year, a student must have passed at least 50% of the remaining first year credits, and at least 112 credits in second year (75% of the total 144 credits in second year).
- (b) A student who has obtained at least 48 but less than 56 second year credits by the end of the second shall repeat the year and re-register for all outstanding modules. Such student will not be allowed to register for any modules in the third year.
- (c) A student who has obtained at least 56 but less than 112 second credits by the end of second year shall repeat the year, and will be allowed to register for a maximum of 48 credits in the third year in addition to the failed modules of the second year provided that the relevant pre-requisites have been passed.

#### **Third Year to Fourth Year**

To proceed to fourth year, a student must pass all first year modules and at least 50% of the remaining second year credits. In addition, the student must have passed at least 104 credits in third year (75% of the total 132 credits in third year).

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### **A.12 AWARDING OF DIPLOMAS AND DEGREES**

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To be awarded a diploma or degree a student shall be required to:

- (i) Pass all modules taken in the programme;
- (ii) Have completed and passed all field practical training courses.

The diploma or degree Certificate shall be classified in accordance with the provisions of the Academic General Regulations of the University of Namibia.

## B. DIPLOMA IN LIVESTOCK PRODUCTION (Ogongo Campus) (31DLP)

### B.1 PROGRAMME SCHEDULE

Total credits YEAR 1						
Module code	Module name	NQF Level	Credits	Contact hours per week (L / P / T)	(Co-requisites) / Pre-requisites	Compulsory (C) / Elective (E)
<b>Year 1 Core semester</b>						
U3403FS	Skills Portfolio	5	0		None	C
U2583LA	Academic literacy 1A	5	8	L (2 h/week)	None	C
U3583AL	Digital Literacy	5	8	L (2 h/week)	None	C
F3500ZI	Issues in Agriculture	5	4	L (2 h/week)	None	C
F2440BD	Basic Programming with Python	5	4	P (40 h/semester)	None	C
<b>Total Credits Core semester</b>						<b>24</b>

Total credits YEAR 1						
Module code	Module name	NQF Level	Credits	Contact hours per week (L / P / T)		Compulsory (C) / Elective (E)
<b>Year 1 Core semester</b>						
U3403FS	Skills Portfolio	5	0		None	C
U2583LA	Academic literacy 1A	5	8	L (2 h/week)	None	C
U3583AL	Digital Literacy	5	8	L (2 h/week)	None	C
F3500ZI	Issues in Agriculture	5	4	L (2 h/week)	None	C
F2440BD	Basic Programming with Python	5	4	P (40 h/semester)	None	C
<b>Total Credits Core semester</b>						<b>24</b>
<b>Year 1 Semester 1</b>						
F2411BB	Principles of Biology	4	14	L (4h/week) P (3h/week)	None	C
F2411CP	Principles of Crop Production	4	14	L (4h/week) P (3h/week)	None	C
F2431CO	Olericulture Technology	4	14	L (4h/week) P (3h/week)	None	C

F2431BM	Elementary agricultural mathematics and statistics	4	12	L (4h/week) T (2h/ alt. week)	None	C
<b>Total Credits Semester 1</b>						<b>54</b>
<b>Year 1 Semester 2</b>						
F2412BI	Information Systems for Agriculture	4	12	L (4h/week) T (2h/ alt. week)	None	C
F2432BD	Community Development & Rural Sociology	4	12	L (4h/week) T (3h/week)	None	C
F2452BE	Basic Economics	4	12	L (4h/week) T (3h/ alt week)	None	C
F2402BN	Animal Nutrition and Feeding	4	7	L (4h/week) T (3h/week)	F2411BB Principles of Biology	C
F2402TR	Farm Mechanization	4	7	L (2h/week) P (2h/ alt. week)	Elementary agricultural mathematics and statistics F2431BM	C
<b>Total Credits Semester 2</b>						<b>50</b>
<b>Total credits YEAR 1</b>						<b>128</b>
Module code	Module name	NQF Level	Credits	Contact hours per week (L / P / T)	(Co-requisites) / Pre-requisites	Compulsory (C) / Elective (E)
<b>Year 2 Core semester</b>						
U3683LA	Academic Literacy II	6	8	L (2 h/week)	English for special purposes	C
U3520LP	Leadership Skills	5	2	L (2 h/week)	None	C
U3420CN	National and Global Citizenship	4	2	L (2 h/week)	None	C
U3420PJ	Project management	5	2	L (2 h/week)	None	C
U3520TH	Introduction to Critical thinking	5	2	L (2 h/week)	None	C
F3610ZR	Introduction to Statistical Programming with R	6	8	L (2h/week)	None	C
<b>Total Credits Core semester</b>						<b>24</b>
<b>Year 2 Semester 1</b>						
F2511BB	Entrepreneurship & Business Development	5	12	L (4h/week) T (3h/week)	None	C
F2502BR	Animal Reproduction	5	14	L (4h/week) P (3h/week)	F2411BB Principles of Biology	C

F2531BG	Genetics	5	14	L (4h/week) P (3h/week)	F2411BB Principles Biology	of	C
F3551AA	Animal anatomy & Physiology	5	14	L (4h/week) P (3h/week)	F2411BB Principles Biology	of	C
<b>Total Credits Semester 1</b>							<b>54</b>
<b>Year 2 Semester 2</b>							
F2552CN	Soil Science	5	14	L (4h/week) P (3h/week)	None		C
F2512BB	Applied Animal Breeding	5	14	L (4h/week) P (3h/week)	F2531BG Genetics		C
F3512AL	Livestock Production Systems	5	14	L (4h/week) P (3h/week)	None		C
F2512C Q	Introduction to statistics	5	12	L (4h/week) T (2h/alt. week)	Elementary agricultural mathematics and statistics F2431BM		C
<b>Total Credits Semester 2</b>							<b>54</b>
<b>Total credits YEAR 2</b>							<b>132</b>
Module code	Module name	NQF Level	Credits	Contact hours per week (L / P / T)	(Co-requisites) / Pre-requisites		Compulsory (C) / Elective (E)
<b>Year 3 Core semester</b>							
W2600B F	Field Attachment	6	16	4 months (extend in semester 1)	None		C
F2660BF	Farm Duties	6	8	L (2 h/week)			C
<b>Total Credits Core semester</b>							<b>24</b>
<b>Year 3 Semester 1</b>							
F2611BE	Extensive Animal Production (Blended)	6	16	L (4h/week) P (3h/week)	F2532BL Livestock Production Systems		C
F2631BF	Farm Management (On line)	6	14	L (4h/week) T (3h/ alt. week)			C
F2651BR	Rangeland Management (Blended)	6	16	L (4h/week) P (3h/week)	None		C
F3601AG	Game Ranching (Blended)	6	8	L (4h/week) P (3h/week)	None		C
<b>Total Credits Semester 1</b>							<b>54</b>
<b>Year 3 Semester 2</b>							

F2612BH	Farm Animal Health	6	16	L (4h/week) P (3h/week)	F2551BA Anatomy & Physiology of Farm Animals	C
F2632BI	Intensive Animal Production	6	16	L (4h/week) P (3h/week)	F2532BL Livestock Production Systems	C
F3612EE	Agricultural Extension & Group dynamics	6	14	L (4h/week) T (2h/week)	None	C
F2622B M	Agricultural Marketing & Policy	6	7	L (2h/week) T (2h/ alt. week)	None	C
<b>Total Credits Semester 2</b>						<b>55</b>
<b>Total credits YEAR 3</b>						<b>132</b>
<b>TOTAL CREDITS IN THE PROGRAMME</b>						<b>392</b>

## B.2 MODULE DESCRIPTORS

### B.3 FIRST YEAR

#### U3403FS SKILLS PORTFOLIO

<b>Module Title:</b>	<b>SKILLS PORTFOLIO</b>
<b>Module Code</b>	U3403FS
<b>NQF Level</b>	5
<b>Notional Hours</b>	0
<b>Contact hours</b>	N/A
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	0
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	None
<b>Semester Offered</b>	1

#### Module content

**UNIT 1:** Academic Planning and Goal Setting Individual Needs and Values; Steps in Reaching a Personal Vision; Proactive Approach Towards Learning; Self-Regulated Learning; Personal and Academic Goal Setting; Receptiveness to Learning; Exploring Self Development and Self-Awareness.

**UNIT 2:** Attitude and Motivation Understanding Motivation; Personal Attitudes, Behaviors and Interests; Self-Reflective Process; Approaches to Dealing with Negative Factors; Class Attendance and Participation; Procrastination; Self-Reliance; Discipline; Accountability; Healthy Habits.

**UNIT 3:** Learning styles Understanding Personal Approaches to Learning; Dynamics of The Learning Process; Learning Styles and Strategies.

**UNIT 4:** Study Methods and Skills Study Habits and Strategies; Learning Styles and Techniques; Effective Study Methods and Skills; Note Taking; Memory and Reading Skills; Critical Thinking.

**UNIT 5:** Time Management Effective Time Management; Planning; Decision-making; Prioritization; Setting Boundaries; Time for Self – care; Procrastination.

**UNIT 6:** Assessment Preparation In class exercise; Test and Examination preparation; Organizing academic workload; Setting daily study goals; Staying physically active; Study groups.

**UNIT 7:** Mental well-being Understanding mental health; Signs and indicators of poor mental health; commonly experienced mental health challenges; psychosocial stressors; Seeking professional help; Coping strategies.

**UNIT 8:** Interpersonal Communication Effective Communication Skills; Verbal and Non-Verbal Communication; Listening Skills; Problem Solving; Assertiveness; Negotiation Skills; Practicing Empathy in Communication; Self-Confidence; Receptiveness to Feedback; Building Trust; Teamwork; Leadership; Public Speaking Skills.

**UNIT 9:** Financial matters and management Financial Literacy; Budgeting; Available Finance Options and Assistance; Managing Financial Resources.

**UNIT 10:** Student Violence Types of Violence; Individual Roles in Violence; Myths, Forms; Consequences of Violence; Prevention Measures; Seeking for Help. **UNIT 11:** Career Planning and Development Defining and Selecting Career Goals; Career Exploring Different Strategies; Soft Skills Training.

Learning and Teaching Strategies/Activities

#### Student Assessment Strategies

100% continuous assessment

Reflective journal on each unit (portfolio)

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**U2583LA ACADEMIC LITERACY 1A**

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<b>Module Title:</b>	<b>ACADEMIC LITERACY 1A</b>
<b>Module Code</b>	U2583LA
<b>NQF Level</b>	5
<b>Notional Hours</b>	180
Semester 0: 4 hours /week; Semester 1:	2 hours/week Semester 2: 2 hours/week
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	0, 1 & 2

**Module content:**

The module will cover study skills, reading (including extensive reading), listening, speaking, writing, referencing, and language usage and text organisation.

Learning and Teaching methods:

The course will be facilitated through, but not limited to, the following learning activities:

- Blended instruction: Face-to-face and online
- Tests and assignments
- Tutorials/ Academic support
- Presentations

**Student Assessment**

Assessment will be based on Continuous Assessment.

Learning and teaching enhancement strategies

Students shall be exposed to library user-based services and training.

- Students that might experience performance difficulty in the module will be identified and the necessary support and guidance as an intervention strategy will be provided by the teaching staff.
- Statistics of the module pass and failure rate will be continuously monitored.
- Student-lecturer evaluation
- Lecturer-peer evaluation
- Curriculum review
- Moderation of assessment tools

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**U3583DD DIGITAL LITERACY**

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<b>Module Title:</b>	<b>DIGITAL LITERACY</b>
<b>Module Code</b>	U3583DD
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>Contact hours</b>	Semester 0: 4 hours /week; Semester 1: 2 hours/week Semester 2: 2 hours/week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1

**Module Content**

Digital Proficiency: ICT-based devices (laptops, tablets, smartphones, desktop computers, digital instruments and equipment); a mouse, keyboard, touch screen, voice control and other forms of input; screens, audio headsets and other forms of output; digital capture devices; University digital learning systems and a range of personal digital services such as social media, cloud storage services, sharing sites

Digital Productivity: Basic productivity software (text editing, presentation, spreadsheets, image editing); email and other digital communication services; Internet or cloud or institutional shared spaces for Organising, managing and backing up digital files; software/apps and services suitable for learning-related tasks; digital tools fit learning and managing learning time

Information Literacy: search engines, indexes or tag clouds; wikis, blog posts, scholarly journals, e-books and the open web; file spaces and folders, bookmarks, reference management software and tagging; copyright, and digital citizenship issues

Data and Media Literacy: Digital data using spreadsheets and other media; data security and privacy; digital media messages – text, graphics, video, animation, audio and multimedia

Digital Creation and Innovation: digital materials (video, audio, stories, presentations, infographics); new digital tools for learning in digital settings

Digital Communication, Collaboration and Participation: digital communication; differences between media, norms of communicating in different spaces; false or damaging digital communications; collaborative tools and online environments; online networks

Digital Learning and Development: digital learning opportunities; digital learning resources; digital tools/materials for organising, planning and reflecting on learning (mind-mapping, note-taking, e-portfolio/ learning journal/ blog)

Digital Identity and Wellbeing: online profiles for different networks (personal, professional, academic); digital reputation; managing personal data and privacy; digital CV or portfolio of work; digital technologies for personal development; online etiquette; wellbeing and safety online; internet addiction; cyberbullying and other damaging online behaviour.

Learning and Teaching Strategies/Activities

Lectures: presentation on concepts and other theoretical foundations of Digital Literacy

Discussion forums: reflecting on own contexts and sharing perspectives

Collaborative learning: group learning and activities carried as part of projects

Inquiry: carrying out of research to explore and understand scenarios and problems

Projects: carry out projects on digital literacy

Presentations and demonstrations: presentation of outcomes of projects (products, processes, impact)

Portfolio writing: writing reflective learning journals related to digital literacy

Student Assessment Strategies 1. Collaborative assessment tasks

1.1 Digital productivity: *cloud based collaborative digital media creation using cloud platforms*

1.2 Project: Digital communication, collaboration and participation/ Digital Wellbeing

Individual assessment tasks

2.1 Assignment: information literacy assignment

2.2 Test x 2

Practical

3.1 Digital proficiency

3.2 Data and Media literacy

No written examination

Learning and Teaching Enhancement Strategies

Student feedback: feedback from students using focused feedback instruments

Peer feedback: student feedback on peer evaluation of each other's collaboration, participation and contribution

Self-evaluation: quizzes and students' reflective journal/ portfolio on their own learning

Learning analytics: use of learning management tools on student participation and online learning activities, and analyse assessment performance

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## F2440BD BASIC PROGRAMMING WITH PYTHON

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<b>Module Title:</b>	<b>BASIC PROGRAMMING WITH PYTHON</b>
<b>Module Code</b>	F2440BD
<b>NQF Level</b>	5
<b>Notional Hours</b>	50
<b>Contact hours</b>	4 hours lectures per week for 5 weeks
<b>Additional learning requirements</b>	P (40 h/semester)
<b>NQF Credits</b>	4
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 0

### Module Content

**Python installation;** The python interpreter; Language semantics. **Data Structures and their operations;** Variables; Strings; numeric variables and their different subtypes; Tuples; Lists; Dictionaries; Sets. **Control Flow;** if, else and elif statements, for loops; while loops; exception handling. **Functions;** returns in Python; Basic functions; Numpy modules; Numpy Arrays. **Classes;** phenomenological approach to classes; **Interaction with OS;** Reading and Writing files, importing data with Numpy; scripting. **Data Visualization;** Introduction to Matplotlib; histograms; line and scatter plots. **Pandas;** Introduction to the Pandas data frames. **Introduction to Jupyter Notebooks.**

### Learning and Teaching Strategies/Activities

1. Lectures: these will be carried out via face to face and online mode (blended method).
2. Tutorials: Students will do guided practical problems. These will summarize the process from raw to final presentable results.

### Student Assessment Strategies

Student assessment will be based on formative assessment only through 100% continuous assessment. The assessment comprises of 2 practical tests (60%) and 2 individual assignments (40%). A minimum mark of 50% needs to be achieved in order to pass the module

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## F3500ZI ISSUES IN AGRICULTURE

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<b>Module Title:</b>	<b>ISSUES IN AGRICULTURE</b>
<b>Module Code</b>	F3500ZI
<b>NQF Level</b>	5
<b>Notional Hours</b>	40
<b>Contact hours</b>	20 Contact hours
<b>Additional learning requirements</b>	Field trips, Seminars and quest lectures
<b>NQF Credits</b>	4
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

of genetically modified organism for food production and agricultural development.

### Module content

Agriculture: Agriculture as important economic sector; Population dependence on agriculture for their livelihoods. Production systems: Production systems and production sustainability. Land tenure systems: freehold and customary tenure. Agricultural Opportunities and Restrictions: such as the veterinary cordon fence; financial collateral; and the greed in the commons. The Namibian market driven economy and agricultural contribution: Agricultural practices; Resilience of livelihoods to withstand challenges posed by climate change; land scarcity, water; drought management relation to climate change; Cause and consequences of the supply chain of agricultural sub-sectors. Overview of sub-sectors and their value chains: cattle; sheep and goats; pigs; dairy; poultry; agronomy; horticulture; game and bio-mass. Niche markets: such as Swakara and Ethical issues of Genetically Modified Organisms (GMO's) and implications to food production systems; use of examples to demonstrate how a society use result into different externalities to balance policy intervention.

### Learning and Teaching strategies/Activities

Face-to-face lectures and/or online lectures/activities (pre-recorded or real-time)

Face-to-face or online tutorials.

Self-study tasks and assignments

Student Assessment strategies

Continuous assessment (100% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments, and practical reports (at least 4 gradable items).

A final mark of 50% is required to pass this course

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**YEAR ONE, SEMESTER ONE**

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**F2411BB PRINCIPLES OF BIOLOGY**

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<b>Module Title:</b>	<b>PRINCIPLES OF BIOLOGY</b>
<b>Module Code</b>	F2411BB
<b>NQF Level</b>	4
<b>Notional Hours</b>	140
<b>Contact hours</b>	3 Lecture hours / week for one semester; 3 Practical hours alternate week for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites) Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester One

**Module Content**

Introduction: Definition, branches, applications; scientific approach; Taxonomy: Basic taxonomy and classification; overview of the three domains and six kingdoms of organisms; Cellular structure and processes: Prokaryotic and eukaryotic cells; ultrastructure of plant and animal cells and their function; process of photosynthesis; Reproduction: Binary fission in bacteria; sexual and asexual reproduction in algae and fungi; basic reproductive cycles in livestock; Growth & Development: Growth and development in plants and animals; Introduction to Ecology: Biogeochemical cycles; environmental pollution (noise, air, water, radiation, soil); global warming and the greenhouse effect; Introduction to entomology: Overview of the important biological vectors and pests of plants and animals

**Learning and Teaching Strategies/Activities**

This module will be offered as a blended on-line and face-to-face mode and learning will be carried out through the following teaching methods: -

1. Lectures and group discussions
2. Practical sessions: students will be given opportunity to acquire skills via practical which will enhance application of knowledge learned and problem solving to practical aspects of biology.
3. Group discussions: students will carry out some tasks in groups to facilitate acquisition of soft skills such as communication and teamwork. WhatsApp platforms may be used as well.

**Student Assessment Strategies**

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 50% of the module grade (2 tests [50%], at least 4 assessed practicals and quizzes [40%] and at least 1 assignment [10%]) and a summative assessment (end of semester examination) 50% (1 x 2 hours theory paper). Pass mark for the module is 50%.

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**F2411CP PRINCIPLES OF CROP PRODUCTION**

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<b>Module Title:</b>	<b>PRINCIPLES OF CROP PRODUCTION</b>
<b>Module Code</b>	F2411CP
<b>NQF Level</b>	4
<b>Notional Hours</b>	140
<b>Contact hours</b>	03 Lecture hours per week per semester; 03 Practicals hours per Alternate week per semester
<b>Additional learning requirements</b>	Field Trips, Term Project
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Crop environment in Namibia. Environmental factors affecting crop choice: temperature, rainfall, solar radiation, photoperiodism. Sustainable crop production and resource use efficiency: Principle of Sustainability; Concepts of Sustainable Crop Production. Cropping systems, tillage and crop establishment. Modern concept of tillage. Climate resilient agriculture and Crop diversification. Fertilization and management practices. Time of planting: Pre- and post-rain planting. Land preparation: Aims; Tillage systems – conventional, minimum, conservation tillage; Cultivation equipment. **Seeding:** Factors affecting seed quality; Seeding depth; Seeding rate; Plant population. **Fertilizer application times, methods and fertilizer rates. Calculation of row and intra-row spacing. Cropping systems:** Monoculture; Mixed culture; Intercropping production potential and mechanism, and yield advantage.

**Student Assessment Strategies**

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 60% to the final mark while the summative assessment would contribute 40%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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**F2431CO OLERICULTURE TECHNOLOGY**

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<b>Module Title:</b>	<b>OLERICULTURE TECHNOLOGY</b>
<b>Module Code</b>	F2431CO
<b>NQF Level</b>	4
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 hours lectures per week per semester, 3 hours practical alternate week per semester
<b>Additional learning</b>	Excursions (visits to relevant farms for exposure) field attachments and group projects on campus.
<b>NQF Credits</b>	14

(Co-requisites)	
Prerequisite	None
Compulsory/Elective	Compulsory
Semester Offered	1

#### Module Content

**Horticulture:** branches of horticulture; types of horticultural production. **Vegetable classification systems:** botanical; pollination; growth season; optimum growth temperature; cold/heat sensitivity; edible plant part. **Importance of vegetables:** economic and human nutrition importance. **Cropping systems:** shifting cultivation; continuous cropping; crop rotation; sole cropping and mixed cropping. **Cultural practices:** hardening/ acclimatization; mulching; thinning; pruning; training; earthing-up; phase planting. **Good agricultural practices (GAP):** scouting; hygiene; record keeping; pollution management; pre-harvest interval; field vegetable holding shed. **Types of vegetables:** leafy; root; fruit; legume; runner; exotic/indigenous vegetables. **Mushrooms:** spawn production; vegetative growth and requirements; fruit body formation and requirements. **Production requirements/ practices:** environmental requirements; selection of suitable cultivars; vegetable nursery practices; management practices; seed dormancy. **Crop protection:** methods of weed; pest and disease control. **Harvesting:** harvesting indicators; harvesting methods and post-harvest handling. **Marketing:** Good harvest and post-harvest practices; marketing strategy; selling channels; price and quality.

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 60% to the final mark while the summative assessment would contribute 40%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

F2431BM	ELEMENTARY AGRICULTURAL MATHEMATICS AND STATISTICS
Module Title:	ELEMENTARY AGRICULTURAL MATHEMATICS AND STATISTICS
Module Code	F2431BM
NQF Level	4
Notional Hours	120
Contact hours	4 hours lectures per week 2-hour tutorial sessions alternate week for a semester
Additional learning requirements	None
NQF Credits	12
(Co-requisites)/ Prerequisite	None
Compulsory/Elective	Compulsory
Semester Offered	1
Module Content	

**Numbers;** Operations; Percentages; Conversion of fractions and decimals; Ratio; Rate; Proportion and scale; **Algebraic representation and formulae;** Equations; Indices; Measurements and conversion of units; Geometrical terms and relationships; Bearings; **Tables and graphs in practical situations;** Trigonometry; Basic statistics; **Population and sampling;** Probability sampling methods; Measures of central tendencies; Measures of dispersion: Frequency distribution (grouped and ungrouped) data; **Probabilities;** Regression and correlation;

#### Student Assessment Strategies

Continuous assessment (at least two tests; four tutorial test and two assignments) 60% Examination 40% (1x2 hour Examination paper).

1. Belinda Huntley and Anne Love: Elementary Tertiary Mathematics with Geometry (2<sup>nd</sup> Ed.)

### YEAR ONE, SEMESTER TWO

F2412BI	INFORMATION SYSTEMS FOR AGRICULTURE
Module Title:	INFORMATION SYSTEMS FOR AGRICULTURE
Module Code	F2412BI
NQF Level	4
Notional Hours	120
Contact hours	3 Lectures / week and 2 hours tutorials every alternate week
Additional Learning requirements	None
NQF Credits	12
(Co-requisites)/ Prerequisite	None
Compulsory/Elective	Compulsory
Semester Offered	1
Module content:	

Introduction to agricultural information systems: main concepts and definitions; types and components of Information system; categories of agricultural information; Scope, importance and needs of Information systems; model of agricultural information systems. Agricultural Knowledge and Information system (AKIS): The key concepts of an Agricultural Knowledge and Information system (AKIS); Key actors in AKIS; Users and flow of agricultural information; Barriers to proper flow of agricultural information. Sources of agricultural information: Databases; Government Institutions; Agricultural Censuses such as Namibia Statistical Agency agricultural censuses and surveys, design and implementation of agricultural surveys, types of survey and strategies for survey implementation; International Agencies ( FAO-STAT, World Bank, UNDP etc); Deficiencies in the current databases. Agricultural Information systems in Namibia: Early warning systems and other information management systems such as Food insecurity and vulnerability information mapping system (FIVIMS). The Data

preparation, its importance and processing: - Data editing, coding, checking and storage of data; communicating of agricultural information; tools for agricultural information systems. Interactive computing: Exposure to various computer packages; Use and analysis of agricultural information; Information gaps and how to extrapolate missing information and the data presentation.

#### Student Assessment Strategies

1. Summative assessments 100% which constitute a minimum of 5 continuous assessments which includes tests, quizzes and practical assessments
2. No Final exam
3. Effective and efficient supervision and monitoring assignments, tests and other assessments
4. To pass this module a student should obtain a minimum final mark of 50%.

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#### F2432BD COMMUNITY DEVELOPMENT AND RURAL SOCIOLOGY

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<b>Module Title:</b>	<b>COMMUNITY DEVELOPMENT AND RURAL SOCIOLOGY</b>
<b>Module Code</b>	F2432BD
<b>NQF Level</b>	4
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 hours Lectures / Week; 2 hours tutorial every alternate week for a semester
<b>Additional learning requirements</b>	Group work and projects
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Basic sociological concepts: introduce sociological concepts and their application to agriculture and rural development planning; Importance of Rural Sociology: the significance of rural sociology to agricultural extension community and rural development; Rural and Urban Populations: differences between rural and urban population; rural/urban migration culture and culture change: social interaction and social structures; groups and organization, deviance, social class and stratification; Social institutions: families; religions; social change in global perspective. Poverty and development: Poverty and wellbeing, understanding the socio-economic context of development, Community development: concept of community development, principles of community development, and ways to – coordinate community development, community development methodologies and approaches, mobilizing resources for community interventions.

#### Student Assessment strategies

1. Continuous 60% (2 Tests (30%), Presentations (10%), Assignments (10%).
2. Examination 40% (1X 2 hours)
3. To pass this module a student should obtain a minimum final mark of 50%.

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#### F2452BE BASIC ECONOMICS

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<b>Module Title:</b>	<b>BASIC ECONOMICS</b>
<b>Module Code</b>	F2452BE
<b>NQF Level</b>	4
<b>National Hours</b>	120
<b>Contact hours</b>	3 Lecture / Week; 2 hours alternate tutorial / week for 12 weeks
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module content:

The course will cover topics such as **Basic Concepts of Economic:** Fundamentals principles of Economics, the economic system; **Demand and Supply:** Law of demand and supply, determinants of demand and supply of agricultural commodities, market equilibrium, market regulations and price control; **Theory of Production:** Production function and law of production; **Cost Theory:** cost concepts, short-run and long-run costs; budget line/constraints, least cost combination and profit maximization; **Theory of consumer behavior:** basis of choice-Utility, budget constraint, equilibrium; **Theory of firm:** monopoly, perfect competition, monopolistic competition, oligopoly; **Risk and Uncertainty:** Types of risk, sources of risk and uncertainty and risk management; **National Income Accounting:** importance of national income accounting, measuring GDP, inflation; Consumptions, Savings and Investment and economic growth. **Business cycles and Unemployment:** phases of business cycle; unemployment, and inflation; **Money and Banking:** characteristics, types and functions of money, quantity theory of money, banking and the concept of interest, monetary policies; **Public funding and Expenditure:** Taxation and Budget and Fiscal policies; **International Trade:** comparative and absolute advantage, exchange rates and terms of trade. **The role of agriculture in the economy of Namibia.**

#### Student Assessment Strategies

Continuous Assessment 50%: minimum of 2 Tests and 2 assignments.  
Examination 50% (2 hours)  
To pass this module a student should obtain a minimum final mark of 50%.

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**F2402BN ANIMAL NUTRITION AND FEEDING**

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<b>Module Title:</b>	<b>ANIMAL NUTRITION AND FEEDING</b>
<b>Module Code</b>	F2402BN
<b>NQF Level</b>	4
<b>Notional Hours</b>	70
<b>Contact hours</b>	3 Lecture hours / week for 12 weeks; 3 Practical hours / week for one semester
<b>NQF Credits</b>	7
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Principles of Biology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module content:**

**Introduction:** Basic animal nutrition concepts and terminologies; The role of animal nutrition in animal production. **Components of animal feeds:** Chemical composition of feeds; Basic feed nutrients (Carbohydrates, lipids, protein, vitamin, micro and macro minerals and water) and Anti-nutritional factors (ANF's) - tannins, gossypol, trypsin inhibitors, saponins; effects in animals, reduction of ANF's. **Laboratory analysis of feeds:** Proximate analysis; Detergent fibre analysis; Near infrared Reflectance Spectroscopy (NIRS). **Animal feed classification:** Feeds and feedstuff classifications: (roughage, concentrates, supplements, feed additives); General comparison of plants and animal feeds as feed sources with special focus on nutritive values, availability, affordability and feed laws. **Fodder conservation & improvement:** Hay & silage making; Improvement of low-quality roughages – chemical & physical treatments. **Nutrient digestion in animals:** Monogastric digestion (poultry, pigs); Non-ruminant herbivores digestion (horses & donkeys); Ruminant herbivore digestion (cattle, goats and sheep). **Digestibility techniques:** *In vivo* & *in sacco* methods of feed digestibility; *In vitro* digestibility. **Feed energy and protein partitioning:** Metabolisable energy system (ME); Metabolisable protein system (MP). **Mineral and vitamin nutrition:** Macro-minerals function, deficiency symptoms, sources; Vitamins function, deficiency symptoms, sources. **Nutritional/Metabolic disorders:** Milk fever, acidosis, bloat, laminitis, ketosis, Hypomagnesemia; Causes, symptoms, treatment, prevention. **Feed formulation and feed mixing:** Nutrient requirement of farm animals for maintenance, growth, reproduction and other functions; Significance and uses of feeding standards; Feed formulation methods – Pearson Square Method, Computer aided methods;

**Student Assessment**

1. Continuous Assessment 60% which will be composed of 2 Tests; 2 assignments and 3 marked practicals.
2. Examination 40% (1 x 2 hours paper)
3. To pass this module a student should obtain a minimum final mark of 50%.

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**F2402TR FARM MECHANIZATIONS**

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<b>Module Title</b>	<b>FARM MECHANIZATIONS</b>
<b>Module Code:</b>	F2402TR
<b>NQF Level</b>	4
<b>Notional hours</b>	70
<b>Contact Hours</b>	4 Lecture hours / week / semester; 3 Practical hours / week for one semester
<b>Additional learning requirements</b>	Field trips / Excursions, Group work
<b>NQF Credits</b>	7
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Elementary agricultural mathematics and statistics, Introduction to Statistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

**Module content**

**Farmstead planning:** Plans and drawings. Building procedures and equipment. Structures for specific purposes: farmstead, livestock, crop storage, greenhouses. **Building economics and standards:** Construction materials. bills of quantities. **Fundamentals of Engineering:** Fundamental quantities and units; Concepts of work; Power and Torque. **Farm Power sources:** Animal Power; electricity; Natural Power wind energy; solar energy. **Animal Power:** Hitching; capability; training. **Machine Power:** The Tractor; The internal combustion engine and other sub-systems; Power Trains: Tractor tests and Performance; Operation and maintenance; Safety. **Tillage:** Primary tillage; secondary tillage; conservation tillage; implement types and their operation. **Crop planting, fertilization and weed control:** Equipment types and operation; calibration and safety aspects. **Crop Harvesting:** Objective, equipment types, operation and maintenance; combine harvester-types and operation. **Farm Machinery Management:** Machine capacity, performance and costs; Machinery cost and selection.

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**B.4 SECOND YEAR**

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**U3683LA ACADEMIC LITERACY II**

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<b>Module Title:</b>	<b>ACADEMIC LITERACY II</b>
<b>Module Code</b>	U3683LA
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact Hours</b>	Semester 0: 4 hours/week Semester 2: 2 hours/week
<b>Prerequisite</b>	Academic Literacy I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester, 1&2
<b>Module Purpose</b>	

Module content

The module is designed for students enrolled in a bachelor's degree, which requires them to do basic research, read and listen to specific academic material, produce specific written texts and give academic presentations. The module thus, focuses on enhancing academic reading, academic vocabulary, writing, listening and speaking.

Student assessment strategies

The module will be continuous assessment based.

Assessment will include written tests, individual and group assignments, portfolio assessments and oral presentations.

**Learning and teaching enhancement strategies**

Weekly task completion monitoring

- Student-lecturer evaluation
- Lecturer peer-review
- Moderation of assessment tools
- Curriculum review

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**U3520LP LEADERSHIP SKILLS**

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<b>Module Title:</b>	<b>LEADERSHIP SKILLS</b>
<b>Module Code</b>	U3520LP
<b>NQF Level</b>	5
<b>Notional Hours</b>	20
<b>Contact hours</b>	1 x 2h per week for 6 weeks
<b>Mode of Delivery</b>	<b>Blended: Face to face and online</b>
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1 or 2

**Module Content**

Definition and scope of leadership; History and origins of leadership; Types of leadership; Leadership versus management skills; Leader (master of self, effective manager of people, active visionary); manager; Not all leaders are managers; Not all managers are leaders; Authority versus leadership; Power versus leadership; Principles of leadership (ability, adaptive, action, empowerment, creativity, problem solving, shared); Are leaders born or made?; Characteristics of a good leader; Functions of leaders in organizations; Leading for the future; Mentoring skills; The 21<sup>st</sup> century leader; Ethical leadership skills; Responsible leadership skills.

**Student Assessment Strategies**

The module will be assessed using 100% continuous assessment.

Learning and Teaching Enhancement Strategies

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**U3420CN NATIONAL AND GLOBAL CITIZENSHIP**

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<b>Module Title:</b>	<b>NATIONAL AND GLOBAL CITIZENSHIP</b>
<b>Module Code</b>	U3420CN
<b>NQF Level</b>	4
<b>Notional Hours</b>	20
<b>Contact hours</b>	Up to 1 contact lecture periods per week for 6 Weeks
<b>Mode of Delivery</b>	Blended: Face to face and Online
<b>Additional learning requirements</b>	Each student will be required to work on a personal project which will include a site visit
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

**Module Content**

UNIT 1: Constitution and its Importance  
 What is a constitution; Functions of a constitution; What it contains; Constitution and democracy  
 UNIT 2: Global Citizenship  
 The meaning of global citizenship; Importance of global awareness; World issues of concern to global citizens.  
 UNIT 3: Civic Engagement  
 What do we mean by civic engagement; Dimensions of civic engagement; Indicators of civic engagement; Promoting civic engagement.  
 UNIT 4: Globalization  
 Understanding globalization; Cultural construction of neoliberal globalization; Major players; Major domains; Major Issues; Futures of Globalization  
 UNIT 5: Intercultural Communication  
 Dealing with difference; Levels of culture; Stereotypes and generalizations; Intercultural communication Processes  
 UNIT 6: Sustainable Development Goals and individual action  
 Introduction to SDGs; Contributing to achievement of SDGs through action

**Learning and Teaching Strategies/Activities**

Student learning in this module will be supported by provision of subject knowledge; engaging students in class discussions, and individual awareness and action portfolios. It will expose students to real life situation through formal lectures, guest lectures, experiential activities such as engaging local civic organizations; Students will engage in active and participatory learning in which they generate ideas and share their knowledge on a topic. Material will include journal articles, videos, PowerPoint presentations, as well as handouts for students' reflection.

### Student Assessment Strategies

Continuous assessment of 100% - Assessment will be done by completing online pop-up quizzes; and developing their online portfolios of personal action as response to tasks assigned in class.

U3420PJ	PROJECT MANAGEMENT SKILLS
<b>Module Title:</b>	<b>PROJECT MANAGEMENT SKILLS</b>
<b>Module Code</b>	U3420PJ
<b>NQF Level</b>	5
<b>Notional Hours</b>	20
<b>Contact hours</b>	2 hour lecture per week for the first two week and field-based practical for the remaining four weeks.
<b>Mode of Delivery</b>	Blended: face-to-face and online
<b>Additional learning requirements</b>	The field-based practical to be undertaken in the immediate environment of the student
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1 or 2
<b>Module Content</b>	

This module consist of two components: **The first component** is a two week theory covering the **concepts** (project vs programme) and the **phases of project life cycle ( project initiation and planning**: work breakdown, development of SMART indicators, estimation of activity duration, efforts, and costs, scheduling of activities, identification of critical path, setting of milestones, stakeholder identification and categorization, stakeholder engagement, initial risk identification, and development of the initial project plan; **project implementation & management**: forming the project team, managing people, resources allocation, responsibilities allocation, quality assurance, leadership style and project liaison; **project monitoring and control**: progress reporting and communication, quality control, time management, budget and cost management, risk management and mitigation; **project closure and evaluation**: project evaluation, project auditing process and the closure process, and final project report). **The second component** is a four week **field-based practical** where students participate in a real-life project in their immediate environment. Students are strictly required to apply the project management approach during the field-based practical.

### Student Assessment Strategies

Student assessment will be 100% continuous assessment based on weekly project progress reports (50%) and the final project report (50%). A minimum pass mark for the module is 50%.

U3520TH	INTRODUCTION TO CRITICAL THINKING
<b>Module Title:</b>	<b>INTRODUCTION TO CRITICAL THINKING</b>
<b>Module Code</b>	U3520TH
<b>NQF Level</b>	5
<b>Notional Hours</b>	20 notional hours
<b>Contact hours</b>	1 hour practical session per week interfaced with limited online engagement
<b>Mode of Delivery</b>	Blended: Face to face and online
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1

### Module Content

The module will cover: **Definition of critical thinking**: striving for understanding; to have an inquisitive yet open-minded and flexible approach to exploring ideas, the ability to evaluate information and draw clear conclusions based on the evidence at hand. **Core critical thinking skills**: explain, infer, analyse, evaluate, problem solving, self-reflect. **deductive and inductive reasoning**: inductive reasoning- move from the specific to the general, deductive reasoning-moving from the general to specific. **Construction of argument**: construct statements that combine reasoning with evidence to support an assertion or argument. **Problem analysis**: define problem, determine the root causes of problem, develop alternative solutions to problem, implement solution, evaluate outcome. **Reflective learning**: asking open questions, reflect on answers, writing reflective learning essays, thinking about other's answers, asking "why" questions. **Understanding fallacies**: what is a fallacy? description of various fallacies, identifying a fallacy in an argument, explaining a fallacy to an opponent in an argument.

### Student Assessment Strategies

100% Continuous assessment (1 reflective learning essay, 1 problem solving activity).

<b>F3610ZR</b>	<b>INTRODUCTION TO STATISTICAL PROGRAMMING WITH R</b>
<b>Module Title:</b>	<b>INTRODUCTION TO STATISTICAL PROGRAMMING WITH R</b>
<b>Module Code</b>	F3610ZR
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	4 lecture periods per week and one 3hour practical per week for semester core
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Elective
<b>Semester Offered</b>	Core Semester

#### Module Content

**Learn how to navigate RStudio:** how to load/save a file; load a package; access help. **Examine the base R objects:** vectors; matrices, arrays, lists, factors and tables; their respective characteristics, naming conventions and structures. Understand sub-setting, filtering and creation of these objects. Examine the implementation of control structures (loops and functions) in R. Investigate how R can be used for mathematical and statistical calculations. **Data Cleaning and Manipulation in R:** Learn how to manipulate and clean data in R; importing and exporting data from other statistical packages and data bases; aggregating data; reshaping data **Visualisation (Packages):** Learn how basic plots are generated in R – histograms; X-Y plots, bar charts; pie charts, scatter plot. Understand the **ggplot2 package** for advanced plotting; **Statistical Testing:** Understand how R can be for hypothesis testing. Investigate how R can be used in statistical modelling techniques (SLR)

#### Student Assessment Strategies

Continuous Assessment: 100 % (minimum of 2 tests (30%), 1 project assignment (presented in oral and written form, 40%), 3 marked practicals, 30%). The pass mark for the module is 50%

<b>F2511BB</b>	<b>ENTREPRENEURSHIP AND BUSINESS DEVELOPMENT</b>
<b>Module Title:</b>	<b>ENTREPRENEURSHIP AND BUSINESS DEVELOPMENT</b>
<b>Module Code</b>	F2511BB
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	3 Lectures + Reflective Practices / Week for one semester
<b>Additional learning requirements</b>	Field Trips, guest lectures, case studies
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Theory of entrepreneurship: meaning, importance of entrepreneurship, concepts, characteristics, classifications of entrepreneurship, problems faced by entrepreneurs in Namibia, entrepreneurial process: critical factors for starting a new enterprise, evaluating opportunities for new businesses, determining resource needs and acquiring resources; business model canvass: the revenue model, the cost model, formulating a winning strategy, the people are what matters- entry strategy- growth strategy; entrepreneurial marketing: marketing considerations- selecting the target market, market strategy. pricing strategies and marketing of services, export marketing; financing entrepreneurial ventures: sources of finance: debt and equity; entrepreneurial growth: transition from start-up to growth, the growth process and execution; intellectual property rights by understanding the mandates of BIPA; copyrights, trademarks, trade secrets, patents, licensing; business planning process under Namibian regulations; planning process, business plan; accounting for agri-business enterprises; basic financial statements, managing cash flows, preparation of projected financial statements, applications of business ratios, small business management as well as strategies that improve performance of new business ventures; production and material, human resources, finance management, break even analysis, operational cycle.

#### Student Assessment Strategies

The student assessment will comprise of Individual assignments, Tests, Quizzes, and Examination.

Exams: There will be a written final examination consisting of essay questions.

Test: the students write tests to assess their understanding of teaching and learning materials.

Quizzes: There will be short unannounced quizzes with questions related to the day's assigned reading and prior class sessions.

Assignments: There will be several assignments for the student to apply the concepts learned. The expectation is that assignments be completed individually.

The grade in this module will be comprised of the following elements

1. Continuous 60% (2 Tests (25%), assignments (15%).
2. Examination 40% (3 hours)
3. To pass this module a student should obtain a minimum final mark of 50%.

<b>F2502BR</b>	<b>ANIMAL REPRODUCTION</b>
<b>Module Title:</b>	<b>ANIMAL REPRODUCTION</b>
<b>Module Code</b>	F2502BR
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 Lecture hours / week; 3 Practical hours alternate week for one semester

<b>Additional learning requirements</b>	Excursions
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Principles of Biology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester Two
<b>Module Content</b>	

**Introduction:** overview of livestock industry and the importance of reproductive efficiency; definition of important terms such as estrus, gametes, embryo, fetus and placenta; **Anatomy and Physiology:** comparative anatomy and physiology of the male and female reproductive systems of domestic animals; **Endocrinology of reproduction;** factors that regulate reproduction; hormonal control; seasonality; puberty; estrous cycle and signs of heat in livestock; oogenesis, folliculogenesis, ovulation, spermatogenesis; sexual behaviour; **Pregnancy & Parturition:** Factors affecting conception and fertilization; corpus luteum (CL), capacitation; fertilization; maternal recognition of pregnancy; embryonic and fetal development, sexual differentiation; placentation; endocrinology of pregnancy; and parturition; lactation; **Biotechnologies in animal reproduction:** artificial insemination (AI); multiple ovulation and embryo transfer (MOET); estrus synchronization; in vitro fertilization (IVF); advantages and disadvantages of the different biotechnologies; **Detecting reproductive problems and improving reproductive efficiency:** use of records; pregnancy diagnosis; management procedures to improve herd reproductive efficiency; introduction to obstetrics in livestock.

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 50% of the module grade (2 tests [40%], at least 4 assessed practicals and quizzes [50%] and at least 1 assignment [10%]) and a summative assessment (end of semester examination) 50% (1x 3 hours theory paper). Pass mark for the module is 50%.

#### F2531BG GENETICS

<b>Module Title:</b>	<b>GENETICS</b>
<b>Module Code</b>	F2531BG
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	3 Lecture hours / week for 12 weeks; 3 Practical hours / week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Principles of Biology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 1
<b>Module Content</b>	

This module introduces and presents principles used in the study of genetics. The emphasis is on application of concepts to solve problems. The specific topics to be covered are:

**Hereditary material:** DNA, genes, chromosomes, genomes, chromosome theory of inheritance, Physical structure of chromosomes, genetic linkage and sex linkages, **Mendelian genetics:** Mendel's laws of inheritance; Monohybrid and dihybrid crosses, genotypes and phenotypes, punnett square, complete dominance, homozygous and heterozygous.

**Introduction to extensions of mendelian analysis:** Multiple alleles, Incomplete dominance, co-dominance, multiple allelism, gene interaction and contribution of genes and the environment to the phenotype using examples.

**Cell division:** Mitosis and meiosis, cross-over, recombination.

**DNA replication** in prokaryotes and eukaryotes.

**Gene expression:** Transcription, Translation and the Genetic Code

**Mutations:** Types and causes, Aneuploidy and non-disjunction.

**Introduction to genetic engineering (GE):** GMOs, advantages and disadvantages of GE technology.

#### Student Assessment Strategies

Continuous Assessment: 60% (2 tests, at least 3 marked practicals, quizzes / assignment)

Exam: 40% (1 x3 hours paper).

#### F3551AA ANIMAL ANATOMY & PHYSIOLOGY

<b>Module Title:</b>	<b>ANIMAL ANATOMY &amp; PHYSIOLOGY</b>
<b>Module Code</b>	F3551AA
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 hours' lecture periods per week and 3 hours practical every week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Principles of Biology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester one
<b>Module Content</b>	

**Overview of the important anatomical structures and function of the following body systems in ruminants and monogastrics:** Circulatory & Lymphatic System; Respiratory System; Digestive System; Urinary System; Nervous System; Integumentary, Muscular and Skeletal System; Endocrine System; Reproductive System. **Other topics:** carcass dissections (cattle, sheep, goats, poultry); examination of internal organs in dead animals; study of laboratory models of farm animals;

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 60% of the module grade (i.e., 2 tests, at least 5 assessed practicals, at least 1 assignment and quizzes) and a summative assessment (end of semester examination) 40% (1x 3 hours theory paper). Pass mark for the module is 50%.

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## YEAR TWO, SEMESTER TWO

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### F2552CN SOIL SCIENCE

<b>Module Title:</b>	<b>SOIL SCIENCE</b>
<b>Module Code</b>	F2552CN
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 Lecture hours/Week per semester 3 Practical hours per semester
<b>Additional learning requirements</b>	Field trips /excursions and group work
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Module Content</b>	

**Origin and development of soil. General physical properties of soil:** weathering and soil formation processes; the soil profile differentiation and morphology; soil phases; volume and mass relationships of soil constituents; soil texture; soil structure. **Soil water:** movement and availability. atmosphere and temperature. **General chemical properties of soil:** soil mineralogy; ion exchange; pH; buffer action; alkalinity; soil acidification and salinisation of soil. **Soil fertility and fertilization:** nutrient content; nutrient availability; organic and inorganic; fertilizer types; fertilizers formulation and calculations, fertilizers applications. **Practical work:** Laboratory evaluation of simple soil characteristics; Field practicals on soil formation in some areas Namibia.

#### Student Assessment Strategies

Continuous Assessment: 60 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 40% (01 x 03 hours paper).

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### F2512BB APPLIED ANIMAL BREEDING

<b>Module Title:</b>	<b>APPLIED ANIMAL BREEDING</b>
<b>Module Code</b>	F2512BB
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lecture hours per week for 12 weeks; 3 Practical hours per week alternating for one semester
<b>This proposed formulation is intended to take care of blended / online teaching and provide flexibility.</b>	
<b>Additional learning requirements</b>	Excursions; group work
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Genetics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Module Content</b>	

**The gene:** principles of Mendelian Genetics; determinants of the phenotype; additive gene action; dominance; epistasis; sex limited traits; sex influenced traits; sex linked traits

**Genes in populations:** gene, genotype and phenotype frequency; Hardy-Weinberg Law; forces that change gene frequency

**Simply inherited and polygenic traits:** number of genes influencing the traits and the influence of the environment

**Selection for simply inherited traits:** change of gene frequency with continued selection; application of Hardy-Weinberg law

**Measures of association:** correlation; regression

**Heritability and repeatability:** definitions; breeding value estimation; prediction of response to selection; selection accuracy; relevance of heritability and repeatability.

**Selection for quantitative traits:** Expected progeny differences (EPDs)

**Multiple trait selection:** tandem; independent culling levels; selection of extremes; selection index

**Inbreeding:** effects; computation.

**Outbreeding:** phenotypic effects; heterosis; complementarity; types of heterosis

**Broad categories of commercial breeding programs:** commercial strait breeding; rotational crossbreeding; terminal sire systems; combination systems; composites

**Beef cattle improvement:** bio-economic traits; record keeping; stud and commercial breeding

**Dairy cattle improvement:** bio-economic traits; record keeping

**Small stock and Poultry improvements:** bio-economic traits; record keeping; stud and commercial breeding

**Animal reproduction:** Heat detection in cattle and small stock; mating and mating seasons

**Biotechnologies in animal reproduction:** artificial insemination (AI); multiple ovulation and embryo transfer (MOET); estrus synchronization; in vitro fertilization (IVF).

**Detecting reproductive problems and improving reproductive efficiency:** use of records; pregnancy diagnosis; management procedures to improve herd reproductive efficiency.

#### Student Assessment Strategies

Continuous assessment constitutes 60% which will be composed of 2 Tests; 2 assignments/ at least 3 marked practicals or tutorials. Examination 40% (1 X 3 hours)

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**F3512AL LIVESTOCK PRODUCTION SYSTEMS**

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<b>Module Title:</b>	<b>LIVESTOCK PRODUCTION SYSTEMS</b>
<b>Module Code</b>	F3512AL
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	3 hour Lectures / week for a semester; 3 Practical hours per week for a semester
<b>Additional learning requirements</b>	Minimum of one (1) excursion (outside the normal practicals)
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 2
<b>Module Content</b>	

**Impact of livestock production on the environment; Structural changes and their impact:** Problems associated with animal production and how they; Contribution of livestock to sustainable agricultural development. **Global perspectives and the livestock industry in Namibia:** Contribution of livestock sector to the Namibian economy; Factors contributing to Namibia's competitiveness in the global export market for meat and other animal products; Marketing of livestock in Namibia; The livestock industry: global perspectives. **Systems of production:** Classification criteria for production systems; Cattle production systems; Improved systems versus traditional systems; Main environmental problems associated with intensive production systems; Intensive versus extensive systems; Systems of beef production; **Livestock management facilities;** Basic rules to maintain good housing in relation to health, behavior and welfare; Design considerations for farm buildings. **Adaptive and productive components of productivity of livestock in the tropics:** Thermal equilibrium; Effects of heat stress on dairy cattle production; Prescriptive measures for reducing heat stress. **Management of cattle:** Characteristics of *Bos indicus/ Bos taurus* cattle; The effect of environment and genotypes on cattle performance; Ruminant nutrition; General management of calves. **Health issues in livestock production:** Recognition of disease – clinical signs; Prevention and control of diseases. **Management of mono-gastrics: pigs:** Bio-economic traits; Breeds and breed improvement; Methods of genetic improvement; Genetic defects in pigs; Nutrition; Summary of losses which occur in pig enterprises due to poor management; Health.

**Student Assessment Strategies**

Continuous assessment constitutes 60% which will be composed of 2 Tests; 2 assignments/ at least 3 marked practicals. Examination 40% (1 X 3 hours)

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**F2512CQ INTRODUCTION TO STATISTICS**

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<b>Module Title:</b>	<b>INTRODUCTION TO STATISTICS</b>
<b>Module Code</b>	F2512CQ
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 hours lectures per week for one semester 2 hour alternate tutorial sessions
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Elementary agricultural mathematics and statistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Introduction to statistics: Basic definition, role of statistics, branches of statistics – descriptive and inferential, basic statistical notations and symbols. Data types: Categorical versus discrete and Continuous versus numerical; Data sources: Primary versus secondary; Types of measurements: Nominal, ordinal, interval and ratio scales; Collection and presentation of data: Tabular forms; frequency tables, cross-tabulations (two variables), Graphical methods; bar charts, histogram, pie charts, frequency polygons, stem-and-leaf plots, box and whiskers plot, ogives; Identifying outliers; Measures of central tendency (grouped and ungrouped data case: Mean, median, mode, quartiles; Measures of dispersion: Skewness, measures of skewness and kurtosis; variance, standard deviation, range, inter-quartile range; coefficient of variation. Basic Set theory: Definitions; Venn diagrams; Distributive Law; De Morgan's Law; Counting techniques: permutation and combination; Probability: definition using relative frequency; properties: axioms of probability, random experiments, sample space and events, addition rule, mutually exclusive events, conditional probability; total probability; Bayes Theorem and independence; Random variables: expectations, random vectors; functions of random variables and probability density in discrete and continuous case; Probability distributions: Bernoulli; Binomial; Poisson, Geometric; Uniform; Normal; Binomial and Normal tables, Point estimation and confidence interval: CI for population mean and difference between two means for both large and small sample size case. Hypothesis testing: Formulation Single population mean, paired and independent samples for both small and large sample cases. Regression and correlation: Definitions, uses, SLR model assumptions, OLS technique, and model validation. Correlation analysis, scatter diagrams, Pearson's correlation coefficient; Spearman's rank correlation and the coefficient of determination.

**Student Assessment Strategies**

Continuous assessment (at least two tests, two tutorial test and two assignments) 50%; Examination 50% (1x3 hour Examination paper). Pass mark for the module is 50%.

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**B.5 THIRD YEAR**

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**F2600BF FIELD ATTACHMENT**

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<b>Module Title:</b>	<b>FIELD ATTACHMENT</b>
<b>Module Code</b>	F2600BF
<b>NQF Level</b>	6

<b>Notional Hours</b>	160
<b>Contact hours</b>	16 weeks (extended into Semester 1)
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core semester

#### Module content:

It is important to train field or on-site supervisors in specific requirements for supervision and evaluation of the students on field attachment. This activity should be carried out prior to the students went on attachment. The purpose of the visits is to identify partners/sites and negotiate relationships, roles and responsibilities.

The students will now be attached to the suitable agricultural business and institutions concerned with livestock or other agribusiness. For this practical module, students spend time at real work situations under the supervision of qualified personnel. Applying the principles and techniques theoretically learnt into real-life problem-solving situations. Develop student understanding of work ethics, employment demands, responsibilities and opportunities.

#### Student Assessment

This is a 100% formative assessment. Report write-up contributes 60% and 40% oral presentation.

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### F2660BF FARM DUTIES

<b>Module Title:</b>	<b>FARM DUTIES</b>
<b>Module Code</b>	F2660BF
<b>NQF Level</b>	6
<b>Notional Hours</b>	60
<b>Contact hours</b>	4 hours per week in one semester
<b>NQF Credits</b>	6
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core semester

#### Module content:

Students will undertake one full day (4 teaching hours) of farm duties every week during semester zero. These farm duties will be undertaken on campus at the various farm sections. The exercise is geared toward developing students' specific farming skills in all crop and livestock farming related activities that is ongoing at that particular time of the year. Student are arranged to participate in **crop husbandry aspects** including land preparation, field planting designs, sowing of different crops and vegetables, irrigation, thinning, weeding, fertilizer and pesticide application, pruning and harvesting. **Post-harvest techniques:** processing, threshing, storage and marketing. Student are also introduced to on-farm **animal husbandry practices:** including identification, tagging, castration, dehorning, vaccination, artificial insemination and pregnancy diagnosis, and animal judging/selection. Further, they will be involved in general farm work regarding **implement operations and maintenance:** tractor driving and implement handling; fence maintenance, pump and borehole maintenance; **Record keeping:** computerization and analysis of farm and financial records, agronomic data recording.

#### Student Assessment

Assessment will be based on attendance of 80% and completion of given practical reports at various section of the farm. At least 4 practical reports with an average of 50%.

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### YEAR THREE, SEMESTER ONE

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### F2611BE EXTENSIVE ANIMAL PRODUCTION

<b>Module Title:</b>	<b>EXTENSIVE ANIMAL PRODUCTION</b>
<b>Module Code</b>	F2611BE
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lecture hours per week and 3 Practical hours per week for one semester
<b>Additional learning requirements</b>	Minimum of one (1) excursion (outside the normal practicals)
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Livestock Production Systems
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 1

#### Module content:

**Introduction:** Importance of the sector; Characteristics of extensive production in Namibia; Constraints affecting extensive livestock production in Namibia; Production systems; Breeds of beef cattle, sheep and goats; **Handling facilities for beef cattle and small stock in communal areas and commercial farms:** Fences/camps; Handling pens; Water supply; Troughs; Crushes and Corridors.

**Herd management of extensively kept beef cattle and small stock Management from mating to calving:** Breeding seasons; Bull: cow ratio/Buck or Ram: Doe or ewe ratio; Mating methods; Pregnancy diagnosis; Calving/kidding/lambing and assistance required. **Management after calving/lambing/kidding:** Records; Identification; Castration; Dehorning; Weaning; Age determination; **Vaccination, dosing and dipping. Large stock/small stock management calendars. Reproduction and fertility:** Economic importance of fertility: Herd/flock fertility. **Breeding:** Aims of breeding program; Cross breeding (advantages & disadvantages); Out crossing (advantages & disadvantages); Selection. **Nutrition of beef cattle, goats and sheep; Record keeping; Growth and development of muscle; fat and**

connective tissues. Conversion of muscles to meat during slaughtering and processing; Meat quality and customer concerns. Biosecurity.

#### Student Assessment Strategies

Continuous assessment constitutes 60% which will be composed of 2 Tests; 2 assignments/ field practicals.

Examination 40% (1 X 3 hours)

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### F2631BF FARM MANAGEMENT

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<b>Module Title:</b>	<b>FARM MANAGEMENT</b>
<b>Module Code</b>	F2631BF
<b>NQF Level</b>	6
<b>Notional Hours</b>	140
<b>Contact hours</b>	3 Lectures + 2 Tutorials / Week for one semester
<b>Additional learning requirements</b>	Group works, case studies
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Basic Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

**Management and Decision Making:** definition and objectives of farm and financial management, types of farms and farm structures, decision-making environment in agriculture; **Farm Accounting & Record keeping:** farm records, diagnostic analysis and financial analysis (balance sheet analysis; income statement analysis, cash flow analysis); **Applying Economic principles:** choosing production levels, and input and output combinations; **Budgeting:** enterprise budgeting, partial budgeting, and whole farm budgeting; **Managing Risk and Uncertainty:** sources of risk and uncertainty, and tools for managing risk, **Income Tax Management:** objectives of tax management, depreciation and asset valuation; **Investment Analysis:** time value of money, and the methods of investment analysis; **Capital and Credit:** sources of capital, types of loans, and sources of loan funds; **Human Resources & Capital Management:** planning farm labor resources, planning of farming equipments & implements, obtaining and managing farm employees, and agricultural labour regulations.

#### Student Assessment Strategies

1. Continuous Assessment 60%: 2 Tests accounting for 40% and practical assessments accounting for 20%.
2. Examination 40% (3 hours)
3. To pass this module a student should obtain a minimum final mark of 50%.

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### F2651BR RANGELAND MANAGEMENT

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<b>Module Title:</b>	<b>RANGELAND MANAGEMENT</b>
<b>Module Code</b>	F2651BR
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lecture hours / week; 3 Practical hours / week per semester
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 1

#### Module content:

**Basic terminologies:** Pastures, veld, ecological capacity, carrying capacity; biodiversity, ecosystem stability, resilience, range reinforcement, legumes, forages, fodder, stocking rates and rangeland sustainability; **Overview on rangeland roles and challenges in Namibia;** **Rangeland ecosystem components:** (biotic and abiotic factors): vegetation, livestock soil, and climate; **Rangeland/veld types and characteristics:** sour, mixed and sweet; **Morphology of common range plants:** structure of a grass plant, flowering, stem & leaf development, elongation and tillering; **Growth cycle of plants and plant & seed dormancy;** **Introduction to systematic botany** with special focus on annuals & perennials range plants, C3 vs. C4, shrubs, trees & bushes; **Plant succession:** pioneer, sub-climax and climax; retrogression and die-back rate; Factors influencing succession process; **Animal-plant interactions on range:** pollinations, role of faeces, urine and trampling on range plants; **Plant adaptation to herbivory and poisonous plants;** **Grazing management systems:** continuous, rotational multi-camp (controlled selective grazing and non-selective grazing), combined planned grazing, deferment; zonal/centripetal grazing; **Forms of range degradation:** bush encroachment, overgrazing, erosion and desertification- (causes and control measures); Land reclamation/restoration methods; **Measuring biodiversity (plant and animal diversity) in rangeland ecosystems:** species richness, composition, evenness and diversity index; **Range condition assessment & monitoring methods** (Transect, quadrat methods, ecological index, grazing value and ecological index); **Estimation of biomass production:** Carrying capacity and stocking rate estimations in rangelands; **Veld fire management;** **Pasture/Fodder production and management:** forage species selection criteria, pasture establishment and fertilization, seeds and forage harvesting, processing and conservation methods; **Importance of tropical forage legumes in pastures;** Drought management strategies and Fodder flow planning.

#### Student Assessment

1. Continuous 60% which will be composed of at least 2 Test; 2 assignments and 5 lab/field practical reports.
2. Examination 40% (3 hours)
3. To pass this module a student should obtain a minimum final mark of 50%.

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### F3601AG GAME RANCHING

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<b>Module Title:</b>	<b>GAME RANCHING</b>
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<b>Module Code</b>	F3601AG
<b>NQF Level</b>	6
<b>Notional Hours</b>	90
<b>Contact hours</b>	2 Lecture hours / week; 3 Practical hours / week for one semester
<b>NQF Credits</b>	9
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module content:

**Roles of Game Ranching:** Role of game ranching at the farm level, contribution to the national economy; Ethics & reasons for conserving & preserving game animals; **Comparative productivity indices of selected game and domestic animals;** Opportunities and constraints to Game Ranching; **Ecological roles, social behaviours and peculiar characteristics/identification of game species of interest:** Small & large herbivores, carnivores, dangerous game & game birds; Eco-zones where game could be an economic asset; **Game ranch management:** Selecting a suitable game farm; Converting a livestock ranch into a game farm; Game habitat identification & evaluation, carrying capacity & stocking rates; practising a crude form of grazing rotation & habitats utilization through; Use of fence, water & licks; fire; water provision; look-out posts/towers; dietary supplementation; **Basic concepts on game population dynamics & monitoring;** Game counting methods including mathematical computations; **Effect of diseases and parasites on game populations;** Systems of production and their economic returns; Consumptive and non-consumptive utilization of game animals; Game capture, infrastructure and transportation including legal and operational requirements; **Meat and trophy processing with special focus:** on animal skinning, preparation of trophies & final trophy handling and, by-products; Importance, establishment & legal requirements of game conservancies; **Game farm economics:** Development capital, running costs & profitability, general trends and; Markets and marketing. **Human-wildlife conflict and value addition of game products.**

#### Student Assessment

1. Continuous Assessment 60% which will be composed of 2 Tests; 2 assignments and 4 marked practicals.
2. Examination 40% (1 x 2 hours paper)
3. To pass this module a student should obtain a minimum final mark of 50%.

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### YEAR THREE, SEMESTER TWO

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#### F2612BH FARM ANIMAL HEALTH

<b>Module Title:</b>	<b>FARM ANIMAL HEALTH</b>
<b>Module Code</b>	F2612BH
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 hours lecture periods per week and 3 hours practical every week for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Animal anatomy and Physiology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester two

#### Module Content

**Introduction:** losses due to animal ill-health or mismanagement; concepts of health and disease; disease development and body response in livestock. **Introduction to epidemiology. Introduction to pharmacology. Introduction to parasitology. Introduction to toxicology. Introduction to bacteriology. Introduction to virology. Congenital and environmental induced defects. Infectious diseases:** infectious agents (bacteria, viruses, parasites); overview of notifiable diseases caused by bacteria, viruses, fungi and yeast; poisonous plants; heavy metals; **Important common, economic and/or zoonotic diseases of domestic animals;** diseases of cattle, sheep, goats, pigs and poultry in Namibia; **Other topics;** restraint of animals, clinical examination, specimen collection, hygiene and sanitation as performed by veterinarian and technicians on the farm as well as manipulating laboratory techniques necessary for diagnosing diseases of domestic animals.

#### Student Assessment Strategies

Student assessment for module will consist of formative and summative tasks. Formative assessments will make up 50% of the module grade (i.e., 2 tests, at least 5 assessed practicals and 1 assignments/quizzes) and a summative assessment (end of semester examination) 50% (1x 3 hours theory paper). Pass mark for the module is 50%.

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#### F2632BI INTENSIVE ANIMAL PRODUCTION

<b>Module Title:</b>	<b>INTENSIVE ANIMAL PRODUCTION</b>
<b>Module Code</b>	F2632BI
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	3 Lecture hours per week and 3 Practical hours per week for one semester
<b>Additional learning requirements</b>	Minimum of one (1) excursion (outside the normal practicals)
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Livestock Production Systems
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 2

### Module Content

**Pig Production:** Status of pig production in Namibia; Terminologies used in pig production; Common pig breeds; Production systems; Pig production cycle; Management of gilts, sows boars and piglets; Selection of breeding stock; Feeding; Housing; Diseases; Marketing, transportation and animal welfare; Pig slaughter and product quality, Processing, preservation and storage of animal products.

**Dairy production:** Status of dairy industry in Namibia; Breeds of dairy cattle & production systems; The production cycle and management of dairy cattle; Lactation cycle of a dairy cow; Milk production persistency; Nutrient requirements of a dairy cow; Problems associated with underfeeding of dairy cows; Grouping strategy of feeding dairy cows; Body Condition Score (BCS) in dairy cows; Breeding and oestrus cycle; Post-partum management of dairy cows; Milking facilities; Milking procedures; Metabolic diseases associated with dairy cows; Vaccination schedule for dairy cows; Preservation, Processing, and storage of dairy products.

**Poultry production:** Namibian poultry industry, Importance of poultry production; Production systems; Common chicken breeds and their characteristics in Namibia; Brooding and Management of chicks; Importance of ventilation in the brooder and chickens house. **Indigenous chicken production:**

**Broiler production** - Main Broiler production systems; Broiler feeds and feeding, and management of broilers; Diseases; Vaccination program for broilers, Process of chicken slaughter and processing; Storage; Chicken cuts. **Layers Production** - Rearing of laying chicks from day-old to 17 weeks; Rearing from laying to culling, Layer feeds and feeding– from day old to culling; Diseases; Vaccination program for layers; Reproductive physiology of a hen; Process of egg formation; Quality attributes of an egg; Process of egg incubation; Egg candling; Hatching process; Sexing of chicks; egg collection, handling, grading and marketing.

### Student Assessment Strategies

Continuous assessment constitutes 60% which will be composed of 2 Tests; 2 assignments/field practicals.  
Examination 40% (1 X 3 hours)

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F3612EE	AGRICULTURAL EXTENSION & GROUP DYNAMICS
<b>Module Title:</b>	AGRICULTURAL EXTENSION & GROUP DYNAMICS
<b>Module Code</b>	F3612EE
<b>NQF Level</b>	6
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 Lectures / 2 hours tutorials alternating every 2 week
<b>Additional Information requirements</b>	Field Trips
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 2

### Module Content:

**Introduction to Agricultural Extension:** concepts of agricultural extension and education, Review of historical background and recent trends in agricultural extension, principles of agricultural extension; the role of agricultural extension in agricultural development; **Adult Learning principles:** The concepts of adult education, characteristics of adults as learners and adult education principles, **Communication and Extension teaching methods:** individual, group and mass teaching methods, communication process and its components, various communication aids/audio visual aids, use of ICT in extension, barriers to effective communication, the change theory, concept of group dynamics and group formation; **Adoption and diffusion theory:** adoption process and diffusion of innovations, adopter categories, factors affecting adoption of innovations; **The role of the Extension worker:** major roles of extension worker in a farming community, requirements of a good extension worker. **Gender issues in Extension:** gender concepts and gender analysis framework; **Extension Programme Planning:** the planning process, implementation, monitoring & evaluation in extension. **Extension Approaches:** various participatory extension approaches.

### Student Assessment Strategies

1. Continuous Assessment 50%: minimum of 2 Tests and 2 practical assignments.
2. Examination 50% (2 hours)
3. To pass this module a student should obtain a minimum final mark of 50%.

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F2622BM	AGRICULTURAL MARKETING AND POLICY
<b>Module Title:</b>	AGRICULTURAL MARKETING AND POLICY
<b>Module Code</b>	F2622BM
<b>NQF Level</b>	6
<b>Notional Hours</b>	70
<b>Contact hours</b>	3 Lectures + 1 practical per week for one semester
<b>Additional learning requirements</b>	Filed Trips
<b>NQF Credits</b>	7
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

### Module Content

This module introduces the basic concepts in marketing theories and place them in the unique context of food and agricultural processing, distribution, wholesaling, and retailing, where discussion of markets are integrated with business marketing principles and strategy. This module will cover the following topics: the **evolution of general marketing**; marketing theory; evolution of agricultural marketing; **overview of agricultural marketing**; characteristics of agricultural produce; objectives of agricultural marketing; market and market components; market classifications; **approaches to the study of marketing**; **Marketing Functions**; grading and standardisation; labelling; branding; **marketing channel for agricultural commodities**; the elements of successful marketing channels; marketing channel roles; marketing channel power; **demand and sales forecasting**; market demand; sales forecast; **agricultural commodity pricing and pricing policies**; objectives of pricing; pricing strategy; pricing policy (pricing methods); break-even analysis; **consumer or**

**buyers behaviour**; the consumer buying behaviour process; **marketing mix**; marketing mix elements; **agricultural marketing research**; types of marketing research; marketing research process; **marketing strategy**; marketing communications; **developing of marketing plan**; steps for creating a marketing plan; marketing strategy and tactics; **agricultural future market**; farmer's contracts; hedging concept; **and agricultural supply chain in Namibia**; supply chain actors; agricultural supply chain; **roles of agricultural boards (Namibia agronomic board and meat board), cooperatives and farmer's organisation in agricultural marketing.**  
**Learning and Teaching Strategies/Activities**

#### **Student Assessment Strategies**

The student assessment will comprise of Individual assignments, Tests, Quizzes, and Examination.

Exams: There will be a written final examination consisting of essay questions.

Test: the students write tests to assess their understanding of teaching and learning materials.

Quizzes: There will be short unannounced quizzes with questions will be related to the day's assigned reading and prior class sessions.

Assignments: There will be several assignments for the student to apply the material from the lectures and the readings. The expectation is that assignments be completed individually.

The grade in this module will be comprised of the following elements

1. Continuous 60% (2 Tests (25%), assignments (15%).
2. Examination 40% (2 hours)
3. To pass this module a student should obtain a minimum final mark of 50%.

## C. DIPLOMA IN AGRICULTURE (Ogongo Campus) [17HDAG]

### C.1 PROGRAMME SCHEDULE

Course code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
ULEG 2410	English for General Communication	4	16	C	
UCLC 3509	Computer Literacy	5	8	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
AAEC 2411	Mathematics and Basic Statistics	4	16	C	
AASC 2431	Biology	4	16	C	
AACA 2400	Farm Duties I	4	8	C	
<b>Total Credits Semester 1</b>				<b>72</b>	
<b>Year 1 Semester 2</b>					
ULEG 2410	English for General Communication	4	16	C	
AAEC 2482	Basic Economics	4	12	C	
AASC 2432	Physical Science	4	16	C	
AASC 2422	Animal Anatomy, Physiology and Reproduction	4	8	C	
AACA 2400	Farm Duties I	4	8	C	
<b>Total credits Semester 2</b>				<b>60</b>	
<b>Total CREDITS YEAR 1</b>				<b>132</b>	

<b>Year 2 Semester 1</b>					
AAEC 2541	Communication and Information systems	5	8	C	None
AAEC 2501	Financial Management	5	8	C	None
AAEC 2521	Introduction to Rural Sociology	5	8	C	None
ACSC 2581	Soil Science	5	12	C	None
AASC 2551	Applied Animal Health	5	16	C	None
AACA 2500	Farm Duties II	5	8	C	None
<b>Total credits Semester 1</b>				<b>60</b>	
<b>Year 2 Semester 2</b>					
ACSC 2582	Introduction to Research	5	12	C	AAEC 2411 (Mathematics & Basic Statistics)
ACSC 2522	Workshop technology, surveying and farm structures	5	8	C	AAEC 2411 Basic Math & Stats
ACSC 2532	Vegetable and Fruit Production	5	16	C	None
ACSC 2592	Crop Production	5	12	C	None
AASC 2502	Applied Animal Breeding	5	8	C	None
AACA 2500	Farm Duties II	5	8	C	None
<b>Total credits Semester 2</b>				<b>64</b>	
<b>TOTAL CREDITS YEAR 2</b>				<b>124</b>	

<b>Year 3 Semester 1</b>					
AACA 2600	Special Study	6	8	C	ACSC2582 (Introduction to Research)
AACA 2601	Field Attachment	6	8	C	None
AAEC 2641	Principles of Agricultural Extension	6	8	C	None
AAEC 2661	Agricultural Marketing and Policy	6	8	C	None
AASC 2681	Intensive Animal Production	6	12	C	None
ACSC 2601	Water Management and Soil Conservation	6	8	C	ACSC 2581 (Soil Science)
AASC 2691	Range Management	6	12	C	None
<b>Total Credits Semester 1</b>				<b>68</b>	
<b>Year 3 Semester 2</b>					

AACA 2600	Special Study	6	8	C	ACSC2582 (Introduction to Research)
AAEC 2602	Project Management	6	8	C	None
AAEC 2622	Entrepreneurship	6	8	C	None
AASC 2622	Animal nutrition and Feeding	6	8	C	None
AASC 2602	Game Farming	6	8	C	None
AASC 2642	Extensive Animal Production	6	8	C	None
ACSC 2682	Farm Power and Machinery	6	12	C	AAEC 2411 (Basic Mathematics & Statistics)
ACSC 2622	Crop Protection	6	8	C	None
<b>Total Credits Semester 2</b>				<b>68</b>	
<b>TOTAL CREDITS YEAR 3</b>				<b>132</b>	
<b>TOTAL PROGRAMME CREDITS</b>				<b>388</b>	

## C.2 MODULE DESCRIPTORS

### C.3 FIRST YEAR

#### ULEG 2410: ENGLISH FOR GENERAL COMMUNICATION

<b>Module title:</b>	<b>ENGLISH FOR GENERAL COMMUNICATION</b>
<b>Code:</b>	ULEG 2410
<b>NQF Level:</b>	4
<b>Contact hours:</b>	4 hours per week for 28 weeks
<b>Credits:</b>	32
<b>Module Assessment:</b>	Continuous Assessment (60%): 4 reading tests, 4 writing tests, 2 oral presentations, 1 literature worksheet. Examination (40%): 1x3 hour paper
<b>Pre-requisites:</b>	None

#### Module Content:

This module attempts to assist students to improve their general English proficiency. The main goal of this module is, therefore, to develop the reading, writing, listening, speaking and study skills of students in order for them to perform tasks in an academic environment. This module focuses on the skills students need to perform cognitive academic tasks in an academic environment and beyond.

#### CLC3509: COMPUTER LITERACY

<b>Module title:</b>	<b>COMPUTER LITERACY</b>
<b>Code:</b>	CLC3509
<b>NQF level:</b>	5
<b>Contact hours:</b>	1 lecture theory and 1 lecture practical per week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 100%: 2 Practical Tests 50%, 2 Theory Tests 50%
<b>Prerequisites:</b>	University Entry

#### Module Content:

The aim of this module is to equip the students through hands-on experience with the necessary skills to use application software: word processing, spreadsheets, databases, presentations and communications. The objective is to increase student's productivity in both the education and later, the work environment. The module covers the following topics. Introduction to Computers: hardware and software, types and categories of computers, usage of Computer devices and peripherals. Working with the windows operating system: File Management, working with multiple programs, using the recycle bin. Using a word processor: formatting a text and documents, spelling check, grammar and thesaurus tools, inserting tables, auto-shapes, clip arts, charts, and mail merge. Spreadsheet: worksheets and workbooks, ranges, formulas and functions, creating graphs, charts, and printing the workbook.

Databases: creating tables, relationships, queries, forms and reports. Presentation software: slide layout and master, animations, auto-content wizard and templates. Communication tools: introduction to the Internet, web browsers, search engines, downloading and uploading files, creating and sending messages, email etiquette, internet security, and digital signatures.

#### CSI3580: CONTEMPORARY SOCIAL ISSUES

<b>Module Title:</b>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code</b>	CSI 3580
<b>NQF Level</b>	5
<b>NQF Credits</b>	8
<b>Contact hours</b>	Equivalent to 1 hour per week for 2 semesters (Online)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1&2

#### Module Content:

The module, Contemporary Social Issues (CSI3580), is designed to encourage behavioural change among UNAM students and inculcate the primacy of moral reasoning in their social relations and their academic lives. In providing students with critical and analytical thinking the module enables students to grow and develop into well rounded citizens, capable of solving contemporary social challenges experienced in their communities and societies. The teaching of the module takes three dimensions: the intellectual, the professional and the personal dimensions. The intellectual dimension is fostered through engaging students with subject knowledge, independent learning and module assessment. The professional dimension, on the other hand, is fostered through exposing students to real life situations of

case studies and practical exercises that draws attention to social issues that attract ongoing political, public and media attention and/or debate. Finally, the professional dimension is fostered through group work, online discussions and class participation.

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**AAEC 2411: MATHEMATICS AND BASIC STATISTICS**

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<b>Module Title:</b>	<b>MATHEMATICS AND BASIC STATISTICS</b>
<b>Code:</b>	<b>AAEC 2411</b>
<b>NQF Level:</b>	4
<b>NQF Credits:</b>	16
<b>Assessment Strategies:</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper).
<b>Contact hours</b>	4 hours lectures per week; 3 hours tutorials alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Numbers; Operations; Percentages; Conversion of fractions and decimals; Ratio; Rate; Proportion and scale; Algebraic representation and formulae; Equations; Indices; Measurements and conversion of units; Geometrical terms and relationships; Bearings; Tables and graphs in practical situations; Trigonometry; Basic statistics: Population and sampling; Probability sampling methods; Measures of central tendencies; Measures of dispersion: Frequency distribution (grouped and ungrouped) data; Probabilities; Regression and correlation; Analysis of variance (ANOVA); Presentation and interpretation of statistical results and information.

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**AASC 2431: BIOLOGY**

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<b>Module Title:</b>	<b>BIOLOGY</b>
<b>Code</b>	AASC 2431
<b>NQF Level</b>	4
<b>NQF Credits</b>	16
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)
<b>Contact hours</b>	4 hours per week lectures; 3 hours per week practicals for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Chemical basis of life; Introductory structure of macromolecules and their functions Prokaryotic and eukaryotic cells; Overview of the five major kingdoms of organisms and Viruses; Basic plant and animal anatomy and physiology; Differences between plant and animal cells; Photosynthesis; Osmosis & diffusion, cell respiration, passive and active transport; Basic taxonomy, Basic concepts of Mendelian genetics: Cell cycle; Mitosis and Meiosis; Sexual and asexual reproduction; Introduction to ecology, ecosystems and communities; Naming of ecosystems and communities; Food chain and food web; Interrelationships among organisms.

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**AACA 2400: FARM DUTIES I**

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<b>Module Title:</b>	<b>FARM DUTIES I</b>
<b>Code</b>	AACA 2400
<b>NQF Level</b>	4
<b>NQF Credits</b>	16
<b>Assessment Strategies</b>	Pass or fail grade. Pass with more than 80 % attendance
<b>Contact hours</b>	one full day (7 hour day) alternating for 28 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1&2

**Module Content:**

During the first year, all Diploma students will undertake one full day (7 teaching hours) of farm duties every second week, for a total of 14 days during the year. These duties will be undertaken on campus farms at Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' specific farming skills as tractor driving and implement operation, vehicle driving, artificial insemination and pregnancy diagnosis, pump and borehole maintenance, vegetable propagation methods, keeping computerization and analysis of farm and financial records, animal judging, fertilization and pesticide application, erosion and draft animal utilization. Forty-nine teaching hours per semester will be awarded for this work. Assessment will be based on attendance at duty stations, participating in and completion of tasks and attitudes towards work, as well as grading during specific courses that take place in the recess periods (e.g. Easter and, winter and spring).

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**AAEC2482: BASIC ECONOMICS**

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<b>Module Title:</b>	<b>BASIC ECONOMICS</b>
<b>Code</b>	AAEC2482
<b>NQF Level</b>	4
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	3 hours lectures and 2 hours practical per week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Definition and scope of economics and agricultural economics; Micro- and macro-economics; Economic systems; Factors influencing demand and supply of agricultural commodities; Elasticity of demand and supply; Price determination under different market structures; Production functions; Cost concepts; Optimal level of output and input use; Risk and uncertainty; Tools used in macroeconomic analysis: the theory, measurement, and determination of national income; taxation; employment and business cycles; the multiplier; fiscal policy,

budget deficits, and the national debt; aggregate supply and aggregate demand; money, banking, and monetary policy; exchange rates and balance of payments accounts; and stabilization policy for unemployment and inflation, introduction to international trade and comparative advantage.

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#### **AASC 2432: PHYSICAL SCIENCE**

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<b>Module Title:</b>	<b>PHYSICAL SCIENCE</b>
<b>Code</b>	AASC 2432
<b>NQF Level</b>	4
<b>NQF Credits Assessment</b>	16
<b>Prerequisite</b>	Continuous assessment 60% (minimum 2 tests and Examination 40% (1 x 3 hour paper)
<b>Compulsory/Elective</b>	4 hours per week lectures; 3 hours practical for 14 weeks
<b>Semester Offered</b>	None
<b>Module Content:</b>	Compulsory

Laboratory safety. Physical quantities and measurements –SI. Properties of matter; Atoms, elements, molecules & compounds; The Periodic Table; Chemical formulae; Covalent and ionic compounds; non-polar and polar molecules; Molecular and formula mass; Redox reactions; Moles and Molarity; Octet rule; Electronic bonding & orbitals; Lewis structures; Chemical reactions and equations; Balancing chemical equations; Stoichiometry; Acids and bases; pH & buffers; Solutions and Solubility; Structure and properties of water; Ionisation of water; Laws of motion, force, energy, work. Kinetic theory of gases; Gas laws, pressure; Basic electricity; Voltage, current, power, conductors, insulators. Thermodynamics and heat; conduction, radiation and convection.

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#### **AASC 2422: ANIMAL ANATOMY, PHYSIOLOGY AND REPRODUCTION**

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<b>Module Title:</b>	<b>ANIMAL ANATOMY, PHYSIOLOGY AND REPRODUCTION</b>
<b>Code</b>	AASC 2422
<b>NQF Level</b>	4
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours lectures per week; 3 hours practical alternate week for 14 weeks
<b>Co-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Aims:**  
**Module Content:**  
 This module covers the following aspects: morphology and Function of the reproductive system, circulatory, respiratory, nervous, skeletal, and urinary and digestive systems of farm animals (ruminants, mono-gastric animals, and poultry), their anatomical and functional interrelationships. Practical classes which will involve the use of carcass dissections, examination of internal organs in dead animals, and the study of laboratory models, will help in the understanding of the anatomical structures and the interrelationship between organic systems. Artificial insemination will also be covered in this Module.

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### **C.4 SECOND YEAR**

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#### **AACA 2500: FARM DUTIES II**

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<b>Module Title:</b>	<b>FARM DUTIES II</b>
<b>Code</b>	AACA 2500
<b>NQF Level</b>	5
<b>NQF Credits</b>	16
<b>Assessment Strategies</b>	Pass or fail grade. Pass with more than 80 % attendance
<b>Contact hours</b>	one full day (7 hour day) alternating for 28 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:**  
 During the second year, all Diploma students will undertake one full day (7 teaching hours) of farm duties every second week, for a total of 14 days during the year. These duties will be undertaken on campus farm Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' specific farming skills as tractor driving and implement operation, vehicle driving, artificial insemination and pregnancy diagnosis, pump and borehole maintenance, vegetable propagation methods, keeping computerization and analysis of farm and financial records, animal judging, fertilization and pesticide application, erosion and draft animal utilization. Forty-nine teaching hours per semester will be awarded for this work. Assessment will be based on attendance at duty stations, participating in and completion of tasks and attitudes towards work, as well as grading during specific courses that take place in the recess periods (e.g. Easter and, winter and Spring).

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#### **AAEC 2541: COMMUNICATION AND INFORMATION SYSTEMS**

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<b>Module Title:</b>	<b>COMMUNICATION AND INFORMATION SYSTEMS</b>
<b>Code</b>	AAEC 2541
<b>NQF Level</b>	5
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 lecture hour per week and practical 2 hours alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Definition of concepts, Theory of communication; the nature and importance of communication; Source, Message Channel and Receiver (SMCRE) communication models; communication process; verbal and non-verbal modes communication; written communication: writing informative articles and pamphlets for farmers; communication methods; extension campaigns; organization of agriculture show; and farmers day; Oral communication: effective speaking; presentation and use of common types of audio visual aids ; Application of ICTs in agricultural development, Design and production of communication materials. Information sourcing; scientific writing, referencing and plagiarism; Managing conflict and negotiation skills

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### AAEC 2501: FINANCIAL MANAGEMENT

<b>Module Title:</b>	<b>FINANCIAL MANAGEMENT</b>
<b>Code</b>	AAEC 2501
<b>NQF Level</b>	5
<b>NQF Credits</b>	8
Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)	
2 lectures and 2 hours practical alternate week for 14 weeks	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Principles of financial Management; Budgeting and Record keeping; Risk management; Investment Analysis; Depreciation and Asset valuation; Financial Statements Analysis, Leasing and renting of equipment or assets; Income tax and Estate planning and legal aspects of borrowing and sources and terms of agricultural loans.

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### AAEC 2521: INTRODUCTION TO RURAL SOCIOLOGY

<b>Module Title:</b>	<b>INTRODUCTION TO RURAL SOCIOLOGY</b>
<b>Course Code</b>	AAEC 2521
<b>NQF Level</b>	5
<b>NQF Credits</b>	8
Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)	
Contact hours 2 hours lectures and 2 hours practical alternate week for 14 weeks	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Concepts of sociology and anthropology; the role of rural sociology in development; types of Communities; leadership structure; community based organisation (CBO); nongovernmental organisations (NGO); the social institution of communities; culture relativism; rural leadership, social change and rural development, indigenous knowledge ; rural poverty and wealth ranking; characteristic of rural and urban communities ; rural urban migration and implication for rural development; gender roles and property right in agriculture ; Impact of HIV/AIDS on Agriculture development.

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### ACSC 2581: SOIL SCIENCE

<b>Module Title:</b>	<b>SOIL SCIENCE</b>
<b>Code</b>	ACSC 2581
<b>NQF Level</b>	5
<b>NQF Credits</b>	12
<b>Assessment Strategies</b> Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)	
<b>Contact hours</b> 3 hours lectures per week, 3 hours practical alternate week for 14 weeks	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Aims:**

This module aims to develop the student's understanding of soil as a medium for plant growth.

**Module Content:**

Definition and importance of soil: mineral fraction, organic matter, soil water and air. Soil formation: types of rocks; processes of weathering. Soil physical and chemical properties: texture, density, porosity, soil aeration and temperature, structure, compaction, profile, water holding capacity, cation exchange capacity. Soil nutrients for plant growth: nutrient content and nutrient availability. Fertilizers: organic and inorganic. Soil water: movement and availability. Soil conditions: acidity, alkalinity, salinity. Soil types of Namibia. Agro-ecological zones of Namibia.

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### AASC 2551: APPLIED ANIMAL HEALTH

<b>Module Title:</b>	<b>APPLIED ANIMAL HEALTH</b>
<b>Code</b>	AASC 2551
<b>NQF Level</b>	5
<b>NQF Credits</b>	16
<b>Assessment Strategies</b> Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)	
<b>Contact hours</b> 4 lectures per week; 3 hours practical's for 14 weeks	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Concepts of health and disease. Disease development and body response in livestock. Introduction to Bacteriology, Virology, Parasitology, Toxicology, Pharmacology and Epidemiology of Disease. Notifiable diseases caused by bacteria, viruses, fungi and yeast. Congenital and environmental induced defects. Important economic and zoonotic diseases of domestic animals. Common diseases of cattle, sheep,

goats, pigs and poultry in Namibia. Actual activities pertaining to animal health (Restraint of animals, clinical examination, specimen collection, hygiene and sanitation) as performed by veterinarian and technicians on the farm as well as manipulating laboratory techniques necessary for diagnosing diseases of domestic animals.

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### ACSC 2582: INTRODUCTION TO RESEARCH

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<b>Module Title:</b>	<b>INTRODUCTION TO RESEARCH</b>
<b>Code</b>	ACSC 2582
<b>NQF Level</b>	5
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	3 hours lectures per week; 3 hours practical's/tutorials alternate week for 14 weeks
<b>Prerequisite</b>	AAEC 2411 Mathematics and Basic Statistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Research process: research problem formulation, research objectives, hypothesis formulation, literature review, research methods. Work plans and budgets. Basic statistical concepts: means, mode, median, standard deviations, coefficient of variation. Basic experimental designs: completely randomized, randomized complete block. Social Survey methods and planning and design of surveys and sampling (Simple random sample, cluster, multi-stage, and stratified); Questionnaire design, interview schedule, Organization of field work for social research work. Data collection methods, Individual/group Interviews.

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### ACSC 2522: WORKSHOP TECHNOLOGY, SURVEYING AND FARM STRUCTURES

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<b>Module Title:</b>	<b>WORKSHOP TECHNOLOGY, SURVEYING AND FARM STRUCTURES</b>
<b>Code</b>	ACSC 2522
<b>NQF Level</b>	5
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours lectures per week; 3 hours practical alternate week for 14 weeks
<b>Prerequisite</b>	AAEC 2411 Mathematics and Basic Statistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Workshop safety, workshop materials, technical drawing. Workshop equipment. Joining and assembly of metal and nonmetals. Measurements. Types of surveys: baseline, basic, triangulation, planimeter. Area/Volume measurements; Instruments, procedures, booking method. Leveling methods: Longitudinal sections, contour grid. Positioning and orientation systems: geographical positioning system, gyroscope, prismatic, traverses. Farmstead planning. Plans and drawings. Construction materials. Building procedures and equipment. Structures for specific purposes: farmstead, livestock, crop storage, greenhouses. Building economics and standards: bills of quantities.

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### ACSC 2532: VEGETABLE AND FRUIT PRODUCTION

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<b>Module Title:</b>	<b>VEGETABLE AND FRUIT PRODUCTION</b>
<b>Code</b>	ACSC 2532
<b>NQF Level</b>	5
<b>NQF Credits</b>	16
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)
<b>Contact hours</b>	4 hours lectures per week, 3 hours practical alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Importance of vegetables and fruits. Types of vegetables: leafy, root, fruit vegetables and mushrooms; legumes, runner crops; exotic/indigenous vegetables. Environmental requirements, selection of suitable cultivars, establishment/vegetable nursery practices, management practices. Methods of weed, pest and disease control, harvesting and handling. Mushrooms: spawn production, vegetative growth and requirements, fruit body formation and requirements. Fruit tree nursery technology: soil sterilization and propagation methods. Major tropical and subtropical fruit species, indigenous fruit trees species and nuts: citrus, mangoes, pawpaw, grapes, peaches, figs, dates, guava, marula and macadamia nuts. Soil and climatic requirements, establishment, management practices. Harvesting, post-harvest cycle and post-harvest technology.

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### ACSC 2592: CROP PRODUCTION

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<b>Module Title:</b>	<b>CROP PRODUCTION</b>
<b>Code</b>	ACSC 2592
<b>NQF Level</b>	5
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment) Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	3 hours lecture per week, 3 hours practical alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Crop environment in Namibia. Cropping systems, tillage and crop establishment. Fertilization and management practices. Choice of land for different crops. Environmental factors affecting crop choice: temperature, rainfall, solar radiation, photoperiodism. Time of planting; pre- and post-rain planting. Land preparation: aims, tillage systems conventional, minimum, conservation tillage. Review of tillage and cultivation equipment for large-scale and small-scale farmers. Seeding: factors affecting seed quality, seeding depth, seeding rate, plant population. Fertilizer application times and methods. Calculation of row and intra-row spacing and fertilizer rates. Cultural practices for weed control. Harvesting: physiological maturity and harvest maturity, harvest index. Cropping systems— monoculture, mixed culture and intercropping. Soil requirements, climatic requirements and management practice for cereals; legumes, fibre crops, oil seed crops, root and tuber crops.

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### **AASC 2502: APPLIED ANIMAL BREEDING**

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<b>Module Title:</b>	<b>APPLIED ANIMAL BREEDING</b>
<b>Code</b>	AASC 2502
<b>NQF Level</b>	5
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 lecture per week; 3 hours practicals alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**  
Applications of population and quantitative genetics principles to the improvement of livestock and poultry. Principles of gene segregation and analysis. Concepts in population genetics including change in gene frequencies as the basis for livestock improvement by selection, Hardy-Weinberg equilibrium, forces that change gene frequencies are discussed. The module covers: Mendelian genetics; causes of variation, measures of variation, partitioning of variation into its causes; estimation of heritability; genotype x environment interactions; correlations between traits; principles of selection; genetic relationships. The practical application of the principles of selection are discussed emphasizing livestock performance recording and evaluation, methods of breed improvement by selection and utilization of different mating systems in beef cattle, dairy cattle, swine, sheep and goats. Breeding values and their application in industry breeding

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### **C.5 THIRD YEAR**

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#### **AACA 2600: SPECIAL STUDY**

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<b>Module Title:</b>	<b>SPECIAL STUDY</b>
<b>Code</b>	AACA 2600
<b>NQF Level</b>	6
<b>NQF Credits</b>	16
<b>Contact hours</b>	32
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:**  
Students carry out a supervised study of a current topic in Agriculture and related fields. The course includes participation in meetings organized by the coordinator, work with a faculty advisor to develop a study, formulate hypotheses, design and carry out experiments and collect data and write a report. Students will make a presentation to other students of the research proposal and a final presentation of the results.

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#### **AACA 2601: FIELD ATTACHMENT**

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<b>Module Title:</b>	<b>FIELD ATTACHMENT</b>
<b>Code</b>	AACA 2601
<b>NQF Level</b>	6
<b>Assessment Strategies</b>	Assessment will consist of on-site inspection, a report by the field supervisor and a written report and oral presentation by the student.
<b>Notional Hours</b>	80
<b>Contact hours</b>	6 weeks
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**  
Three periods of , in total, six (6) weeks of field attachment will be undertaken by all Diploma students in one summer recess period (two are available: between the 1st and 2nd year and again between 2nd and 3rd year) and the winter recess in the 2nd year to gain practical experience and hands-on skills in support of teaching. During these periods, the students will be attached to suitable community forests, research stations, extension units and agro-industries in a structured, pre-planned manner to ensure that the objectives of off-site training are attained. Students will be visited during their attachment on-site to check on the efficiency of attachment. Twenty-one lecture hours (2 credits at level 5) will be allocated to this course for oral presentations.

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#### **AAEC 2641: PRINCIPLES OF AGRICULTURAL EXTENSION**

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<b>Module Title:</b>	<b>PRINCIPLES OF AGRICULTURAL EXTENSION</b>
<b>Code</b>	AAEC 2641
<b>NQF Level</b>	6
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours lectures and 2 hr practical alternate week for 14 weeks
<b>Prerequisite</b>	None

**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

Definition of extension and history of extension; role of agriculture extension worker; extension methods and nature of extension and development; the concept of adult learning; adoption and diffusion theory; opinion leaders and contact farmers; agricultural extension system and approaches: FSRE; group dynamics; establishing and strengthening farmer organisations and formation of new groups; Participatory Rural Appraisal (PRA) techniques; Theoretical perspective in extension program development, purpose and steps in planning process; Agriculture extension campaigns; Motivation theory (Maslow's Hierarchy of needs) plan of work coordination supervision and administration feedback and evaluation procedure.

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**AAEC 2661: AGRICULTURAL MARKETING AND POLICY**

**Module Title:** AGRICULTURAL MARKETING AND POLICY  
**Code NQF Level NQF** AAEC 2661  
**Credits Assessment** 6  
**Strategies** 8  
Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)  
**Contact hours** 2 lectures per week for 14 weeks  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

The course introduces students to concepts and theory in agricultural marketing as well as marketing plans of agricultural commodities and the essentials trade and contemporary policy issues critical to economic performance and growth in today's dynamic and competitive environment.

Introduction to marketing, marketing functions and systems, marketing agricultural products, determining prices of agricultural products, demand and supply elasticities of agricultural commodities, price fluctuations, marketing margins, marketing alternatives (auctions, commodity exchanges, future and contract markets) and strategies, market structures, supply chain analysis (supply and demand chain, vertical and horizontal integration) of key agricultural commodities in Namibia. Introduction to policy formulation and analysis, the National Agricultural Policy, credit policy, input policy, environmental policy, food security policy.

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**AASC 2681: INTENSIVE ANIMAL PRODUCTION**

**Module Title:** INTENSIVE ANIMAL PRODUCTION  
**Code** AASC 2681  
**NQF Level** 6  
**NQF Credits** 12  
**Assessment Strategies** Continuous Assessment: 60 % (2x assignments + 2 tests + at least 5 marked practicals); Exam: 40% (1 x 2 hr paper)  
**Contact hours** 03 Lecturers hours / week for 14 weeks; 03 Practical hours / weeks alternating  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 2

This course develops the students' understanding of pig, dairy and poultry production

Pig production in Namibia, Pig breeds & production systems. The pig cycle and the management of pigs. Marketing, transportation and animal welfare. Pig slaughter and product quality, Processing, preservation and storage of animal products. The Namibian dairy industry. Breeds of dairy cattle & production systems. The production cycle and management of dairy cattle. Processing, preservation and storage of dairy products. Poultry production in Namibia; Poultry breeds & production systems; Poultry management. Marketing, transportation and animal welfare, Chicken slaughter and product quality, Processing, preservation and storage of animal products.

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**ACSC 2601: WATER MANAGEMENT AND SOIL CONSERVATION**

**Module Title:** WATER MANAGEMENT AND SOIL CONSERVATION  
**Code** ACSC 2601  
**NQF Level** 6  
**Notional Hours** 80  
**NQF Credits** 8  
**Contact hours** 2 lectures per week, 3 hours practical alternate weeks for 14 weeks  
**Prerequisite** ACSC 2581 Soil Science  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Aims:**  
This course develops a student's understanding of irrigation crop water requirements and the process of soil erosion.

**Module content:**

The hydrological cycle, water sources and quality, uses and requirements. Water harvesting and storage. Soil erosion and soil loss estimation. Wind erosion and control. Conservation agriculture. Social, economic and institutional factors in water management and soil conservation planning. Overview or irrigation in Namibia. Soil/plant/water relationships. Crop water requirements. Irrigation methods. Drainage of agricultural lands.

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)

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**AASC 2691: RANGE MANAGEMENT**

**Module Title:** RANGE MANAGEMENT  
**Code** AASC 2691  
**NQF Level** 6  
**NQF Credits** 12  
Continuous Assessment: 60% (2x assignments + 2 tests + at least 5 marked practicals); Exam: 40% (1 x2 hr paper)

<b>Contact hours</b>	3 lectures and 2 hours practical alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module content:**

Roles, basic terminologies & background information on rangelands; Namibian range types. Overview of the carrying capacity of Namibian range types and carrying capacity determination. Morphology and taxonomy of common range plants. Growth cycle of plants and plant & seed dormancy. Types of succession including pioneer, sub-climax and climax processes; Retrogression and die-back rate of selected range plants; Factors influencing succession; State & transition models. Animal-plant interactions on range. Plant adaptation to herbivory; Grazing systems & stocking rates. Continuous and rotational grazing. Range degradation: Bush encroachment, overgrazing, desertification and erosion. Range evaluation and monitoring; Range condition & trend assessment; integrated feed budgeting and fodder flow planning; introduction to cultivated pastures; conservation of forage: hay and silage, in situ conservation.

**AAEC 2602: PROJECT MANAGEMENT**

<b>Module Title:</b>	<b>PROJECT MANAGEMENT</b>
<b>Code</b>	AAEC 2602
<b>NQF Level</b>	5
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours of lectures per week and 2 hour practical alternate week 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module content:**

Project as a means of developing rural areas. The project cycle; project identification, situation analysis: problem tree analysis. Project review (technical, institutional and managerial); Project environment: social, political, financial economic, commercial, legal and gender. Project design techniques (logical framework); Project implementation, management structure and resources; Project monitoring; project evaluation, type of evaluation. Examples of projects, Namibian projects, level of planning. Projects in the context of the regional and national development plan.

**AASC 2622: ANIMAL NUTRITION AND FEEDING**

<b>Module Title:</b>	<b>ANIMAL NUTRITION AND FEEDING</b>
<b>Code</b>	AASC 2622
<b>NQF Level</b>	6
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours lectures per week; 3 hours practicals alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module content:**

The chemical composition of feeds. The biochemistry of nutrients (carbohydrates, lipids, proteins, vitamins and micro- and macro-minerals), anti-nutrients and water. Nutrient standards (voluntary feed intake, crude protein, digestibility, metabolizable energy) and the nutrient requirement of animals. Feeds and feedstuffs (roughage, concentrates, supplements, feed additives, growth promotants and performance manipulants). Comparative digestion of feeds and absorption (diffusion & facilitated) of nutrients in ruminants and non-ruminants. Mineral and Vitamin Nutrition. On-farm processing of feeds. Feed formulation. Metabolic disorders.

**AAEC 2622: ENTREPRENEURSHIP**

<b>Module Title:</b>	<b>ENTREPRENEURSHIP</b>
<b>Code</b>	AAEC 2622
<b>NQF Level</b>	6
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours lectures and 2 hrs practical alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module content:**

Management function; types of business organization. Human resource management in SMEs: labour requirement, recruitment, selection and induction, compensation and incentives, labour relations, dismissal and compliance with Labour Act; Entrepreneurship; Strategic management dimensions, strategy levels, decisions, risks and benefits; Strategic plan; The SWOT analysis, business environment, formulation of objectives and strategies, development of action plans and functional tactics and strategic control; components of feasibility study and business plan.

**AASC 2602: GAME FARMING**

<b>Module Title:</b>	<b>GAME FARMING</b>
<b>Code</b>	6
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours per week lectures; 3 hours practical alternate week for 14 weeks
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

Potentials and constraints of game ranching in Namibia. Identification, ecology and management of suitable game species in Namibia. Management of the game ranch. Wildlife ethology and its implication to wildlife management. Wildlife surveys. Wildlife management in conservancies, community forests and other land uses types. Future prospects of each land use. Human and wildlife conflicts: the concept, management of conflict, existing policies and regulations on human wildlife conflicts. Game population dynamics. Environment, production, financial and marketing management. Product diversity and quality control.

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#### **AASC 2642: EXTENSIVE ANIMAL PRODUCTION**

<b>Module Title:</b>	<b>EXTENSIVE ANIMAL PRODUCTION</b>
<b>Code</b>	AASC 2642
<b>NQF Level</b>	6
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours lectures; 3 hours practical alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module content:**

Characteristics, requirements and constraints of extensive meat production systems in Namibia. Production systems. Breeds of beef cattle, mutton sheep and goats. Facilities and handling. Management: sexual activity and fertility, flock composition, management targets and calendar, herd health, diversification. Economics of and factors affecting extensive meat production in Namibia, including legal framework. Record keeping. Growth and development of muscle, fat and connective tissue. Muscle physiology and composition. Conversion of muscle to meat during slaughtering and processing. Meat quality and legal framework. Bio-security. Consumer concerns. Future prospects of the industry.

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#### **ACSC 2682: FARM POWER AND MACHINERY**

<b>Module Title:</b>	<b>FARM POWER AND MACHINERY</b>
<b>Code</b>	ACSC 2682
<b>NQF Level</b>	6
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	3 hours lecture per week; 3 hours practical alternate week for 14 weeks
<b>Prerequisite</b>	AAEC 2411 Mathematics and Basic Statistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module content:**

Animal Power in Namibia. Selection, training and maintenance of draft animals. Animal drawn implements. Internal combustion engines and maintenance. Transmission and other sub systems. Tractors operation and maintenance. Tillage: Primary secondary, conservation tillage equipment, Implement Types, their operation, calibration and maintenance Crop planting, fertilization and weed control, crop protection, harvesting and post-harvest equipment. Crop drying, storage, handling and processing equipment. Farm machinery management.

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#### **ACSC 2622: CROP PROTECTION**

<b>Module Title:</b>	<b>CROP PROTECTION</b>
<b>Code</b>	ACSC 2622
<b>NQF Level</b>	6
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 2 hour paper)
<b>Contact hours</b>	2 hours lectures per week, 3 hours practical alternate week
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module content:**

Definition of pests, diseases and weeds. Pests and diseases during production and storage. Importance of crop protection. Characteristics and classification of insects, fungi, bacteria, viruses and weeds. Common fungal, bacterial and viral plant diseases of Namibia. Common weeds of Namibia. Common insect pests of Namibia. Methods of crop protection and their application. Integrated pest management. Pesticide handling and safety. Crop protection legislation in Namibia and International guidelines.

## D. B.SC. AGRICULTURE (AGRICULTURAL ECONOMICS) HONS (17BSAE)

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by School of Science. English Communication and Study Skills, English for Academic Purposes, Contemporary Social Issues and Computer Literacy are University Core Modules taken by all First Year University of Namibia students.

### D.1 PROGRAMME SCHEDULE

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
UCLC 3509	Computer Literacy	5	8	C	
ULCE 3419	English Communication and Study Skills	4	16	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
SBLG 3511	Introduction to Biology	5	16	C	
CEMI 3571	Basic Microeconomics	5	16	C	
SMAT 3511	Basic Mathematics	5	16	C	
<b>Total Credits Semester 1</b>					<b>80</b>
<b>Year 1 Semester 2</b>					
CEMA 3572	Basic Macroeconomic	5	16	C	
SBLG 3512	Diversity of Life	5	16	C	
SMAT 3512	Diversity of Life	5	16	C	
SSTS 3522	Introduction to Statistics	5	8	C	
ULEA 3519	English for Academic Purposes	5	16	C	
<b>Total credits Semester 2</b>					<b>72</b>
<b>Total CREDITS YEAR 1</b>					<b>152</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 2 Semester 1</b>					
AAEI 3681	Intermediate Microeconomics	6	12	C	CEMI3571 (Basic Microeconomics)
AAEC 3691	Rural Sociology	6	12	C	None
AAEF 3681	Financial Management	6	12	C	None
AAEA 3681	Agric. Communication and Group Dynamics	6	12	C	None
ACSC 3691	Agronomy	6	12	C	None
<b>Total Credits Semester 1</b>					<b>60</b>
<b>Year 2 Semester 2</b>					
AAEC 3682	Production Economics	6	12	C	CEMI3571(Basic Microeconomics)
AAEI 3682	Intermediate Macroeconomics	6	12	C	CEMA3572(Basic Macroeconomics)
AAEC 3612	Mathematical Economics & Linear Programming	6	16	C	SMAT 3511 (Basic Mathematics)
AASC 3602	Livestock Production Systems	6	8	C	None
AFST 3602	Food Technology	6	8	C	None
<b>Total credits Semester 2</b>					<b>60</b>
<b>Total CREDITS YEAR 2</b>					<b>120</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 3 Semester 1</b>					
AACA 3701	Field Attachment I*	7	8	C	None
ACSE 3781	Agricultural Engineering	7	12	C	None
AAEC 3751	Econometrics	7	16	C	AAEC 3612 (Mathematical)

					Economics & Linear Programming)
AAER 3781	Resource Economics	7	12	C	AAEI 3681 (Intermediate Microeconomics)
AAEC 3781	Farm Planning and Management	7	12	C	None
AAED 3781	Development Economics	7	12	C	None
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 3 Semester 2</b>					
AAER 3782	Research Methodology in Agric. Economics	7	12	C	None
AAEC 3712	Agricultural Extension	7	16	C	AAEC 3691 (Rural Sociology)
AAEC 3702	Entrepreneurship	7	8	C	None
ACSC 3722	Crop Storage and Handling	7	8	C	None
ACSC 3722	Agricultural Price analysis and Forecasting	7	12	C	AAEC 3731 (Econometrics)
AAEC 3782	Agricultural marketing	7	12	C	None
<b>Total credits Semester 2</b>					<b>68</b>
<b>Total CREDITS YEAR 3</b>					<b>140</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 4 Semester 1</b>					
AACA 3801	Field Attachment II	8	8	C	None
AAEC 3810	Research Project in Agricultural Economics	8	16	C	AAER3782 (Research Methodology Agricultural Economics)
AAEC 3881	Project Planning and Management	8	12	C	None
AAEC 3891	International Agricultural Trade	8	12	C	None
AASC 3881	Beef Production	8	12	C	None
<b>Total Credits Semester 1</b>					<b>60</b>
<b>Year 4 Semester 2</b>					
AAEC 3810	Research Project in Agricultural Economics	8	16	C	AAER3782 (Research Methodology Agricultural Economics)
AAEC 3882	Agricultural Policy Analysis	8	12	C	None
AAEA 3882	Agric. Business Management	8	12	C	None
AASC3892	Small Ruminant Production	8	12	C	None
AAEC 3842	Rural Development	8	8	C	AAEC 3712 (Agricultural Extension)
<b>Total credits Semester 2</b>					<b>60</b>
<b>Total CREDITS YEAR 4</b>					<b>120</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>532</b>

## D.2 MODULE DESCRIPTORS

### D.3 FIRST YEAR

#### CLC3509: COMPUTER LITERACY

Module title:	COMPUTER LITERACY
Code:	CLC3509
NQF level:	5
Contact hours:	1 lecture theory and 1 lecture practical per week for 14 weeks
Credits:	8
Module assessment:	Continuous Assessment 100%: 2 Practical Tests 50%, 2 Theory Tests 50%

**Prerequisites:** University Entry

**Module Content:**

The aim of this module is to equip the students through hands-on experience with the necessary skills to use application software: word processing, spreadsheets, databases, presentations and communications. The objective is to increase student's productivity in both the education and later, the work environment. The module covers the following topics. Introduction to Computers: hardware and software, types and categories of computers, usage of Computer devices and peripherals. Working with the windows operating system: File Management, working with multiple programs, using the recycle bin. Using a word processor: formatting a text and documents, spelling check, grammar and thesaurus tools, inserting tables, auto-shapes, clip arts, charts, and mail merge. Spreadsheet: worksheets and workbooks, ranges, formulas and functions, creating graphs, charts, and printing the workbook.

Databases: creating tables, relationships, queries, forms and reports. Presentation software: slide layout and master, animations, auto-content wizard and templates. Communication tools: introduction to the Internet, web browsers, search engines, downloading and uploading files, creating and sending messages, email etiquette, internet security, and digital signatures.

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**LCE3419 ENGLISH COMMUNICATION & STUDY SKILLS**

**Module title:** ENGLISH COMMUNICATION AND STUDY SKILLS  
**Code:** LCE3419  
**NQF Level:** 4  
**Contact hours:** 4 hours per week for 14 weeks  
**Credits:** 16  
**Module Assessment:** Continuous assessment (60%): two tests (reading and writing), two reading assignments, one oral presentation, Examination (40%): one three hour examination paper  
**Pre-requisites:** None

**Module Content:**

This module is aimed at assisting students in the development of their reading, writing and speaking and listening skills, in order to cope with studying in a new academic environment and in a language which may not be their first language. The module also focuses on study skills that students need throughout their academic careers and beyond. The module serves as an introduction to university level academics, where styles of teaching and learning differ from those at secondary schools in that more responsibility is placed on the student. The module therefore, focuses on the skills that students need throughout their academic careers and beyond.

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**CSI 3580 CONTEMPORARY SOCIAL ISSUES**

**Module Title:** CONTEMPORARY SOCIAL ISSUES  
**Code** CSI 3580  
**NQF Level** 5  
**NQF Credits** 8  
**Contact hours** Equivalent to 1 hour per week for 2 semesters (Online)  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1&2

**Module Content:**

The module, Contemporary Social Issues (CSI3580), is designed to encourage behavioural change among UNAM students and inculcate the primacy of moral reasoning in their social relations and their academic lives. In providing students with critical and analytical thinking the module enables students to grow and develop into well rounded citizens, capable of solving contemporary social challenges experienced in their communities and societies. The teaching of the module takes three dimensions: the intellectual, the professional and the personal dimensions. The intellectual dimension is fostered through engaging students with subject knowledge, independent learning and module assessment. The professional dimension, on the other hand, is fostered through exposing students to real life situations of case studies and practical exercises that draws attention to social issues that attract ongoing political, public and media attention and/or debate. Finally, the professional dimension is fostered through group work, online discussions and class participation.

**Module Descriptor (Rationale of the module):**

The module, Contemporary Social Issues (CSI3580), is designed to encourage behavioural change among UNAM students and inculcate the primacy of moral reasoning in their social relations and their academic lives. In providing students with critical and analytical thinking the module enables students to grow and develop into well rounded citizens, capable of solving contemporary social challenges experienced in their communities and societies. The teaching of the module takes three dimensions: the intellectual, the professional and the personal dimensions. The intellectual dimension is fostered through engaging students with subject knowledge, independent learning and module assessment. The professional dimension, on the other hand, is fostered through exposing students to real life situations of case studies and practical exercises that draws attention to social issues that attract ongoing political, public and media attention and/or debate. Finally, the professional dimension is fostered through group work, online discussions and class participation.

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**SBLG 3511: INTRODUCTION TO BIOLOGY**

**Module title** INTRODUCTION TO BIOLOGY  
**Code** SBLG3511  
**NQF Level** 4  
**Contact hours** 4 lectures/ week for 14 weeks and one 3-hour practical session per week.  
**NQF Credits** 16  
**Module Assessment:** Continuous assessment (40%): Theory (not less than 3 tests and 2 assignments), 40%. Practicals (not less than 10 marked assignment), 60%. Examination (60%): 3 hour examination paper.  
**Prerequisite** NSCC (Biology C or better)  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

It will consider organization of life, chemical basis of life, carbohydrates, proteins, nucleic acids, lipids and fats, water, cell structure and function, prokaryotic and eukaryotic cells, ultra-structure of plant and animal cells, cytoskeleton, membrane structure and function, cell communication, mitosis, meiosis, cell reproduction, cell cycle, and cell death. The following topics will be covered: Introduction to systems of classification, taxonomy and binomial nomenclature, including the five kingdoms and the three domain system. Definitions and

categories/groups within the five kingdoms, evolution by natural selection (microevolution vs macroevolution), phylogeny and evolutionary relationships in five kingdoms. The course content will also include genes, chromosomes, genomes, Mendelian genetics, extensions to Mendelian genetics, chromosome theory of inheritance, linkage and cross-over, recombination, sex determination. The course content will also cover an introduction to Ecology: Definitions, history, scales in ecology, application of ecology. Conditions and Resources: Environmental conditions, animals and their resources, plants and their resources.

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### CEMI3571: BASIC MICROECONOMICS

<b>Module title:</b>	BASIC MICROECONOMICS
<b>Code:</b>	EMI3571
<b>NQF Level:</b>	5
<b>Credits:</b>	16
<b>Contact hours:</b>	4 hours lecture per week for 14 weeks
<b>Module assessment:</b>	Continuous assessment 50%: two tests and one assignment Examination 50%: 1 x 3 hour examination paper
<b>Pre-requisites:</b>	None

#### Module Content:

Economics is the study of how society allocates scarce resources to satisfy the wants of its members for goods and service. As such, it is a subject concerned with issues of both efficiency and equity. An efficient economy gets the most it can from its scarce resources; an equitable economy fairly distributes the benefits of its resources among its members. Is the economy efficient? Is the economy fair? The course aims to introducing students to key concepts used in microeconomics and facilitate a basic understanding of the economic phenomena. The course is designed to help students understand that society's economic choices often involve trade-offs between efficiency and equity.

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### LEA3519: ENGLISH FOR ACADEMIC PURPOSES

<b>Module title:</b>	ENGLISH FOR ACADEMIC PURPOSES
<b>Code:</b>	LEA3519
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 periods per week for 14 weeks
<b>Credits:</b>	16
<b>Module</b>	Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral presentation Examination (40%): One three hour examination paper
<b>Prerequisites:</b>	None

#### Module Content:

This module develops a student's understanding, and competencies regarding academic conventions such as academic reading, writing, listening and oral presentation skills for academic purposes. Students are required to produce a referenced and researched essay written in formal academic style within the context of their university studies. Students are also required to do oral presentations based on their essays. The reading component of the course deals with academic level texts. This involves students in a detailed critical analysis of such texts. The main aim is therefore, to develop academic literacy in English.

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### SBLG 3512: DIVERSITY OF LIFE

<b>Module title:</b>	DIVERSITY OF LIFE
<b>Code:</b>	SBLG 3512
<b>Course Equivalent:</b>	NSSC (HIGH GRADE) Biology
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lecture periods / week for 14 weeks and one three hour practical session per week
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment: Theory (not less than 3 tests and 2 Assignments) 40% Practicals (not less than 10 marked assignments) 50% Examination: 60% (1 x 2 hour examination paper)
<b>Prerequisites:</b>	NSSC (Biology C or better)

#### Module Content:

This module is designed to give students a detailed understanding of the diversity of life. It gives students the broader appreciation of biodiversity in the different ecological habitats. The course shall describe diagnostic characteristics of principle taxonomic categories for each phylum. Coverage of each Phylum shall follow a phylogenetic (evolutionary) approach as well as introduce broad ecological and physiological principles. Various aspects of reproduction and development shall be highlighted. This module prepares students to understand subsequent courses such as Introduction to Ecology and Microbiology, Population Ecology, Comparative physiology, Biogeography, Plant and Animal Form and Function  
Topics covered will include viral, bacterial, fungal, algal, animal and plant diversity. It then considers the characteristics and life cycles of the following important algae, animal and plant groups: Chlorophyta, Phaeophyta, Rhodophyta, Chrysophyta, Euglenophyta, Pyrrophyta, Cryptophyta, Protostomate phyla: Nemertea, Mollusca, Anellida, Arthropoda, Nematoda, Rotifera, Lophophorates, Onychophora. Deuterostomate phyla: Echinodermata, Hemichordata and Chordata (Subphyla: Urochordata, Cephalochordata and Vertebrata: Class Myxiniiformes, Petromyzontiformes, Placoderms, Chondrichthyes, Actinopterygii, Actinistia, Dipnoi, Amphibia, Reptilia, Aves, Mammalia ) bryophytes, seedless vascular plants, gymnosperms, and the angiosperms. Concepts such as Homology and analogy; body symmetry (radial, bilateral), cephalisation, body cavities: diploblastic, triploblastic (acoelomate and coelomate [deuterostomes and protostomes]) will be covered.

Examples from Namibia shall be used where possible and applicable. The course content shall be supplemented with appropriate weekly practical sessions in the laboratory and in the field.

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### SMAT 3512: PRE-CALCULUS

<b>Module Title:</b>	PRE-CALCULUS
<b>Code:</b>	SMAT 3512
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16

**Module Assessment:** Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).

**Prerequisite:** NSSC Mathematics

**Module Content:**

Functions: one-to-one and onto functions, horizontal line test, composition of functions, inverse of a function. Introduction to exponential and logarithmic functions. Limit of a function: definition, left and right limits, infinite limits, limits at infinity, continuity in terms of limits. Differentiation: rate of change, derivative of a function, rules of differentiation, increasing and decreasing functions and graph sketching. Integration: antiderivatives, the definite integral, area under a graph. Trigonometry: further trigonometric identities, area of a sector and segment of a circle, derivatives and integrals of trigonometric functions.

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### SSTS 3522: INTRODUCTION TO STATISTICS

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**Module Title:** INTRODUCTION TO STATISTICS

**Code:** SSTS 3522

**NQF Level:** 5

**Contact Hours:** 2 Lectures per Week + 1 hour tutorial per week for 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (at least two tests and two assignments) 40%, Examination 60% (1x2 Hour examination paper)

**Prerequisites:** C in IGCSE Mathematics

**Module Content:**

Definition: Statistics; descriptive, inferential. Variables: qualitative versus quantitative. Data types: primary versus secondary, categorical versus discrete, continuous. Sources of data. Population versus sample. Types of measurements: nominal, ordinal, interval, ratio scales. Presentation of data: tabular forms and graphical methods: histograms, pie charts, bar charts, frequency polygons, ogives, stem- and-leaf plots, box- and-whiskers plots. Measures of Central Tendency:  $\Sigma$  notation, mean, median, mode, quartiles, percentiles. Measures of Dispersion: variance, standard deviation, range, inter- quartile range, skewness and kurtosis. Identification of outliers. Uses of scientific calculators for statistical manipulation limited to calculation of mean, standard deviation.

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### CEMA3572: BASIC MACROECONOMICS

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**Module Title:** BASIC MACROECONOMICS

**Code:** CEMA3572

**NQF Level:** 5

**Credits:** 16

**Contact hours:** 4 hours lecture per week for 14 weeks

**Module assessment:** Continuous assessment 50%: two tests and one assignment  
Examination 50%: 1 x 3 hour examination paper

**Pre-requisites:** None

**Module Content:**

This course introduces basic concepts and tools used in macroeconomic analysis: the theory, measurement, and determination of national income; business cycles; the multiplier; fiscal policy, budget deficits, and the national debt; aggregate supply and aggregate demand; money, banking, and monetary policy; exchange rates and balance of payments accounts; and stabilization policy for unemployment and inflation.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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## D.4 SECOND YEAR

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### AAEI 3681: INTERMEDIATE MICROECONOMICS

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**Module Title:** INTERMEDIATE MICROECONOMICS

**Code** AAEI 3681

**NQF Level** 6

**NQF Credits** 12

**Contact hours** 3 lectures per week for 14 weeks

**Strategies:** Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)

**Prerequisite** CEMI 3571 Basic Microeconomics

**Compulsory/Elective** Compulsory

**Semester Offered** 1

**Module Content:**

This course aims to develop students' ability to use some fundamental tools of microeconomics analysis and to apply them to a wide range of economic problems. In particular, the analytical tools are intended to assist students in understanding and undertake research into the area of agricultural economics and agribusiness. This implies focus on firm level issues including the agency problem, consumer behavior looking at choice, preferences, budget constraints, and utility maximization, risk, cost minimization, employment and wages trade offs.

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### AAEC 3691: RURAL SOCIOLOGY

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**Module Title:** RURAL SOCIOLOGY

**Code** AAEC 3691

**NQF Level** 6

**NQF Credits** 12

**Contact hours** 3 lectures per week for 14 weeks

**Assessment Strategies** Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)

**Prerequisite** None

**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

This module investigates the basic sociological concepts and their application to agricultural progress and rural development planning; the significance of rural sociology to agricultural extension and rural development; differences between rural and urban population; culture and culture change, social interaction and social structures; groups and organization, deviance, social class and stratification; Social institutions families; religions; rural/urban migration and environment; social change in global perspective.

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**AAEF 3681: FINANCIAL MANAGEMENT**

**Module Title:** FINANCIAL MANAGEMENT  
**Code** AAEF 3681  
**NQF Level** 6  
**NQF Credits** 12  
**Assessment Strategies** Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)  
**Contact Hour** 3 lectures per week for 14 weeks; 1 practical for 1 hour alternate week for 14 weeks  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

The course includes issues such as: evaluating and controlling profitability, growth, risk and liquidity in the farm and agribusiness firms, farm accounting records, credit, leverage, capital budgets, and capital costs, capital structure, land acquisition and improvements, and sources of credit and finance; farm financing practical implications (time delays in production, daily interest calculations, timeframe involved in perfection of securities proposed for a specific lending).

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**AAEA 3681: AGRICULTURAL COMMUNICATION AND GROUP DYNAMICS**

**Module Title:** AGRICULTURAL COMMUNICATION AND GROUP DYNAMICS  
**Code** AAEA 3681  
**NQF Level** 6  
**NQF Credits** 12  
**Assessment Strategies** Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)  
**Contact Hours** 3 lectures per week for 14 weeks; 1 practical for 2 hours alternate week for 14 weeks  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

The course clarify philosophies, and definition of communication; importance roles and component of communication to change agents; different communication channels and models; Audio-visual aid and public speaking; news reporting articles and newsletters; communication and perception; definition and importance of group; the group as channel of communication; ICT in agriculture (mobile phone, internet and computer usage), group formation and functioning; group techniques; the contribution of Beal, Bohlen and Raudabaugh to group dynamics; Group Norms and cohesion; group goals; Behaviour and attitude in a group; motivation of group; different leadership styles and theories;

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**AAEC 3682: PRODUCTION ECONOMICS**

**Module Title:** PRODUCTION ECONOMICS  
**Code** AAEC 3682  
**NQF Level** 6  
**NQF Credits** 12  
**Assessment Strategies** Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)  
**Contact hours** 3 lectures per week for 14 weeks and 1hour of practical/week  
**Prerequisite** CEMI 3571 Basic Microeconomics  
**Compulsory/Elective** Compulsory  
**Semester Offered** 2

**Module Content:**

This module covers the basic theory of how, what and when firms should produce to maximize profits. Based on the neoclassical theory of the firm presented in most general microeconomic textbooks such as production functions, cost of production, optimum resource allocation, profit maximization, isoquants, product-product relationships, economies of size and scale, it extends the general treatment and focuses on the application of the theory to specific problems that the agricultural firm faces when making production decisions to maximize profits. Technical change is often very expensive equipment in modern production motivates the following focus areas: 1) How to optimize production under restrictions, 2) Treatment of fixed inputs and the process of input fixation, 3) Optimization of production over time, 4) Linear Programming as tools for optimization in practice. Introduce students to the concept of production decisions under risk and uncertainty.

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**AAEI 3682: INTERMEDIATE MACROECONOMICS**

**Module Title:** INTERMEDIATE MACROECONOMICS  
**Code** AAEI 3682  
**NQF Level** 6  
**NQF Credits** 12  
**Assessment Strategies** Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)  
**Contact hours** 3 lectures per week for 14 weeks  
**Prerequisite** CEMA 3572 Basic Macroeconomics  
**Compulsory/Elective** Compulsory

**Semester Offered** 2

**Module Content:**

The course includes issues such as: price indices, inflation, real and nominal values, national accounting, determination of aggregate demand and supply, consumption, investment, and savings; it also presents fiscal and monetary policies, government spending, taxation, budget deficits, interest rates, money and banking and balance of payments, employment and business cycles. It provides an overview of the position of the agriculture and fishing sectors in the national economy.

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**AEC 3612: MATHEMATICAL ECONOMICS AND LINEAR PROGRAMMING**

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<b>Module Title:</b>	MATHEMATICAL ECONOMICS AND LINEAR PROGRAMMING
<b>Code</b>	AEC 3612
<b>NQF Level</b>	6
<b>NQF Credits</b>	16
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 3 hour paper)
<b>Contact Hours</b>	4 lectures per week for 14 weeks; 1 practical for 1 hour per week for 14 weeks
<b>Prerequisites</b>	SMAT 3511 Basic Mathematics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course focuses on matrix algebra, functions, differentiation, integration, simplex method and linear programming and their applications to decision making in agricultural economics and business.

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**D.5 THIRD YEAR**

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**AACA 3701: FIELD ATTACHMENT I**

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<b>Module Title:</b>	FIELD ATTACHMENT I
<b>Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 40% (Class oral presentation); 60% (report write up.)
<b>Contact Hours</b>	6 weeks of Field Attachment
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:**

This is a practical course where students spend time at real work situations under the supervision of qualified personnel. The students are attached to suitable agricultural businesses and institutions concerned with agricultural economics and rural development and agriculture. During the attachment period University lecturers visit the students to ensure that they are doing practical work as prescribed.

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**AAEC 3751: ECONOMETRICS**

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<b>Module Title:</b>	ECONOMETRICS
<b>Code</b>	AAEC 3751
<b>NQF Level</b>	7
<b>NQF Credits</b>	16
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 3 hour paper)
<b>Contact Hours</b>	4 lectures per week for 14 weeks; 2 practical hours per week for 14 weeks
<b>Co-requisite</b>	AAEC 3612 Mathematical Economics & Linear Programming
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

The course includes issues such as: classical linear regression model, assumptions, model formulation, hypothesis testing, and violation of OLS assumptions, detection and correction of multicollinearity, autocorrelation, heteroscedasticity, functional forms, dummy variables, and estimation using appropriate computer software (e.g. SPSS or STATA)

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**AAER 3781: RESOURCE ECONOMICS**

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<b>Module Title:</b>	RESOURCE ECONOMICS
<b>Code</b>	AAER 3781
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 1 practical for 1 hour alternate week for 14 weeks
<b>Prerequisite</b>	AAEI 3681 Intermediate Microeconomics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

The course include issues such as: Natural Resources classification; natural resources issues (efficient utilization, sources of inefficiency –property right, externalities, market and government failure); resource scarcity and sustainability use of natural resources, policies to address efficiency goals; natural resources analysis and valuation (introduction to Cost-Benefit analysis, use and non-use values, and resources valuation techniques –Hedonic Pricing Method, Travel Cost Method and Contingent Valuation Method); application of economics in natural resources management – renewable resources (e.g. fishery, water, forest and land) and non renewable resources (mineral, petroleum or natural gas) use/extraction.

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**AAEC 3781: FARM PLANNING AND MANAGEMENT**

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<b>Module Title:</b>	FARM PLANNING AND MANAGEMENT
<b>Code</b>	AAEC 3781
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 1 practical for 1.5 hour every alternate for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

The course includes issues such as: management of farm records; machinery; land; labor; and capital, farm business planning, enterprise budgeting, agricultural risk management strategies. Students will be exposed to business planning using spreadsheets.

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**AAED 3781: DEVELOPMENT ECONOMICS**

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<b>Module Title:</b>	DEVELOPMENT ECONOMICS
<b>Code</b>	AAED 3781
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 1 practical for 1 hour alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

This course is an introduction to the field of development economics, focusing on some key questions such as: why some countries poor and others rich? Why some countries experienced rapid economic development while others are trapped in poverty? It also reviews policy issues which developing countries can pursue to best address poverty and underdevelopment. These are just few of the many questions that this course will deal with. Last but not the least, the course looks at how international factors such as trade and foreign investment affect a country's economic development.

The course is divided into 3 main parts. PART I: Defining and Measuring Economic Development: the millennium development goals, human development index, measuring inequality, measuring poverty. PART II: Domestic Development Policy: Theories of economic development; human capital and development; rural-urban migration; agricultural markets and development. PART III: International Policies: Trade and development; balance of payment and debt crisis; foreign sources of finance, financial markets and government policy.

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**AAER 3782: RESEARCH METHODOLOGY IN AGRICULTURAL ECONOMICS**

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<b>Module Title:</b>	RESEARCH METHODOLOGY IN AGRICULTURAL ECONOMICS
<b>Code</b>	AAER 3782
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 1 practical for 1 hour per week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course includes issues such as: identifying research problems, definition research problem, and formulation, data collection, data analysis, presentation and report writing.

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**AAEC 3712: AGRICULTURAL EXTENSION**

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<b>Module Title:</b>	AGRICULTURAL EXTENSION
<b>Code</b>	AAEC 3712
<b>NQF Level</b>	7
<b>NQF Credits</b>	16
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 3 hour paper)
<b>Contact Hours</b>	4 lectures per week for 14 weeks; 1 practical for 1 hour per week for 14 weeks
<b>Prerequisite</b>	AAEC 3691 Rural Sociology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course explores Extension concepts; principles and theories; compare Modern and Traditional Extension; agricultural extension as adult learning; extension methods; definition and importance of program extension; philosophy and principles of program development in extension; Comparing agricultural extension approaches (FSRE); Science and Indigenous knowledge systems and participatory appraisal techniques; Social change and innovation; Attributes of Innovations and their rate of adoptions; Elements in diffusion of Innovations; Motivational theories; Community participation and involvement in extension, PRA methodologies and techniques; Improving the organisation and management of extension; establishing and strengthening farmer's organisations.

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**AAEC 3702: ENTREPRENEURSHIP**

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<b>Module Title:</b>	ENTREPRENEURSHIP
<b>Code</b>	AAEC 3702

<b>NQF Level</b>	7
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	2 lectures per week for 14 weeks; 1 practical for 1.5 hour alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course includes issues such as: types of entrepreneurs, the importance of entrepreneurship and the forces and ideas that lead to business establishment, growth and survival, choice of the option of self-employment (carrying out feasibility studies and writing business plan), entrepreneurial process, the different schools of thought on the sources of entrepreneurship, the entrepreneur's characteristics, traits and motivation; developing entrepreneurial skills (SWOT analysis, business opportunity identification, opportunity assessment and evaluation) the role of entrepreneurship in the economy: the management competencies necessary for business success (planning, organizing, coordinating, operations, directing, leading and controlling), financing a business, Government policies on small business ventures (SME).

**AAEA 3782: AGRICULTURAL PRICE ANALYSIS AND FORECASTING**

<b>Module Title:</b>	AGRICULTURAL PRICE ANALYSIS AND FORECASTING
<b>Code</b>	AAEA 3782
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 2 hours practicals per week for 14 weeks
<b>Co-requisite</b>	AAEC 3731 Econometrics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

In this module students will be exposed to role price, price determination and price discovery, using of index numbers to correct for inflation, analysis of trend (movement of prices over time), least square regression analysis for defining trends and relationship between data series, prices analysis during cycles, measuring cycles, conceptual basis for seasonality, measuring seasonality, estimation of demand and supply function, estimating price discovery models, and causality.

**AAEC 3782: AGRICULTURAL MARKETING**

<b>Module Title:</b>	AGRICULTURAL MARKETING
<b>Code</b>	AAEC 3782
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact hours</b>	3 lectures per week for 14 weeks; 1 Practical for 3 hours every alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course include issues such as: Agricultural to marketing functions; Price Analysis and the marketing functions (role of price in a competitive economy, relative prices, supply and demand analysis elasticities, price discovery etc.); Farm and Food Prices; Risk Management and Futures Markets; Models of market behavior (derived demand, derived supply and food and marketing costs/margins; Marketing Research and Planning (SWOT analysis i.e. internal and external environment analysis, marketing mix the 4P's); Spatial characteristics of markets (including marketing constraints in developing countries); Agricultural products markets and supply chain management (supply and demand chain, vertical and horizontal integration, middlemen, agricultural cooperatives); Commodity supply chain analysis; Strategic marketing management.

**D.6 FOURTH YEAR**

**AAEA 3801: FIELD ATTACHMENT II**

<b>Module Title:</b>	FIELD ATTACHMENT II
<b>Code</b>	AAEA 3801
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Assessment Strategies</b>	40% (Class oral presentation); 60% (report write up.)
<b>Contact Hours</b>	8 practical hours per day for 6 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:**

This is a practical course where students spend time at real work situations under the supervision of qualified personnel. The students are attached to suitable agricultural businesses such the Ministry of Agriculture and Forestry's Green Scheme projects, Meatboard Board of Namibia, Agronomic Board, and institutions concerned with agricultural economics and rural development and agriculture such as the Agricultural Bank of Namibia (AGRIBANK) and the Development Bank of Namibia (DBN). Students are engaged in decision-making exercises, planning, monitoring and evaluation of agricultural extension programmes and plans. Furthermore, they should be engaged in data capturing, analysis report writing and record keeping. During the attachment period University lecturers visit the students to ensure that they are doing practical work as prescribed.

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**AAEC 3810: RESEARCH PROJECT IN AGRICULTURAL ECONOMICS**

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<b>Module Title:</b>	RESEARCH PROJECT IN AGRICULTURAL ECONOMICS
<b>Code</b>	AAEC 3810
<b>NQF Level</b>	8
<b>NQF Credits</b>	32
<b>Assessment Strategies:</b>	Continuous assessment (100%) consisting of research proposal write up and presentation of proposal in a seminar, presentation of empirical findings in a second seminar, and grading of the final report
<b>Contact Hours</b>	1 hour per week for 28 weeks
<b>Prerequisite</b>	AAER 3782 Research Methodology in Agricultural Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 & 2

**Module Content:**

Students carry out independent study of a current topic in natural resources and agriculture. The course include participation in meetings organized by the coordinator, work with a faculty advisor to develop a research project, formulate hypotheses, design and carry out preliminary experiments and collect data and test the hypotheses. Students will carry out independent library research, begin experimental work, prepare a written report and make a presentation to other students the proposal and final report. The student will submit a final report written following Guidelines for Scientific Writing.

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**AAEC 3881: PROJECT PLANNING AND MANAGEMENT**

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<b>Module Title:</b>	PROJECT PLANNING AND MANAGEMENT
<b>Code</b>	AAEC 3881
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact hours</b>	3 lectures per week for 14 weeks; 1 practical for 1.5 hour alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Aims:**

The course exposes students to principles and applications of project planning and management in agriculture.

**Module Content:**

The course includes topics such as: planning process, project cycle, logical framework, financial and economic analysis of project; Project feasibility and appraisal techniques (pay back period, the time value of money, Net Present Value, Benefit cost Ratio, and Internal Rate of Return), and sensitivity analysis; Project monitoring and evaluation, leadership, control, and the problems of identifying project costs and benefits and dealing with sustainability in project implementation

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**AAEC 3891: INTERNATIONAL AGRICULTURAL TRADE**

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<b>Module Title:</b>	INTERNATIONAL AGRICULTURAL TRADE
<b>Code</b>	AAEC 3891
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 week; 1 practical for 1.5hours alternate week for 14 weeks
<b>Compulsory/Elective</b>	Compulsory
<b>Prerequisite</b>	None
<b>Semester Offered</b>	1

**Module Aims:**

The course exposes students to concepts and theories of international agricultural trade and policy for exporting countries and importing countries

**Module Content:**

The course includes topics such as: agricultural trade policies, role and benefits of international trade, welfare impacts of trade policies, importance of multilateral and regional trade agreements such as WTO, SACU, EPAs, and technical barriers to trade currently shaping international trade.

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**AAEC 3882: AGRICULTURAL POLICY ANALYSIS**

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<b>Module Title:</b>	AGRICULTURAL POLICY ANALYSIS
<b>Code</b>	AAEC 3882
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 1 practical for 2 hours per alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course includes issues such as: policy issues relevant to Namibia, policy intervention and cost and benefits of policy intervention, food security, food quality and food safety policies, agricultural and environment policy, economic evaluation of alternative policies and their application for farmers, consumers and agribusiness.

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**AAEA 3882: AGRIBUSINESS MANAGEMENT**

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<b>Module Title:</b>	AGRIBUSINESS MANAGEMENT
<b>Code</b>	AAEA 3882
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 1 practical for 1.5 hour alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course includes issues such as: Agribusiness management process, industry situation analysis and industry attractiveness, methods of analyzing competitiveness, competitive advantages and how to sustain it; strategic management (environmental scanning, strategy formulation, strategy implementation and control; social responsibility and business ethics, human resource management. Case studies of agribusiness or agro-food complex in Southern Africa.

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**AAEC 3842: RURAL DEVELOPMENT**

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<b>Module Title:</b>	RURAL DEVELOPMENT
<b>Code</b>	AAEC 3842
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 2 hour paper)
<b>Contact Hours</b>	2 lectures per week for 14 weeks; 1 practical for 1 hour alternate week for 14 weeks
<b>Prerequisite</b>	AAEC 3712 Agricultural Extension
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course includes issues such as: rural poverty and deprivation and the major factors in food security and insecurity –access to basic services: education, health, infrastructure, water and safe sanitation; rural development models; integrated rural development; rural employment and unemployment, incomes and livelihoods; land reform and land resettlement practices and challenges; rural cooperatives –challenges and best practices.

## E. BACHELOR OF SCIENCE IN ANIMAL SCIENCE HONOURS (NEUDAMM CAMPUS) (31BSAS)

### E.1 PROGRAMME SCHEDULE

Course code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisites)/ Pre-requisites	Contact hours per week (L/P/T)
<b>Year 1 Core Semester</b>						
U3583AL	Academic Literacy IB	5	8	C	None	40 hours
U3403FS	Skills Portfolio	4	0	C	None	
U3583DD	Digital Literacy	4	8	C	None	Sem 0: 4hr/wk Sem 1: 2hr/wk Sem 2: 2hr/wk
F3500EE	Issues in Agriculture	4	4	E	None	20 hr
F3520ZP	Basic Programming with Python	5	4	E	None	20 hr
<b>Total Credits Core Semester</b>			<b>24</b>			
<b>Year 1 Semester 1</b>						
F3511AB	Introduction to Biochemistry	5	14	C	None	L (4h/w) P (3h/w)
F3513AR	Introduction to Range Management	5	14	C	None	L (4h/w) P (3h/w)
F3551AA	Animal Anatomy & Physiology	5	14	C	None	L (4h/w) P (3h/w)
F3531CA	Mathematics for Agriculture	5	12	C	None	L (4h/wk) T (3h/w)
<b>Total Credits Semester 1</b>			<b>54</b>			
<b>Year 1 Semester 2</b>						
F3532AG	Molecular Genetics	5	14	C	Introduction to Biochemistry	L (4h/w) P (3h/w)
F3512AL	Livestock Production Systems	5	14	C	None	L (4h/w) P (3h/w)
F3502AF	Introduction to Fodder Production	5	7	C	None	L (2h/w) P (2h alt w)
F3522AM	Principles of Microbiology	5	8	C	Introduction to Biochemistry	L (2h/w) P (3h/w)
F3532AS	Introduction to Statistics	5	12	C	None	L (4h/w) T (3h/w)
<b>Total Credits Semester 2</b>			<b>55</b>			
<b>Total credits Year 1</b>			<b>133</b>			
<b>Year 2 Core Semester</b>						
U3683AL	Academic Literacy II	6	8	C	None	40 hours
U3520LP	Leadership Skills	5	2	C	None	10 hours
U3420CN	National and Global Citizenship	4	2	C	None	10 hours
U3420EM	Ethics and Morality	4	2	C	None	10 hours
F3600ZP	Introduction to Statistical Programming with R	6	8	C	None	40 hours
F3683AF	Farm Duties for Animal Scientists	6	2	C	None	10 hours
<b>Total Credits Core Semester</b>			<b>24</b>			
<b>Year 2 Semester 1 (49-56 credits)</b>						
F3611AB	Biochemistry	6	16	C	Introduction to Biochemistry	L (4h/w) P (3h/w)
F3601AG	Game Ranching	6	9	C	None	L (2h/w) P (2h/w)
F3631AR	Animal Reproduction and Biotechnology	6	15	C	Animal Anatomy & Physiology	L (4h/w) P (3h alt w)
F3611AE	Principles of Economics	6	14	C	None	L (4h/w) T (2h/w)
<b>Total Credits Semester 1</b>			<b>54</b>			
<b>Year 2 Semester 2</b>						
F3612AN	Animal Nutrition	6	15		None	L (4h/w) P (3h alt w)

F3632EE	Agricultural Extension and Group Dynamics	6	14	C	None	L (4h/w)
F3612EF	Farm Management	6	14	C	None	L (4h/w) T (2h alt w)
F3602AP	Field Attachment for Animal Scientists Preparation	6	8	C	None	L (2h/w)
<b>Total Credits Semester 2</b>		<b>51</b>				
<b>Year 2 Total Credits</b>		<b>129</b>				
<b>Year 3 Core Semester (24 credits)</b>						
F3783AA	Field Attachment for Animal Scientists	7	24	C	Field Attachment for Animal Scientists Preparation	Four months Continues in Semester 1
<b>Total Credits Core Semester</b>		<b>24</b>				
<b>Year 3 Semester 1</b>						
F3711AP	Animal Science Practices and Equipment [Block teaching]	7	18	C	None	P (4h/w)
F3731AE	Entrepreneurship [Online]	7	16	C	None	L (4h/w) T (2h/w)
F3751AW	Farm Animal Welfare [Online]	7	16	C	None	L (4h/w) T (2h/w)
<b>Total Credits Semester 1</b>		<b>50</b>				
<b>Year 3 Semester 2</b>						
F3712AH	Animal Health	7	18	C	Animal Anatomy & Physiology	L (4h/w) P (3h alt w)
F3732AA	Animal Breeding	7	18	C	Molecular Genetics	L (3h/w) P (3h/w)
F3752CB	Biometry	7	16	C	Introduction to Statistics	L (4h/w) T (2h/w)
<b>Total Credits Semester 2</b>		<b>52</b>				
<b>Year 3 total credits</b>		<b>126</b>				
<b>Year 4 Core Semester (22 credits)</b>						
F3880AD	Design thinking	8	8	C	None	
F3880AP	Research proposal	8	14	C	None	
<b>Total Credits Core Semester</b>		<b>22</b>				
<b>Year 4 Semester 1 (45-50 credits)</b>						
F3883AR	Research Project*	8	16	C	Biometry	
F3801AM	Meat Science and Animal Products	8	10	C	None	L (2h/w) P (3h alt w)
F3811AB	Beef Production	8	20	C	None	L (4h/w) P (3h/w)
F3831AP	Range Management	8	20	C	Introduction to Range Management	L (4h/w) P (3h/w)
<b>Total Credits Semester 1</b>		<b>50</b>				
<b>Year 4 Semester 2</b>						
F3883AR	Research Project*	8	16	C	Biometry	
F3802AD	Dairy Production	8	10	C	None	L (2h/w) P (3h/w)
F3812AS	Small Ruminant Production	8	20	C	None	L (4h/w) P (3h/w)
F3832AM	Monogastric Animal Production	8	20	C	None	L (4h/w) P (3h/w)
<b>Total Credits Semester 2</b>		<b>50</b>				
<b>Year 4 total credits</b>		<b>138</b>				
<b>TOTAL CREDITS FOR THE PROGRAMME</b>		<b>526</b>				

\*Year module with 16 credits

## E.2 MODULE DESCRIPTORS

## E.3 FIRST YEAR

### U3583AL

### ACADEMIC LITERACY IB

Module Title:	ACADEMIC LITERACY IB
Module Code	U3583AL
NQF Level	5
Notional Hours	80
NQF Credits	8
Prerequisite	None

**Contact Hours** Semester 0: 4 hours /week; Semester 1: 2 hours/week Semester 2: 2 hours/week  
**Compulsory/Elective** Compulsory  
**Semester Offered** 0,1&2

**Module Content**

The module will cover study skills, reading, listening, speaking and writing, referencing, language usage and text organization.

**Student assessment strategies**

Assessment will be based on Continuous Assessment.

U3403FS	SKILLS PORTFOLIO
<b>Module Title:</b>	<b>SKILLS PORTFOLIO</b>
<b>Module Code</b>	U3403FS
<b>NQF Level</b>	N/A
<b>Notional Hours</b>	N/A
<b>Contact hours</b>	N/A
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	NCB
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester, Semesters 1 & 2

**Module Content**

**UNIT 1: Academic Planning and Goal Setting**

Individual Needs and Values; Steps in Reaching a Personal Vision; Proactive Approach Towards Learning; Self-Regulated Learning; Personal and Academic Goal Setting; Receptiveness to Learning; Exploring Self- Development and Self- Awareness.

**UNIT 2: Attitude and Motivation**

Understanding Motivation; Personal Attitudes, Behaviors and Interests; Self-Reflective Process; Approaches to Dealing with Negative Factors; Class Attendance and Participation; Procrastination; Self-Reliance; Discipline; Accountability; Healthy Habits.

**UNIT 3: Learning styles**

Understanding Personal Approaches to Learning; Dynamics of The Learning Process; Learning Styles and Strategies.

**UNIT 4: Study Methods and Skills**

Study Habits and Strategies; Learning Styles and Techniques; Effective Study Methods and Skills; Note Taking; Memory and Reading Skills; Critical Thinking.

**UNIT 5: Time Management**

Effective Time Management; Planning; Decision-making; Prioritization; Setting Boundaries; Time for Self – care; Procrastination.

**UNIT 6: Assessment Preparation**

In class exercise; Test and Examination preparation; Organizing academic workload; Setting daily study goals; Staying physically active; Study groups.

**UNIT 7: Mental well-being**

Understanding mental health; Signs and indicators of poor mental health; commonly experienced mental health challenges; psychosocial stressors; Seeking professional help; Coping strategies.

**UNIT 8: Interpersonal Communication**

Effective Communication Skills; Verbal and Non-Verbal Communication; Listening Skills; Problem Solving; Assertiveness; Negotiation Skills; Practicing Empathy in Communication; Self-Confidence; Receptiveness to Feedback; Building Trust; Teamwork; Leadership; Public Speaking Skills.

**UNIT 9: Financial matters and management**

Financial Literacy; Budgeting; Available Finance Options and Assistance; Managing Financial Resources.

**UNIT 10: Student Violence**

Types of Violence; Individual Roles in Violence; Myths, Forms; Consequences of Violence; Prevention Measures; Seeking for Help.

**UNIT 11: Career Planning and Development**

Defining and Selecting Career Goals; Career Exploring Different Strategies; Soft Skills Training.

**Student Assessment Strategies**

100% continuous assessment

Reflective journal on each unit (portfolio)

U3583DD	DIGITAL LITERACY
<b>Module Title:</b>	<b>DIGITAL LITERACY</b>
<b>Module Code</b>	U3583DD
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>Contact Hours</b>	Semester 0: 4 hours /week; Semester 1: 2 hours/week Semester 2: 2 hours/week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1

**Module Content**

Digital Proficiency: ICT-based devices (laptops, tablets, smartphones, desktop computers, digital instruments and equipment); a mouse, keyboard, touch screen, voice control and other forms of input; screens, audio headsets and other forms of output; digital capture devices; University digital learning systems and a range of personal digital services such as social media, cloud storage services, sharing sites  
 Digital Productivity: Basic productivity software (text editing, presentation, spreadsheets, image editing); email and other digital communication services; Internet or cloud or institutional shared spaces for Organising, managing and backing up digital files; software/apps and services suitable for learning-related tasks; digital tools fit learning and managing learning time

Information Literacy: search engines, indexes or tag clouds; wikis, blog posts, scholarly journals, e-books and the open web; file spaces and folders, bookmarks, reference management software and tagging; copyright, and digital citizenship issues  
 Data and Media Literacy: Digital data using spreadsheets and other media; data security and privacy; digital media messages – text, graphics, video, animation, audio and multimedia  
 Digital Creation and Innovation: digital materials (video, audio, stories, presentations, infographics); new digital tools for learning in digital settings  
 Digital Communication, Collaboration and Participation: digital communication; differences between media, norms of communicating in different spaces; false or damaging digital communications; collaborative tools and online environments; online networks  
 Digital Learning and Development: digital learning opportunities; digital learning resources; digital tools/materials for organising, planning and reflecting on learning (mind-mapping, note-taking, e-portfolio/ learning journal/ blog)  
 Digital Identity and Wellbeing: online profiles for different networks (personal, professional, academic); digital reputation; managing personal data and privacy; digital CV or portfolio of work; digital technologies for personal development; online etiquette; wellbeing and safety online; internet addiction; cyberbullying and other damaging online behaviour.

#### Student Assessment Strategies

1. Collaborative assessment tasks
    - 1.1 Digital productivity: cloud based collaborative digital media creation using cloud platforms
    - 1.2 Project: Digital communication, collaboration and participation/ Digital Wellbeing
  2. Individual assessment tasks
    - 2.1 Assignment: information literacy assignment
    - 2.2 Test x 2
  3. Practical
    - 3.1 Digital proficiency
    - 3.2 Data and Media literacy
- No written examination

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#### F3500ZI ISSUES IN AGRICULTURE

<b>Module Title:</b>	<b>ISSUES IN AGRICULTURE</b>
<b>Module Code</b>	F3500ZI
<b>NQF Level</b>	5
<b>Notional Hours</b>	40
<b>Contact hours</b>	20 Contact hours
<b>Additional learning requirements</b>	Field trips, Seminars and guest lectures
<b>NQF Credits</b>	4
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

#### Module content

Agriculture: Agriculture as important economic sector; Population dependence on agriculture for their livelihoods. Production systems: Production systems and production sustainability. Land tenure systems: freehold and customary tenure. Agricultural Opportunities and Restrictions: such as the veterinary cordon fence; financial collateral; and the greed in the commons. The Namibian market driven economy and agricultural contribution: Agricultural practices; Resilience of livelihoods to withstand challenges posed by climate change; land scarcity, water; drought management relation to climate change; Cause and consequences of the supply chain of agricultural sub-sectors. Overview of sub-sectors and their value chains: cattle; sheep and goats; pigs; dairy; poultry; agronomy; horticulture; game and bio-mass. Niche markets: such as Swakara and Ethical issues of Genetically Modified Organisms (GMO's) and implications to food production systems; use of examples to demonstrate how a society use result into different externalities to balance policy intervention.

#### Student Assessment strategies

1. Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments and practical reports (at least 4 gradable items).
2. A continuous assessment mark of at least 50% is required to gain exam admission.
3. One examination with minimum duration of 3-hours (50% of the final mark).
4. A subminimum of 40% in the examination is required to pass, irrespective of the final mark.
5. A final mark of 50% is required to pass this course

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#### F3520ZP BASIC PROGRAMMING WITH PYTHON

<b>Module Title:</b>	<b>BASIC PROGRAMMING WITH PYTHON</b>
<b>Module Code</b>	F3520ZP
<b>NQF Level</b>	5
<b>Notional Hours</b>	20
<b>Contact hours</b>	One practical session every week for the duration of CS1
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	CS

#### Module Content

Python installation; Anaconda. Data Structures and their operations; Variables; Strings; numeric variables; Lists. Control Flow; if, else and elif statements. Functions; How to use basic functions; Numpy Arrays. Pandas; Series; DataFrames. Interaction with OS; Reading and Writing files. Data Visualization; histograms; line and scatter plots.

### Student Assessment Strategies

Student assessment will be based on formative assessment only through 100% continuous assessment. The assessment comprises 1 programming assignment. A minimum mark of 50% is required pass the module.

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<b>F3511AB</b>	<b>INTRODUCTION TO BIOCHEMISTRY</b>
<b>Module Title:</b>	<b>INTRODUCTION TO BIOCHEMISTRY</b>
<b>Module Code</b>	F3511AB
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	04 Lecture hours / week; 3 Practical hours / week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

### Module Content

The scientific method and basic methods in Biology and Biochemistry:

Microscopy, scientific drawings, scientific method and writing of scientific reports. Biological foundation: Taxonomy and binomial nomenclature; Overview of the five major kingdoms of organisms and viruses; Overview of Phylum Chordata; Introduction to cellular respiration and photosynthesis; Chemical basis of life, Introduction to the structure of macromolecules or biomolecules. Cellular foundation: Cells as functional units of living organisms; prokaryotic and eukaryotic cells; ultra-structure of plant and animal cells, membrane structure and function, cell communication; cell cycle and cell death; cell division – mitosis and meiosis; molecular organization of genomes (prokaryotic and eukaryotic); source of energy and biosynthetic precursors. Chemical foundation: Atomic structure and the Periodic table; Electron configuration; Average Atomic Mass. The Mole Concept; Lewis structures; Introduction to organic chemistry: organic compounds. Biochemistry foundation: Acids, bases, buffers, pH, ionic strength, molarity; water (structure and ionization); Functional groups; Classes of hydrocarbons: alkanes, cycloalkanes: alkanes; alkenes and alkynes. Genetics foundation: DNA as the genetic material, genes and chromosomes, genomes, Mendelian genetics - monohybrid and dihybrid crosses, Aneuploidy and non-disjunction, genotypes and phenotypes, introduction to extensions of mendelian analysis, chromosome theory of inheritance, mutations, Introduction to linked genes and sex linkages.

### Student Assessment Strategies

Continuous Assessment consists of 50% comprising of 2 tests, at least 3 marked practicals, quizzes / Assignment and a three-hours examination that constitutes 50% of the final grade. Pass mark for the module is 50%.

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<b>F3531AR</b>	<b>INTRODUCTION TO RANGE MANAGEMENT</b>
<b>Module Title:</b>	<b>INTRODUCTION TO RANGE MANAGEMENT</b>
<b>Module Code</b>	F3531AR
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact Hours</b>	4 x 1-hour Lectures / week for 12 weeks; Practicals: 1 x 3 hours practical/week for one semester.
<b>Additional learning requirements</b>	Compulsory excursions; practicals; attachments / group work / project
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

### Module Content

Rangeland ecology: Concept and Terminology of Ecology; Taxonomy of grasses; The Natural Ecological Cycles: Hydrological cycle; Carbon cycle; Nitrogen cycle; Phosphorous cycle; Morphology of grasses: Plant parts; Erect growth morphology; Stoloniferous grass morphology; Rhizomatous morphology; Ontogeny of Grasses: Seed germination; Vegetative grass growth; Reproductive growth; Tiller development; Factors affecting tillering; Growth of Woody plants: Plant photosynthesis; The basic mechanism of photosynthesis; Factors controlling photosynthesis; Plant water relations: Cell water relations; Water uptake; Transpiration; Environmental factors affecting transpiration; Nutrient acquisition by plants: Nutrient uptake by roots; The development of plant communities: Plant Succession – primary and secondary succession; Clements' stages of succession; Identification of the major forage species: Grasses; Legumes; Bush, shrubs and trees; Grazing value and ecological status of grasses: Palatability; digestibility; Increasers; Decreasers; Veld types in the farming areas of Namibia: Rainfall map; Soil types of Namibia; Agro-ecological zones; Biotic and abiotic factors affecting rangelands, Effect of climate change on rangeland condition and its mitigations; Introduction to rangeland restoration; Sustainable range management in Namibia.

### Student Assessment Strategies

Continuous Assessment: 50% (2x assignments + 2 tests + at least 4 marked practicals).  
Exam: 50% (1 x2 hr paper).

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<b>F3511AA</b>	<b>ANIMAL ANATOMY AND PHYSIOLOGY</b>
<b>Module Title:</b>	<b>ANIMAL ANATOMY AND PHYSIOLOGY</b>
<b>Module Code</b>	3511AA
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	Lectures: 4 hours per week; 3 hours Practicals every alternate week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None

**Compulsory/Elective** Compulsory  
**Semester Offered** 1

#### Module Content

The module deals with the concepts pertaining to the morphology function of the circulatory, respiratory, nervous, skeletal and locomotory systems of farm animals (ruminants, mono-gastric animals, and poultry). The anatomical and functional interrelationship of these systems and their embryonic development with special reference to their progenitors and derivatives are discussed. Practical classes that involve the use of carcass dissections, examination of internal organs in dead animals, and the study of laboratory models, help in the understanding of theoretical concepts discussed in the lectures.

#### Student Assessment Strategies

Continuous Assessment: 50% (1 x assignment; 2 tests; 2 quizzes and 3 x Practicals).

Exam: 50% (1 x 3 hour-paper)

Learning and Teaching Enhancement Strategies

Internal and external moderation of exam paper and scripts, peer review of course outlines and teaching; student evaluation, regular review of course content, effective and efficient supervision and monitoring of assignments, tests and exams

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<b>F3531CA</b>	<b>MATHEMATICS FOR AGRICULTURE</b>
<b>Module Title:</b>	<b>MATHEMATICS FOR AGRICULTURE</b>
<b>Module Code</b>	F3531CA
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact Hours</b>	4 Lecture hours per week per semester; 4 Tutorial hours per week per semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)/Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 1

#### Module Content

Ratios and Proportions: Share a given quantity in a specified ratio; and Use proportion to scale down or scale up quantities given a specific rate. Mathematics applications in agriculture: Calculation of various fertilizer contents; application rates; conversions in foreign markets; areas and volumes of various shapes; figures and Interest rates calculations Sets: Definition of a set; notation; equality of sets; subsets; characterization of equality via the subset relation; empty set; Venn diagrams; intersection; union; complement; proofs of simple results on set equality. Standard examples of sets: natural numbers; integers; rationals; real numbers. Cardinality of sets (examples of finite; infinite; countable; uncountable sets). Matrix Algebra: Matrices and vectors; principle of matrix multiplication; determinants; minors; cofactors and; transpose matrix; the cofactor matrix; adjoint and inverse; Cramer's rule; Solution of systems of equation; Gauss-Jordan elimination. Functions: Definition of function; Linear and non-linear function; selected nonlinear functions (exponents; and logarithms) and application in the biological field. Calculus: Differentiation and Integration of basic functions. Optimization: Review of inequalities; Linear; constrained and non-constrained problems: Review of series: Binomial and Geometric; factorial and summations notations.

#### Student Assessment Strategies

- Continuous assessment (at least 2 tests; 2 tutorial tests and 2 assignments): 50%; Examination 50% (1 x 3 hour paper).
- To pass this module a student must obtain a minimum final mark of 50%.

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<b>F3512AG</b>	<b>MOLECULAR GENETICS</b>
<b>Module Title:</b>	<b>MOLECULAR GENETICS</b>
<b>Module Code</b>	F3512AG
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>Contact hours</b>	04 Lecture hours / week; 3 Practical hours / week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Foundations to Biology and Biochemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

This course introduces and presents principles and methods used in the study of genetics. The emphasis is on application of concepts to solve problems. The course provides a foundation for more advanced studies in the field of agriculture. The specific topics to be covered are:

The molecular structure of nucleic acids (DNA and RNA) and gene expression: The double helix model of DNA; Transcription, Translation and the Genetic Code; Regulation of gene expression – the Lac operon; DNA replication in prokaryotes and eukaryotes.

Extension of Mendelian analysis and ratio: Incomplete dominance; co-dominance; multiple allelism; gene interactions (pleiotropy, epistasis, lethal genes); additive gene action.

Chromosomal basis of heredity: Physical structure of chromosomes and DNA Packaging; Karyotypes and Variations; gene linkage; genetic mapping.

Introduction to Quantitative Genetics: Introduction to population genetics

Other topics to be covered include: Molecular structure of genes; Mutations (types, causes, detection and significance); Sex determination; Sex linkage; sex-limited and sex-influenced.

The module also introduces students to molecular biology techniques: Genetic engineering or recombinant DNA technology; DNA extraction; Polymerase Chain Reaction (PCR); DNA electrophoresis and gene sequencing; gene cloning; animal cloning; markers (PCR-RFLP, Microsatellites & Minisatellites; PCR-SSCP, SNPs); marker-assisted selection as well as introduction to epigenetics.

#### Student Assessment Strategies

Continuous Assessment consists of 50% comprising of 2 tests, at least 4 marked practicals,

quizzes / Assignment, group discussions and a three-hours examination that constitutes 50% of the final grade. Pass mark for the module is 50%.  
Learning and Teaching Enhancement Strategies

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### **F3512AL LIVESTOCK PRODUCTION SYSTEMS**

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<b>Module Title:</b>	<b>LIVESTOCK PRODUCTION SYSTEMS</b>
<b>Module Code</b>	F3512AL
<b>NQF Level</b>	6
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 x 1-hour Lectures / week; 03 Practical hours per week for one semester
<b>Additional learning requirements</b>	Excursions; group work
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### **Module Content**

Structural changes in the global livestock sector: drivers of change; impacts of changes; Climate change and livestock: impacts, adaptation and mitigation; The livestock industry in Namibia: contribution of livestock to sustainable agricultural development; livestock value chains; key lessons to learn from Botswana and Namibia export-oriented livestock industries; marketing of livestock; Systems of production: classification criteria; traditional and modern production systems; systems of beef production; Livestock management facilities: basic rules to maintain good housing; design considerations for farm buildings; Adaptive and productive components of productivity of livestock in the tropics: thermal equilibrium; heat load; heat dissipation; reducing heat load; effects of heat stress; reducing heat stress. Management of cattle: characteristics of Bos indicus and Bos taurus cattle; effects of environment and genotype on livestock production; Ruminant nutrition: nutrients; energy partitioning; digestion in cattle; Calf management: calf feeding; identification; dehorning; castration; vaccination; weaning; management of adult cattle; Health issues in livestock production: signs of good health; recognition of disease; disease prevention and control strategies; Management of pigs: bioeconomic traits; breeds and breed improvement; genetic defects; nutrition; losses that occur in pig enterprises due to poor management; external and internal parasites; infectious diseases; Sustainable livestock production: sustainable intensification; organic livestock production

#### **Learning and Teaching Strategies/Activities**

The module will be covered through a blend of lectures, practicals, excursions, case studies and projects. Some of the activities will be on individual basis, while others will be done as a group to encourage teamwork and facilitate learning. Students will do a SWOT analysis of a given livestock enterprise at Neudamm or Ogongo campus or other selected farm as part of a project.

#### **Student Assessment Strategies**

##### **The assessment will include:**

- (a) Continuous assessment will contribute 50 marks (50%) to the final mark composed of:
  - (i) Two tests (60% of CA mark)
  - (ii) Case study on livestock production enterprise (25% of CA mark)
  - (iii) Marked practicals/project (15% of CA mark)
- (b) A 3-hour examination paper that will contribute 50 marks to the final mark.
- (c) The final mark will be calculated as follows:  
50% CA mark + 50% Exam mark = 100 % (final mark)

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### **F3502AF INTRODUCTION TO FODDER PRODUCTION**

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<b>Module Title:</b>	<b>INTRODUCTION TO FODDER PRODUCTION</b>
<b>Module Code</b>	3502AF
<b>NQF Level</b>	5
<b>Notional Hours</b>	70
<b>Contact Hours</b>	2 x 1 hour Lectures / week; 02 Practical hours alternate weeks for one semester
<b>Additional learning requirements</b>	Compulsory field trips / excursions; Farm attachments / group work
<b>NQF Credits</b>	7
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester two

#### **Module Content**

Classification of Pasture and Forage Crops: Role of fodder crops in livestock production; Terminologies in Pasture and Forage Crops Production; Morphological characteristics of grasses, legumes, shrubs and trees. Types of Pastures: Temporary Pastures, Semi-Permanent Pastures, Permanent Pastures. Common Fodder Species in Namibia: Pasture grass species for different ecological zones; Herbaceous legumes for different ecological zones; Fodder trees. Pasture Species Selection Criteria: Adaptability – climatic & edaphic, Yield, Persistence, Ability to associate with other species, Ease of establishment (propagation). Pasture Seed Quality: Seed purity, Seed germination, Seed Scarification. Pasture grass and legume establishment & management: Land preparation, Fertilizer application, Legume seed inoculation, seeding rate and planting depth, Water/irrigation management, Weed management. Fodder trees establishment & management: Nursery establishment, Land preparation, Fertilizer application, seeding rate and planting depth, Water/irrigation management; Weed management. Feeding animals fodder crops: Harvesting techniques, Practical feeding strategies; Feed quality of pasture crops. Seed production of pasture species: Seed production systems opportunist & specialized), Harvesting & threshing methods, Seed drying techniques, Cleaning methods, Seed packaging & storage

#### **Student Assessment Strategies**

The hands-on assessment will include:

- Field practicals on fodder seed quality testing procedures, fodder establishment of grasses and legumes species, field conservation of fodder as hay and silage and nutritional analysis of conserved fodder, quality improvement of roughage feed resources such as cereal straws and hay done in groups.
- Seminar presentations of assigned research topics done in groups

- Oral tests done face to face on topics covered for that test
- Continuous assessment will contribute 40 marks (40%) to the final mark composed of:
- Two assignments (25% of CA mark)
- Four marked practicals (15% of CA mark)
- Two 2-hour tests (60% of CA mark)
- A 3-hour examination paper that will contribute 60 marks to the final mark.
- The final mark will be calculated as follows:  
50% CA mark + 50% Exam mark = 100 % final mark

<b>F3502AM</b>	<b>PRINCIPLES OF MICROBIOLOGY</b>
<b>Module Title:</b>	<b>PRINCIPLES OF MICROBIOLOGY</b>
<b>Module Code</b>	F3502AM
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>Contact Hours</b>	2 hours lecture periods per week and 3 hours practical alternate week for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Foundations to Biology and Biochemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Overview of Microbiology: Branches and history of microbiology; classification of microorganisms; microbial environments and interrelationships. Overview of Bacteria: Bacterial size, shape and arrangements; bacterial culture, media and streaking; microscopy and staining; control of microbial growth; chlamydia and rickettsia. Overview of Eukaryotic Organisms: General characteristics of algae, fungi and protozoa. Introduction to Virology: Salient features; bacteriophages. Role of microbes in soil, food and industry: microbes and bacterial use in various industries. Important pathogens of animals. Other topics: Preparation of media; culture of bacteria; staining and microscopic examination of bacterial cells; antibiotic sensitivity testing.

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks.

Formative assessments will make up 50% of the module grade (i.e., 2 tests, at least 4 assessed practicals and 2 assignments and ad-hoc quizzes/tasks) and a summative assessment (end of semester examination) 50% (1x 3 hours theory paper). Pass mark for the module is 50%.

<b>F3512AS</b>	<b>INTRODUCTION TO STATISTICS</b>
<b>Module Title:</b>	<b>INTRODUCTION TO STATISTICS</b>
<b>Module Code</b>	F3512AS
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact Hours</b>	4 Lecture hours per week per semester 1 hour tutorial session per week per semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 2

#### Module Content

Introduction to statistics: Basic definition; role of statistics; branches of statistics – descriptive and inferential; basic statistical notations and symbols. Data types: Categorical versus discrete and Continuous versus numerical; Data sources: Primary versus secondary; Types of measurements: Nominal, ordinal, interval and ratio scales; Collection and presentation of data: Tabular forms; frequency tables, cross-tabulations (two variables), Graphical methods; bar charts, histogram, pie charts, frequency polygons, stem-and-leaf plots, box and whiskers plot, ogives; Identifying outliers; Measures of central tendency (grouped and ungrouped data case): Mean, median, mode, quartiles; Measures of dispersion: Skewness, measures of skewness and kurtosis; variance, standard deviation, range, inter-quartile range, coefficient of variation. Basic Set theory: Definitions, Venn diagrams, Distributive Law, De Morgan's Law; Counting techniques: permutation and combination; Probability: definition using relative frequency, properties; axioms of probability, random experiments, sample space and events, addition rule, mutually exclusive events, conditional probability, total probability, Bayes Theorem and independence; Random variables: expectations, random vectors, functions of random variables and probability density in discrete and continuous case; Probability distributions: Bernoulli; Binomial; Poisson; Geometric; Uniform; Normal, Binomial and Normal tables, Point estimation and confidence interval: CI for population mean and difference between two means for both large and small sample size case. Hypothesis testing: Formulation Single population mean, paired and independent samples for both small and large sample cases. Regression and correlation: Definitions, uses, SLR model assumptions, OLS technique, and model validation. Correlation analysis, scatter diagrams, Pearson's correlation coefficient, Spearman's rank correlation and the coefficient of determination.

#### Student Assessment Strategies

- Continuous assessment (at least 2 tests, 2 tutorial test and 2 assignments) 50%; Examination 50% (1 x 3 hour paper).
- To pass this module a student must obtain a minimum final mark of 50%.

### E.4 SECOND YEAR

<b>U3683LA</b>	<b>ACADEMIC LITERACY II</b>
<b>Module Title:</b>	<b>ACADEMIC LITERACY II</b>
<b>Module Code</b>	U3683LA
<b>NQF Level</b>	6

<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact Hours</b>	Semester 0: 4 hours/week Semester 2: 2 hours/week
<b>Prerequisite</b>	Academic Literacy I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester, 1&2

#### Module content

The module is designed for students enrolled in a bachelor's degree, which requires them to do basic research, read and listen to specific academic material, produce specific written texts and give academic presentations. The module thus, focuses on enhancing academic reading, academic vocabulary, writing, listening and speaking.

#### Student assessment strategies

The module will be continuous assessment based.

Assessment will include written tests, individual and group assignments, portfolio assessments and oral presentations.

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### U3520LP LEADERSHIP SKILLS

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<b>Module Title:</b>	<b>LEADERSHIP SKILLS</b>
<b>Module Code</b>	U3520LP
<b>NQF Level</b>	5
<b>Notional Hours</b>	20
<b>Contact hours</b>	1 x 2h per week for 6 weeks
<b>Mode of Delivery Blended:</b>	Face to face and online
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1 or 2

#### Module Content

Definition and scope of leadership; History and origins of leadership; Types of leadership; Leadership versus management skills; Leader (master of self, effective manager of people, active visionary); manager; Not all leaders are managers; Not all managers are leaders; Authority versus leadership; Power versus leadership; Principles of leadership (ability, adaptive, action, empowerment, creativity, problem solving, shared); Are leaders born or made?; Characteristics of a good leader; Functions of leaders in organizations; Leading for the future; Mentoring skills; The 21st century leader; Ethical leadership skills; Responsible leadership skills.

Learning and Teaching Strategies/Activities

The course will be facilitated through the following learning activities: face to face and online lectures, and tutorials.

#### Student Assessment Strategies

The module will be assessed using 100% continuous assessment.

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### U3420CN NATIONAL AND GLOBAL CITIZENSHIP

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<b>Module Title:</b>	<b>NATIONAL AND GLOBAL CITIZENSHIP</b>
<b>Module Code</b>	U3420CN
<b>NQF Level</b>	4
<b>Notional Hours</b>	20
<b>Contact hours</b>	Up to 1 contact lecture periods per week for 6 Weeks
<b>Mode of Delivery Blended:</b>	Face to face and Online
<b>Additional Learning requirements</b>	Each student will be required to work on a personal project which will include a site visit
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

#### Module Content

##### UNIT 1: Constitution and its Importance

What is a constitution; Functions of a constitution; What it contains; Constitution and democracy

##### UNIT 2: Global Citizenship

The meaning of global citizenship; Importance of global awareness; World issues of concern to global citizens.

##### UNIT 3: Civic Engagement

What do we mean by civic engagement; Dimensions of civic engagement; Indicators of civic engagement; Promoting civic engagement.

##### UNIT 4: Globalization

Understanding globalization; Cultural construction of neoliberal globalization; Major players; Major domains; Major Issues; Futures of Globalization

##### UNIT 5: Intercultural Communication

Dealing with difference; Levels of culture; Stereotypes and generalizations; Intercultural communication Processes

**UNIT 6:** Sustainable Development Goals and individual action Introduction to SDGs; Contributing to achievement of SDGs through action

#### Student Assessment Strategies

Continuous assessment of 100% - Assessment will be done by completing online pop-up quizzes; and developing their online portfolios of personal action as response to tasks assigned in class.

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### U3420EM ETHICS AND MORALITY

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<b>Module Title:</b>	<b>ETHICS AND MORALITY</b>
<b>Module Code</b>	U3420EM

<b>NQF Level</b>	4
<b>Notional Hours</b>	20
<b>Contact hours</b>	2 hours per week – supplemented by online learning
<b>Mode of delivery Blended:</b>	Face to face and online
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core semester 1 or 2

#### Module Content

Theoretical approaches towards ethical decision making:

Ethical principles in perspective: Why is the principle of ethics necessary and significant? Ethics and the notion of ethical behavior related to value systems in the organizational setting in the 21st century. Fundamental ethical principles: Meta-ethics implies the nature of ethics and moral reasoning. Discussions and reasoning around the role of for example self-interest are examples of meta-ethical discussions. Normative ethics guides the individual on how to determine the content of moral behavior. Applied Ethics are related to specific realms of human action and how to address challenges within those realms. Psychological Egoism is a metaethical theory of motivation and related to self-interest and forms part of the first stage of moral development. Ethical egoism is a normative theory that states that our actions ought to be done from the perspective of self-interest. The moral concept of virtue and constructive evaluation of "virtue" ethics related to virtues found in a particular society or culture. Moral responsibility comprises of causality (cause and effect), knowledge (the facts, information and the skills acquired by the person through education or experience) and freedom (freedom of speech and acts). Applied ethics focusing on domain-specific areas for example science, health, business, education and engineering. Common ethical risks in personal life, studies and in the workplace that can lead to unethical behavior.

#### Student Assessment Strategies

100% Continuous Assessment

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#### F3610ZR INTRODUCTION TO STATISTICAL PROGRAMMING WITH R

<b>Module Title:</b>	<b>INTRODUCTION TO STATISTICAL PROGRAMMING WITH R</b>
<b>Module Code</b>	F3610ZR
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact Hours</b>	4 lecture periods per week and one 3hour practical per week for semester core
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Elective
<b>Semester Offered</b>	CS

#### Module Content

Learn how to navigate RStudio: how to load/save a file; load a package; access help. Examine the base R objects: vectors; matrices, arrays, lists, factors and tables; their respective characteristics, naming conventions and structures. Understand sub-setting, filtering and creation of these objects. Examine the implementation of control structures (loops and functions) in R. Investigate how R can be used for mathematical and statistical calculations. Data Cleaning and Manipulation in R: Learn how to manipulate and clean data in R; importing and exporting data from other statistical packages and data bases; aggregating data; reshaping data Visualisation (Packages): Learn how basic plots are generated in R – histograms; X-Y plots, bar charts; pie charts, scatter plot. Understand the ggplot2 package for advanced plotting; Statistical Testing: Understand how R can be for hypothesis testing. Investigate how R can be used in statistical modelling techniques (SLR)

#### Student Assessment Strategies

Continuous Assessment: 100 % (minimum of 2 tests (30%), 1 project assignment (presented in oral and written form, 40%), 3 marked practicals, 30%). The pass mark for the module is 50%

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#### F3683AF FARM DUTIES FOR ANIMAL SCIENTISTS

<b>Module Title:</b>	<b>FARM DUTIES FOR ANIMAL SCIENTISTS</b>
<b>Module Code</b>	F3683AF
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	One full day (7-hour day) alternating weeks for CS, 1 and 2
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	CS

#### Module content:

Content of all courses in degree programme is relevant for the hands-on farm duties. Students will undertake farm duties at Neudamm Campus involving all activities ranging from farm mechanizations, crop husbandry activities, animal husbandry activities and analysis of farm and financial records. Assessment will be based on attendance at different enterprises/units of the farm, participating in completion of tasks and attitudes toward work. Students on farm duties will be in the close supervision of the unit head or the teaching staff.

#### Student Assessment

Specific learning outcomes

Already listed      Assessment tasks

1. Assessment will be based on attendance and participation on tasks at hand. Pass or fail grade. Pass with more than 80% attendance.

<b>F3611AB</b>	<b>BIOCHEMISTRY</b>
<b>Module Title:</b>	<b>BIOCHEMISTRY</b>
<b>Module Code</b>	F3611AB
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	04 Lecture hours / week; 3 Practical hours per week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Introduction to Biochemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Structural Biochemistry: Structure and function of macromolecules (carbohydrates, proteins and lipids), Vitamins, Coenzymes and Cofactors.

Enzymology: Enzymes as organic catalysts; Enzyme nomenclature; Factors affecting activities of enzymes; Enzyme kinetics - The Michaelis-Menten equation; The Lineweaver-Burk plot; Enzyme inhibition; Allosterism.

Bioenergetics and Thermodynamics: Free Energy, Laws of Energy, Activation Energy, Transition States, Endergonic and exergonic reactions.

Metabolism: Catabolism and Anabolism; Carbohydrate catabolism (Glycolysis, Alcohol and lactic acid Metabolism, Tricarboxylic acid cycle or the TCA cycle; Electron transport chain and oxidative phosphorylation); Regulation of carbohydrate metabolism; Gluconeogenesis; Synthesis of the disaccharides (lactose and sucrose); Lipid metabolism ( $\beta$ -oxidation, malonyl CoA); Integration of carbohydrate and fat metabolism; Amino acids and protein metabolism; Urea cycle; The Cori cycle; Pentose phosphate pathway.

Spectrophotometry: Fundamental laws of spectrophotometry and absorbance, including calibration curve

#### Student Assessment Strategies

Continuous Assessment consists of 50% comprising of 2 tests, at least 3 marked practicals, quizzes / Assignment and a three-hours examination that constitutes 50% of the final grade. Pass mark for the module is 50%.

<b>F3601AG</b>	<b>GAME RANCHING</b>
<b>Module Title:</b>	<b>GAME RANCHING</b>
<b>Module Code</b>	F3601AG
<b>NQF Level</b>	6
<b>Notional Hours</b>	90
<b>Contact Hours</b>	2 x 1-hour Lectures / week for 12 weeks; Practicals: 1 x 2 hours practical/weeks for one semester
<b>Additional learning requirements</b>	Practicals, compulsory field trips / excursions (outside the normal practicals); attachments / group work / project
<b>NQF Credits</b>	9
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Course content:

Wildlife in Namibia: Namibia – water, land use, wildlife numbers, economic returns; effects of climate change; value of wildlife in Namibia today and in the future; Conservation: key terms in wildlife conservation; conservation principles in terms of wildlife management, successful conservation, approaches to conservation, wildlife value; community involvement in successful conservation; relevant Namibian legislation; components of wildlife protection; components of wildlife biology and behaviour; habitat; range; management principles; population dynamics and monitoring; management styles; Game Ranching: four pillars of game ranching; nutrition management practices; Namibia's "Golden Opportunity"; Veld Management for Wildlife: types of vegetation occurring; land degradation; natural veld managers; ecological disturbance; grazing management practices; Disease Ecology: ecological; the Ecosystem; Ecosystem interferences; One Health: mitigation of effects of crises that originate at the interface between humans, animals and their various environments including antibiotic resistance ; Meat and trophy processing with special focus: on animal skinning, preparation of trophies & final trophy handling and, by-products.

#### Student Assessment Strategies

Continuous Assessment: 50% (2x assignments + 2 tests + at least 4 marked practicals). Exam: 60% (1 x3 hours paper).

<b>F3611AR</b>	<b>ANIMAL REPRODUCTION AND BIOTECHNOLOGY</b>
<b>Module Title:</b>	<b>ANIMAL REPRODUCTION AND BIOTECHNOLOGY</b>
<b>Module Code</b>	F3611AR
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 hours / week; 3 practical hours every alternate week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Animal Anatomy and Physiology

**Compulsory/Elective Semester Offered**                      Compulsory  
1

#### Module Content

Introduction content-Female and male reproductive systems and processes in farm animal, Poultry reproductive system, gamete and egg production; the oestrous cycles in large and small ruminants, oestrus synchronization in ruminants; hormones and hormonal utilization in the reproductive process of farm animals, superovulation, oocyte production and embryo collection in cattle; ova and sperm production: collection and evaluation, heat detection in ruminants; artificial insemination and uses in animal production systems; fertilization/conception and gestation in farm animals, diagnosis of pregnancies in farm animals, pregnancy durations and management in cattle, goats and sheep; overview of embryo growth and development in livestock; management of the gestation and parturition periods in farm animals; management of lactating farm animals; current advances in animal reproduction, induction of multiple ovulations in farm animals, embryo collection and transfer; selecting donor and surrogate animals for embryo transfer; theoretical aspects of cloning.

#### Student Assessment Strategies

Continuous Assessment will constitute 50% from at least 1 assignment; 2 tests; 2 quizzes; 3x 3 hour practical conducted over a period of 14 weeks; 3 hour examination will constitute 50% of the final mark.

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### **F3611AE                      PRINCIPLES OF ECONOMICS**

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<b>Module Title:</b>	<b>PRINCIPLES OF ECONOMICS</b>
<b>Module Code</b>	F3611AE
<b>NQF Level</b>	6
<b>Notional Hours</b>	140
<b>Contact hours</b>	L:3h / w; P:0h/w, T:2h/w
<b>Additional learning requirements</b>	field trips
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

This module introduces a broad range of economic concepts, theories and analytical techniques. Basic Concepts of Economic:, Fundamentals principles of Economics, Production Possibility frontier, economic system; Demand and Supply: Law of demand and supply, determinants of demand and supply of agricultural commodities, market equilibrium, price control for agricultural markets, elasticity of demand and supply in agricultural market; Theory of Production: Production function, factors of production, production concepts and law of production; Cost Theory: short-run and long-run farming production costs, least cost combination and profit maximization in farming; Theory of consumer behaviour: Cardinal and Ordinal Utility, law of marginal utility, Utility Maximising; Theory of firm: agricultural market structures. Macroeconomics: macroeconomics concept; National Income Accounting; importance of national income accounting, measuring GDP and National income; Consumptions, Savings, and Investment: consumption, saving, and investment function; economic growth. Business cycles and Unemployment: business cycle phases; types of unemployment, inflation; Money and Banking: types of money, money supply, quantity theory of money; Government funding and Expenditure: Government spending, government Revenue-Taxation, Budget; Fiscal and Monetary policies; International Trade: comparative and absolute advantage, exchange rates and terms of trade in Namibia.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments and practical reports (at least 4 gradable items).

1. A continuous assessment mark of at least 50% is required to gain exam admission.
2. One examination with minimum duration of 3-hours (50% of the final mark).
3. A subminimum of 40% in the examination is required to pass, irrespective of the final mark.
4. A final mark of 50% is required to pass this course

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### **F3612AN                      ANIMAL NUTRITION**

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<b>Module Title:</b>	<b>ANIMAL NUTRITION</b>
<b>Module Code</b>	F3612AN
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact Hours</b>	4 x 1-hour Lectures / week; 03 Practical hours alternate weeks for one semester
<b>Additional learning requirements</b>	Compulsory field trips / excursions; Farm attachments / group work
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Two

#### Module Content

Nutrient categories: The role of animal nutrition in animal production; Key concepts and terminology  
Components of animal feeds: water, dry matter, organic matter, carbohydrates, proteins, lipids, minerals and vitamins. Feed resources classification: Roughages, concentrates, browse, mineral & vitamin supplements  
Comparative nutritional values of different feedstuffs, Availability, affordability and laws associated with the use of either; Feed fractions and their nutritional implications; Feed additives - Objective of using additives; classification, and their role in animal nutrition, Forage conservation techniques and improving feeding value of low-quality feedstuffs. Laboratory feeds analysis: Proximate analysis, Detergent fibre analysis; Near infrared Reflectance Spectroscopy (NIRS), Anti-nutritive factors. Anti-nutritive factors: Classification/types (tannins, phenols, saponins, trypsin inhibitors etc.), Effects in animals, Reduction of ANFs methods. Feed energy & protein partitioning in livestock: Metabolisable energy (ME) system, Metabolisable protein (MP) system. Nutrient Digestion: Monogastric animals: poultry, pigs; Non-ruminant herbivores: horses, donkeys, Ruminant herbivores: cattle, goats, sheep; Digestibility techniques: In vivo, in sacco, In vitro digestibility and degradability experiments. Mineral and vitamin nutrition: Macro-minerals function, deficiency symptoms, sources; Micro-

minerals function, deficiency symptoms, sources; Fat- & Water-soluble vitamins function, deficiency symptoms, sources. Feed processing & ration formulation: Feed processing: extrusion, grinding, cooling, crumbling, drying, & pelleting; Nutrient requirements of different farm animals; Significance and use of feeding standards; Ration formulation methods and feed mixing for different farm animals. Climate smart animal production: Livestock contribution to greenhouse gases (GHGs), Nutritional manipulation for reduction of enteric GHG emission, Methane & nitrous oxide mitigation strategies from livestock manure.

#### Student Assessment Strategies

The hands-on assessment will include:

- Field practicals on fodder conservation as silage, formulation of animal feeds and testing animal performance in the metabolism house, quality improvement of roughage feed resources such as cereal straws and hay done in groups.
- Seminar presentations of assigned research topics done in groups
- Oral tests done face to face on topics covered for that test

Continuous assessment will contribute 50 marks (50%) to the final mark composed of:

Two 2-hour tests (60% of CA mark)

Two assignments (25% of CA mark)

Four marked practicals (15% of CA mark)

A 3-hour examination paper that will contribute 50 marks to the final mark.

The final mark will be calculated as follows:

50% CA mark + 50% Exam mark = 100 % final mark

<b>F3632EE AGRICULTURAL EXTENSION AND GROUP DYNAMICS</b>	
<b>Module Title:</b>	<b>AGRICULTURAL EXTENSION AND GROUP DYNAMICS</b>
<b>Module Code</b>	F3632EE
<b>NQF Level</b>	6
<b>Notional Hours</b>	140
<b>Contact hours</b>	L:4h/w, P:0h/w, T:0h/w
<b>Additional learning requirements</b>	Group work
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory

#### Module Content

Extension concepts: Principles, principles and philosophies; compare Modern and Traditional Extension; introduction of the new extensionist. Trends in the extension sector: The focus on globalisation and pluralism; adult learning for behavioural change. Extension methods: group contact, individual and mass contact. ICT innovation: to emerging agricultural challenges faced by extensionist. Extension Approaches: Identifying and comparing agricultural extension approaches. Perception: theatrical background of farmers, attitudes and decision making. Programme Extension: understanding of leadership principles and leadership development in the community-run initiatives. Social change and innovation: attributes of Innovations and their rate of adoptions. Models of the communication: process; written communication news reporting articles and newsletters; setting up communication public speaking; non-verbal communication: Interpersonal communication and needs: definition and importance of group; the group as channel of communication; group formation and functioning; group techniques. Group norms and cohesion: group goals; group member's roles; behavior and attitude in a group; motivation of group.

#### Student Assessment strategies

1. Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments and practical reports (at least 4 gradable items).
2. A continuous assessment mark of at least 50% is required to gain exam admission.
3. One examination with minimum duration of 3-hours (50% of the final mark).
4. A subminimum of 40% in the examination is required to pass, irrespective of the final mark.
5. A final mark of 50% is required to pass this course

<b>F3612EF FARM MANAGEMENT</b>	
<b>Module Title:</b>	<b>FARM MANAGEMENT</b>
<b>Module Code</b>	F3612EF
<b>NQF Level</b>	6
<b>Notional Hours</b>	140
<b>Contact hours</b>	L:4h/w, P:0h/w, T:3h/aw
<b>Additional learning requirements</b>	Individual assignments and projects
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module content

Concepts of farm management and decision-making, acquisition and the use of farm records, depreciation methods and assets valuation, economic principles-choosing production levels, economic principles in choosing input and output relationship, cost concepts, various budgets, investment analysis, risk and uncertainty management, machinery management and human resource management.

#### Student Assessment Strategies

- Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments and practical reports (at least 4 gradable items).
- A continuous assessment mark of at least 50% is required to gain exam admission.
- One examination with minimum duration of 3-hours (50% of the final mark).
- A subminimum of 40% in the examination is required to pass, irrespective of the final mark.
- A final mark of 50% is required to pass this course.

<b>F3602AP</b>	<b>FIELD ATTACHMENT FOR ANIMAL SCIENTISTS PREPARATION</b>
<b>Module Title:</b>	<b>FIELD ATTACHMENT FOR ANIMAL SCIENTISTS PREPARATION</b>
<b>Module Code</b>	F3602AP
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact Hours</b>	Lectures: 2 hours per week for one semester
<b>Additional Learning Requirements</b>	None
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### **Module Content**

The importance of animal science knowledge and practice in industrial attachment: Guides on how to get specific job and skill experience during field attachment. Employability-enhancing activities: gaining workplace skills and building network of company or industry contacts. Professional behavior and/or knowledge: role and expectation of student in the workplace, acceptable workplace behaviors and specific common job norms. Guide on effectiveness of field-based learning. Demonstration and discussion of ethical awareness, the ability to do ethical reflection, and the ability to apply ethical principles in decision-making. Collaboration and teamwork in a work context. Preparation to be able to identify, comment on and relate organizational, scientific and technical knowledge based on the key activities, as may be applicable, at the company/institution where attached. Administration: Procurement procedures, adequate record keeping. Personnel Health and safety, occupational health, dose exposures and risks assessments in workplace: Assess risks, hazards and exposures in the working environment. Student placement indemnity: The placement indemnity form is given to the students for signature, to prepare them for the field attachment in the following semester.

#### **Student Assessment Strategies**

Assessment for this module will consist of formative activities, and the final mark will be made of 100% Continuous Assessment (CA). The CA will be made up of seminars (30 %) and field-based learning plan (70 %).

### **E.5 THIRD YEAR**

<b>F3783AA</b>	<b>FIELD ATTACHMENT FOR ANIMAL SCIENTISTS</b>
<b>Module Title:</b>	<b>FIELD ATTACHMENT FOR ANIMAL SCIENTISTS</b>
<b>Module Code</b>	F3783AA
<b>NQF Level</b>	7
<b>National Hours</b>	240
<b>Contact hours</b>	4-6 months from November/December to Semester one
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	24
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core and S1

#### **Module content:**

This is a practical module where students spend time at real work situations under the supervision of qualified personnel. The students are attached to suitable livestock related institutions and agricultural businesses. Students are engaged in activities such as: Animal management and handling: learn how to herd animals with minimal stress based on animal welfare regulations, learn how to handle animals prior and during animal husbandry procedures (castration, dehorning, ear tagging, vaccination, tail docking, teeth clipping, iron supplementation, milking, etc.) in accordance with animal welfare standards, learn how to carry out animal husbandry techniques, body condition score. Animal health: recognize and diagnose zoonotic and economic important diseases such as: anthrax, rabies, food and mouth disease, CBPP etc. and internal and external parasites, implementation of prophylactic disease control measures (e.g. isolation, quarantine, vaccination). Nutrition (feeds and feeding): common feeds, supplementary feeding, feeding at different stages of production, ration formulation and mixing. Rangeland management and assessment: management of rangeland, assess rangeland conditions, fodder production and conservation, effective drought preparedness plan, feeding for drought. Breeding and selection: selection and management of breeding stock, preparation for breeding seasons, breeding soundness evaluation, heat detection. Maintenance of farm infrastructure: Repair of fences, pipeline inspection and maintenance, cleaning of pens, farm buildings. Farm planning: planning for breeding season and activities, maintenance of appropriate herd structure, proper disposal of animal waste while reducing harm to the environment, fodder flow planning Administration and record keeping: procurement procedures, meticulous record keeping on all farm operation activities, input usage and outputs, animal records (performance, pedigree, health recording), weather data, regular periodic reports, learn how to properly record and capture data in farm performance registers (digitalized records, NAMLiTS system, transportation documents, permits. Marketing: marketing research, marketing plan development and evaluation, learn how to grade and classify products. Research: Design of experiments, data collection, analysis and writing up of research results, and any other duties as per respective institution.

During the attachment period University lecturers visit the students to engage with field supervisors and to ensure that students are at their attached places and doing practical work as prescribed.

#### **Student Assessment Strategies**

Assessment by Field Supervisor = 30%

Oral presentation = 20%

Written report = 50%

<b>F3711AP</b>	<b>ANIMAL SCIENCE PRACTICES AND EQUIPMENT</b>
<b>Module Title:</b>	<b>ANIMAL SCIENCE PRACTICES AND EQUIPMENT</b>
<b>Module Code</b>	F3711AP
<b>NQF Level</b>	7
<b>Notional Hours</b>	180

<b>Contact hours</b>	7 hours practical per week for one month during the semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	18
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Year 1 and 2 modules
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Students will be divided into four groups of 6 students each. The practicals are divided into 4 clusters. Each of the following practical clusters is worth 4-5 credits and is for 9 hours:

##### Week 1:

(5 Credits) Dairy: Milking parlor operations (processing and storage; CMT); body condition scoring  
Poultry production: Interpreting production figures; Basic hatchery operatives; feeding; brooding; biosecurity; health basics  
Beef Production: Basic husbandry: - Castration and dehorning and vaccination cattle; branding (animal traceability; electronic ear tag or rumen bolus???)

##### Week 2:

(4 Credits) Rangeland: Carrying capacity estimation and stocking rate and veld condition assessment  
Nutrition: Feed Formulation and Balancing (Cattle, small stock, poultry, pigs)  
Piggery: Biosecurity; feeding; production plan

##### Week 3:

(4 Credits) Animal Products: Visit to a Tannery or other farm products processes at the farm  
LPS: Design production calendar according to species or simulated scenario  
Animal Welfare: Visit abattoir Neudamm or Meatco slaughter [canning??]

##### Week 4:

(5 Credits) Breeding & Genetics: Calculations and case studies; selection  
Small stock: body score condition; deworming; vaccination  
Business: Use specified data to make some decisions linked to farm management

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks.

Practical exercises 50%

Written Reports 30%

Written theoretical paper 20%

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#### F3752EE ENTREPRENEURSHIP

<b>Module Title:</b>	<b>ENTREPRENEURSHIP</b>
<b>Module Code</b>	F3752EE
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Online lectures, P:0h/w, T:2h/w
<b>Additional learning requirements</b>	Individual assignments and projects
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

This course introduces students to the theory of entrepreneurship and its step-by-step practical implementation. It focuses on theory of entrepreneurship; meaning, importance of entrepreneurship, concepts, characteristics, classifications of entrepreneurship, problems faced by entrepreneurs in Namibia, entrepreneurial process; critical factors for starting a new enterprise, evaluating opportunities for new businesses, determining resource needs and acquiring resources; business model; the revenue model, the cost model, formulating a winning strategy, the people are what matters- entry strategy- growth strategy; entrepreneurial marketing; marketing considerations- selecting the target market, market strategy. pricing strategies and marketing of services, export marketing; financing entrepreneurial ventures; sources of finance: debt and equity; entrepreneurial growth; transition from start-up to growth, the growth process and execution; intellectual property rights by understanding the mandates of BIPA; copyrights, trademarks, trade secrets, patents, licensing; business planning process under Namibian regulations; planning process, business plan; accounting for agri-business enterprises; basic financial statements, managing cash flows, preparation of projected financial statements, applications of business ratios, small business management as well as strategies that improve performance of new business ventures; production and material, human resources, finance management, break even analysis, operational cycle.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments and practical reports (at least 4 gradable items).

- 1.. A continuous assessment mark of at least 50% is required to gain exam admission.
2. One examination with minimum duration of 3-hours (50% of the final mark).
3. A subminimum of 40% in the examination is required to pass, irrespective of the final mark.
4. A final mark of 50% is required to pass this course

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#### F3711AW FARM ANIMAL WELFARE

<b>Module Title:</b>	<b>FARM ANIMAL WELFARE</b>
<b>Module Code</b>	F3711AW
<b>NQF Level</b>	7
<b>Notional Hours</b>	160

<b>Contact hours</b>	4 hours lecture periods per week and 3 hours practical for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Introduction – Concepts of animal welfare. Five freedoms of life. Introduction to welfare assessment– behaviour, physiology and motivation, preference and aversion testing etc. Physiological indicators of welfare. Measurement of stress responses. Immune system function and welfare. Pathological effects of stress. Relationships between welfare indicators. Using a range of methods in combination to assess welfare. Review of studies comparing different conventional and alternative housing systems for farm livestock – their effects on health and welfare. Understanding of environmental factors affecting welfare – pen design, stocking density, safety aspects, building design. Problems associated with barren and enriched environments, social grouping and husbandry procedures. Methods of assessing and improving environments. Diseases related to animal housing– lameness in cattle, leg weakness in poultry, wounding due to aggressive behavior in pigs and poultry. Specific problems of farm animals – identification of casualty animals, transport, slaughter. Effects of routine surgical procedures– castration, tail docking, beak trimming.

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks.

Formative assessments will make up 50% of the module grade (i.e., 2 tests, at least 4 assessed practicals and 2 assignments and ad-hoc quizzes/tasks) and a summative assessment (end of semester examination) 50% (1x 2 hours theory paper). Pass mark for the module is 50%.

F3712AH	ANIMAL HEALTH
<b>Module Title:</b>	<b>ANIMAL HEALTH</b>
<b>Module Code</b>	F3712AH
<b>NQF Level</b>	7
<b>Notional Hours</b>	180
<b>Contact Hours</b>	4 hours lecture periods per week and 3 hours alternate practical for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Animal Anatomy and Physiology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Introduction: Concepts of animal health, disease development and control; nature of disease and body responses; types of immunities, Disease control: General knowledge of pharmacology and therapeutics concepts of vaccination and herd health; disease development and body responses in livestock; causative agents of disease; diagnosis of disease; Hygiene practices: Cleaning, disinfection, sanitation; Animal health management: Animal disease management, biosecurity measures, management of pregnant, lactating animals; wastes, carcasses disposal; Diseases and disorders of lactating cow: mastitis, udder edema, dystocia, milk fever, ketosis, and calves: pneumonia, diarrhea; poultry diseases; and swine diseases; Effect of environment on: animal function and performance; Animal housing requirements, Common notifiable diseases of cattle, sheep, goats, pigs, and poultry in Namibia. Practical classes: allow the participation of students in actual activities pertaining to animal health as performed by veterinarians and technicians on the farm; laboratory based practical lessons includes, examination of blood smears, pre-prepared slides of blood, tissue and saliva borne agents of disease.

#### Student Assessment Strategies

Continuous Assessment: 50% comprising 1 assignment, 2 tests, 2 quizzes, 10 practical sessions; and a 3-hour examination constitutes 50% of the final grade.

A3712AB	ANIMAL BREEDING
<b>Module Title:</b>	<b>ANIMAL BREEDING</b>
<b>Module Code</b>	A3712AB
<b>NQF Level</b>	7
<b>Notional Hours</b>	180
<b>Contact Hours</b>	3 x 1-hour Lectures / week for 12 weeks; 03 Practical hours per week for 12 weeks
<b>Additional learning requirements</b>	Excursions; group work; project; tutorials
<b>NQF Credits</b>	18
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Pre-requisites: Molecular Genetics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Review of Mendelian Genetics: Mendel's laws; linkage; sex determination; pleiotropy; Modes of gene action: additive, dominance, epistasis; Introduction to Population Genetics: probability; Hardy-Weinberg law; forces that change gene frequency; Variation: continuous and discontinuous variation; metric characters; the normal distribution; genotype x environment interaction; Measures of association: correlation; regression; Partitioning quantitative variation into its causal components: genetic causes of variability; environmental cause of variability; breeding value; heritability; repeatability; Methods of estimating heritability: selection experiment; sib correlations; parent-offspring regression; High-low line separation; Correlation between traits: phenotypic correlation; genetic correlation; causes of genetic correlation; Principles of selection: factors that influence rate of selection gain; interaction of selection accuracy, selection intensity and generation interval; correlated selection response; Sources of information used in selection: individual information; ancestor information; collateral relatives; progeny information; Genetic evaluation and selection: Expected Progeny Differences (EPDs); breeding value estimation and associated accuracy with different sources of information; maternally influenced traits; BLUP; Inbreeding and relationship

coefficients: path coefficient method; Tableau methods; Outbreeding: phenotypic effects; heterosis; types of heterosis; crossbreeding; Broad categories of commercial breeding programmes: commercial strait breeding; rotational crossbreeding; terminal sire systems; combination systems; composites; Dairy cattle improvement: procedures used to evaluate bulls; records kept; breeding strategies; nucleus breeding schemes; Beef cattle improvement: bioeconomic traits; Swine and poultry improvement: pyramid breeding structure; bioeconomic traits; Goat improvement: bioeconomic traits; Types of genetic markers: RFLPs, microsatellites and SNPs; Molecular Genetics applications in animal breeding: halothane gene; Booroola fecundity gene; linkage disequilibrium; whole genome selection (WGS); commercial genetic tests; selection for disease resistance.

#### Student Assessment Strategies

The assessment will include:

Continuous assessment will contribute 50 marks (50%) to the final mark composed of:

1. Two 2-hour tests (40% of CA mark)
2. Three assignments (15% of CA mark)
3. Three marked practicals (20% of CA mark)
4. One project (15% of CA mark)
5. Data modelling, analysis and interpretation (10% of CA mark)

A 3-hour examination paper that will contribute 50% to the final mark.

The final mark will be calculated as follows:

50% CA mark + 50% Exam mark = 100 % (final mark)

#### F3712CB

#### BIOMETRY

<b>Module Title:</b>	<b>BIOMETRY</b>
<b>Module Code</b>	F3712CB
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lecture hours per week per semester 2 hour tutorial sessions per semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)/Prerequisite</b>	Introduction to Statistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 2

#### Module Content

Experimental design: Basic experimental terms; Principles of experimental design; Types of designs CRD; RCBD; Latin Square; Factorial; Split plot; Split-split plot and Repeated Measures designs; one-way and two-way ANOVA; assumptions and ANOVA model diagnostic checks. Parametric and non-parametric tests: comparison between parametric and non-parametric tests; Non-parametric test- Goodness of fit and test of association; paired and independent test in non-parametric; Kruskal-Wallis test; Friedman and Runs test. Multivariate techniques: PCA; CA; Path Analysis; FA; Canonical Correspondence; multidimensional scaling and Genotype × environment Interaction Analysis. Response Surface Methodology: Central Composite designs and Box-Behnken designs. Multiple Linear Regression: MLR model; Analysis and building a MLR; testing the usefulness of the MLR model. Survey Methods: Sampling Frame; Modes of data collection; research designs; and questionnaire design and reliability analysis.

#### Student Assessment Strategies

- Continuous assessment (at least 2 tests; 2 tutorial test and 2 assignments): 50%; Examination: 50% (1x3 hour Examination paper).
- To pass this module a student must obtain a minimum final mark of 50%.

### E.6 FOURTH YEAR

#### F3880AD

#### DESIGN THINKING

<b>Module Title:</b>	<b>DESIGN THINKING</b>
<b>Module Code</b>	F3880AD
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>Contact hours</b>	(2 lecture periods per week for one semester)
<b>Additional learning requirements</b>	N/A
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

#### Module Content

Problem structuring methods: creative reasoning, innovative offering (i.e. a new product) based on creative reasoning, various problem structuring methods from different disciplines; Design thinking dimensions: cognitive (reference to creativity & exploratory issues), social (reference to stakeholder & process issues), strategic (reference to creating value & organisational strategy).

#### Student Assessment Strategies

- The module will be evaluated using 100% continuous assessment (at least 2 assignments & 2 presentations). A minimum pass mark for the module is 50%.

#### F3880AP

#### RESEARCH PROPOSAL

<b>Module Title:</b>	<b>RESEARCH PROPOSAL</b>
<b>Module Code</b>	F3880AP
<b>NQF Level</b>	8
<b>Notional Hours</b>	140

<b>Contact Hours</b>	1 x 2hr lectures per week in semester core 1 x 2hr discussion forum per week in semester core
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3712CB: Biometry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	0

#### Module Content

Principles of Research design: Meaning of research, identifying different types of research, purposes of conducting research, the research process, Identifying topics for research; Qualities of a good research project, Literature review, Searching the literature, Managing the search yield; Interpreting and assessing the quality of the literature in the context of the topic, Presenting and synthesizing evidence; Research questions and objectives, Developing a research question; Research / Experimental design, Matching the purpose, aims, question and hypothesis with study design and methodology; Collecting and managing data; Data analysis; Budget, Ethical considerations and processes

#### Student Assessment Strategies

The assessment will include:

The module is based on 100% continuous assessment and the final mark will be calculated as follows:

- Module assessment quizzes (20%)
- Proposal report (50%)
- Proposal presentation (20%)
- Reflection on supervisor feedback (5%)
- Participation in forum discussions (5%)

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#### F3883AR RESEARCH PROJECT

<b>Module Title:</b>	<b>RESEARCH PROJECT</b>
<b>Module Code</b>	F3883AR
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<b>Contact hours</b>	N/A
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3712CB: Biometry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semesters 1 and 2

#### Module Content

The module is Research based. It includes writing of research proposal in Animal Science during the Core Semester in the fourth year and carrying out research under supervision of a Departmental lecturer, reviewing relevant literature on the topic under study, analyzing data and report presentation as well as research project write-up. Students should be able to utilize the plagiarism software and the plagiarism report Urkund is to be applied consistently in the Department

#### Student Assessment Strategies

The Research Project Assessment will be based on formative assessment only through 100% continuous assessment, which will constitute a weighting of:

- Research Proposal Presentation - 10%
- Draft Project Proposal - 15%
- Draft research report presentation - 20%
- Final marked report - 50%
- Final corrected report - 5%

A minimum mark of 50% needs to be achieved in order to pass the module.

Learning and Teaching Enhancement Strategies

The following initiatives have been proposed for assuring the quality of the programme

1. Engagement of Internal and External moderation of final research thesis for the students
2. Evaluation of draft report by more than one Lecturer
3. Student evaluation of teaching and materials
5. Effective supervision and monitoring of research activities

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#### F3801AM MEAT SCIENCE AND ANIMAL PRODUCTS

<b>Module Title:</b>	<b>MEAT SCIENCE AND ANIMAL PRODUCTS</b>
<b>Module Code</b>	F3801AM
<b>NQF Level</b>	8
<b>Notional Hours</b>	100
<b>Contact hours</b>	03 Lecture hours / week; 2 Practical hours / week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	10
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Introduction: Importance of meat, livestock products and by-products, Muscle anatomy and physiology: anatomy of skeletal muscles; physiology of muscular contraction and relaxation; growth and carcass composition of meat animals; rearing animals for meat, milk, eggs,

hide and skin on the farm; transportation of animals for slaughter; management of slaughter animals at feedlots; Slaughtering procedures: cattle, goats and sheep, pigs and poultry; animal welfare and religious concerns; Conversion of muscle to meat: postmortem changes in muscles and its conversion into meat; identification of wholesale and retail cuts; Abattoir infrastructure requirements: construction, general layout, equipment; abattoir hygiene: microbial control procedures; sanitation general and personnel hygiene; and sanitation; abattoir waste management; condemned material, Basic meat processing (abattoir environment): hygiene; packaging and preservation;. Methods used to evaluate qualities of meat; physical, sensory and chemical attributes of meat; factors affecting meat qualities. Milk quality, processing, preservation and storage. Egg quality, processing and storage; Hides and skin processing: quality of hides & skins, tanning process, quality of leather, Wool processing: Quality of wool, wool processing; Principles of quality management systems: Good Manufacturing Practices (GMP); food safety; food hygiene and sanitation, food laws and regulations; codex Alimentarius; Hazard Analysis Critical Control Point (HACCP) and ISO 9001:2000. Consumer concerns regarding the consumption of meat, milk and eggs.

#### Student Assessment Strategies

Continuous Assessment consists of 50% comprising of 1 assignment, 2 tests, 2 quizzes, 2 practical sessions; and a three-hour examination constitutes 50% of the final grade.

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### F3811AB BEEF PRODUCTION

<b>Module Title:</b>	<b>BEEF PRODUCTION</b>
<b>Module Code</b>	F3811AB
<b>NQF Level</b>	8
<b>Notional Hours</b>	200
<b>Contact Hours</b>	4 x 1-hour Lectures / week; 02 Practical hours alternate weeks for one semester
<b>Additional learning requirements</b>	Compulsory field trips / excursions; Farm attachments / group work
<b>NQF Credits</b>	20
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**  
 Namibian Beef industry: Importance of the Namibian beef industry, Conception to Consumption: Beef Industry stratification, Introduction and background' stakeholders and their roles, Legislation/policy, marketing channels and associated costs, understanding prices, industry performances, challenges faced by the meat industry, future prospects. Beef Production Systems: Commercial sector (Ranching- weaner & steer production, feedlotting); Stud breeders; Communal sector (Sedentary subsistence, nomadic herding, transhumance). Handling Facilities: Requisite facilities and equipment for a beef ranch: Camps, Corridors, Water supply, Cattle pens, Crush, Neck and body clamps, Scales, Loading ramps, Dips, spray race, Lick feed trough, Hay shelves. Equipment needed for: Identification, dehorning, castration, vaccination etc. Beef Cattle Breeding: Breeding objectives in beef cattle, bio-economic traits, herd fertility management, crossbreeding, commercial beef cattle breeding programs, continuous vs restricted breeding, Genotype x environment interactions. Beef Cattle Nutrition and Feeding: Nutrient requirements of the beef herd, Rangeland as basic feed, Major feeding systems including supplementary feeding, Feed additives, Potential nutritional & metabolic disorders. Cow-Calf Management: Body Condition Scoring, Management at Calving, Managing the Calf Crop, Weaning, sound beef cattle husbandry practices. Beef Cattle Growth: Principles and concepts, the growth curve and its phases, measures of growth, factors affecting growth and development, compensatory growth. Beef Herd Health: Herd Health Program, Common Diseases and parasites, Treatment of Calves, Cattle Vaccinations. Beef Cattle Transportation and Marketing: Transport and animal welfare, Management Factors Affecting Market Price.

#### Student Assessment Strategies

The assessment will include:

Continuous assessment will contribute 50 marks (50%) to the final mark composed of:

Two 2-hour tests (60% of CA mark)

Two assignments (25% of CA mark)

Four marked practicals (15% of CA mark)

A 3-hour examination paper that will contribute 50 marks to the final mark.

The final mark will be calculated as follows:

50% CA mark + 50% Exam mark = 100 % final mark

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### F3811AP RANGE MANAGEMENT

<b>Module Title:</b>	<b>RANGE MANAGEMENT</b>
<b>Module Code</b>	F3811AP
<b>NQF Level</b>	8
<b>Notional Hours</b>	200
<b>Contact Hours</b>	4 x 1-hour Lectures / week; Practicals: 1 x 3 hours practical/weeks for one semester
<b>Additional learning requirements</b>	Include any compulsory field trips / excursions (outside the normal practicals); attachments / group work / project.
<b>NQF Credits</b>	20
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	Introduction to Range Management
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Namibian range types and their characteristics: Overview of the carrying capacity of Namibian range types and carrying capacity determination; Morphology of common range plants: the structure of a grass plant; Flowering, stem & leaf development, elongation and tillering; Growth cycle of plants and plant & seed dormancy; Systematic botany with special focus on: Annuals & Perennials range plants, C3 vs. C4, (role of C3 vs C4 in Methane yield in rumen) shrubs, trees & bushes; Plant succession: Progressive; retrogression of range plants; Factors influencing succession; State & transition models; Animal-plant interactions on range: Animal-plant interface; The role of animal breed/size, dentition/digestive system vs. diet preference; Role of faeces, urine and trampling on range plants; Plant adaptation to herbivory; Grazing management systems & stocking rates; Continuous and rotational including multi-camp, non-selective & controlled selective grazing; Deferment; Zonal/centripetal grazing; Rangeland degradation: Bush encroachment, overgrazing, desertification and erosion; Land reclamation/restoration: Range evaluation and monitoring; Range condition & trend assessment; Drought management

strategies in Namibia; Planted pastures: The role of cultivated pastures in a farming system; Selection & classification of pasture species; Seed quality – seed purity, seed scarification, seed inoculation, germination; Establishment & Management principles of pasture species; Pasture Forage conservation: The need of pasture conservation, Characteristics of species suitable for hay making, Characteristics of species suitable for silage making, Characteristics of species suitable for foggage; Hay Making: Grass and legume species suitable for hay making, Plant phenological development stage for hay making, Procedures in hay making, Factors affecting hay quality; Silage making: Grass and legume species suitable for silage making, Plant phenological development stage for silage making, Procedures in silage making, The ensiling process, Factors affecting silage quality; Foggage Production: Grass species suitable for foggage production; Foggage quality, Foggage grazing management; Hydroponic fodder production: Seed purity, Seed germination, Seed Scarification, Legume seed inoculation; Fodder Flow Planning: Why fodder flow planning, Fodder flow variable, Modification of feed supply on the farm, Modifying seasonal patterns of animal demand on the farm; Pasture Crops in Climate Change Mitigation: Practical feeding strategies, Feed quality of pasture crops, Enteric methane mitigation through use of pasture fodder; Seed production for sustainable pasture production.

#### Student Assessment Strategies

Continuous Assessment: 50% (2x assignments + 2 tests + at least 4 marked practicals).

Exam: 50% (1 x3 hours paper).

<b>F3883AR RESEARCH PROJECT</b>	
<b>Module Title:</b>	<b>RESEARCH PROJECT</b>
<b>Module Code</b>	F3883AR
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<b>Contact hours</b>	N/A
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3712CB: Biometry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semesters 1 and 2
<b>Module Content</b>	The module is Research based. It includes writing of research proposal in Animal Science, carrying out research under supervision of a Departmental lecturer, reviewing relevant literature on the topic under study, analyzing data and report presentation as well as research project write-up. Students should be able to utilize the plagiarism software and the plagiarism report Urkrud is to be applied consistently in the Department

#### Student Assessment Strategies

The Research Project Assessment will be based on formative assessment only through 100% continuous assessment, which will constitute a weighting of:

Research Proposal Presentation - 10%

Draft Project Proposal - 15%

Draft research report presentation - 20%

Final marked report - 50%

Final corrected report - 5%

A minimum mark of 50% needs to be achieved in order to pass the module.

<b>F3802AD DAIRY PRODUCTION</b>	
<b>Module Title:</b>	<b>DAIRY PRODUCTION</b>
<b>Module Code</b>	F3802AD
<b>NQF Level</b>	8
<b>Notional Hours</b>	100
<b>Contact Hours</b>	4 x 1-hour Lectures / week; 02 Practical hours alternate weeks for one semester
<b>Additional learning requirements</b>	Compulsory field trips / excursions; Farm attachments / group work
<b>NQF Credits</b>	10
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module content

Dairy Cattle Breeding: Strategies for dairy genetic improvement in the tropics; bioeconomic traits in dairy cattle; heat detection in dairy cows; detecting reproductive problems; role of artificial insemination and other biotechnologies in genetic improvement; crossbreeding strategies; genotype x environment interactions. Dairy Cattle Nutrition and Feeding: Calf rearing, Heifer feeding management; Nutrient requirements of dairy animals; Dairy feeding systems – conventional, challenge, flat rate, budget, total mixed ration (TMR); Feeding the lactating cow, Feeding & management of dry cow, Feed formulation. Milk Production and Dairy Hygiene: Physiology of lactation; milk harvesting –types of milking parlors; milking machine, hand milking; factors which affect milk yield and composition, production of high-quality milk- good husbandry practices; clean milk production, quality control in milk and milk products. Mastitis and milk quality. Dairy Herd Health: Metabolic disorders, Mastitis, Internal & external parasites

#### Student Assessment Strategies

The assessment will include:

Continuous assessment will contribute 50 marks (50%) to the final mark composed of:

Two 2-hour tests (60% of CA mark)

Two assignments (25% of CA mark)

Four marked practicals (15% of CA mark)

A 3-hour examination paper that will contribute 50 marks to the final mark.

The final mark will be calculated as follows:

50% CA mark + 50% Exam mark = 100 % final mark

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**F3812AS SMALL RUMINANT PRODUCTION**

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<b>Module Title:</b>	<b>SMALL RUMINANT PRODUCTION</b>
<b>Module Code</b>	F3812AS
<b>NQF Level</b>	8
<b>Notional Hours</b>	200
<b>Contact hours</b>	4 x 1-hour Lectures / week; 03 Practical hours / week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	20
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Introduction to small ruminant production: Roles, advantages and disadvantages; Overview of the Namibian sheep and goats Industry, its importance, legal and policy framework, Namibia's trade partners in meat, opportunities and challenges; Breeds of sheep and goats commonly farmed with in Namibia: Identify and discuss breeds in terms of their origin, characteristics and adaptability; Sheep/Goat production systems: A description of the traditional/Communal and modern/commercial sheep/goat production systems; Facilities and equipment: Requisite facilities required for small ruminant production, and equipment needed for husbandry practices; Feeding habits and grazing systems: Feeding/grazing habits of sheep and goats, grazing management and systems; Feeding management and nutrient requirements of sheep and goats: Feeding management and Nutrient requirement of sheep and goats in different stages of production (rams/bucks, ewes/does, lambs/kids); Selection and breeding of small ruminants: Factors to consider when selecting breeding animals (female and male), breeding/mating seasons and methods/systems, Estrous cycle, Estrus synchronization, improving flock fertility; Lambing and kidding management: Lambing/kidding and assistance, fostering, husbandry practices, weaning, management calendar, record keeping, factors affecting slaughter lamb production; Dairy goat production: feeding, reproduction and lactation management; Animal welfare and health: Animal welfare, common diseases and internal and external parasites, flock health programs; Transportation and Marketing of small ruminants: Transportation of sheep and goats, selecting right animals for marketing, marketing costs and marketing channels

**Student Assessment Strategies**

The assessment will include:

Continuous assessment will contribute 50 marks (50%) to the final mark composed of:

Two tests (60% of CA mark)

Two assignments (25% of CA mark)

Five marked practicals/quizzes (15% of CA mark)

A 3-hour examination paper that will contribute 50 marks to the final mark.

The final mark will be calculated as follows:

50% CA mark + 50% Exam mark = 100 % final mark

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**F3812AM MONOGASTRIC ANIMAL PRODUCTION**

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<b>Module Title:</b>	<b>MONOGASTRIC ANIMAL PRODUCTION</b>
<b>Module Code</b>	F3812AM
<b>NQF Level</b>	8
<b>Notional Hours</b>	200
<b>Contact Hours</b>	4 x 1-hour Lectures / week; 3 Practical hours alternate weeks for one semester
<b>Additional learning requirements</b>	Compulsory field trips / excursions; Farm attachments / group work
<b>NQF Credits</b>	20
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Namibian poultry industry: The type of poultry production systems; factors for success in poultry farming; breeds and strains of chicken; the socio-economic importance of poultry production in Namibia; prospects and challenges of poultry production in Namibia; Poultry production systems: extensive, semi-intensive; intensive; Poultry housing: types of houses; location and layout; ventilation; floor space requirements; daily routine management procedures; Management poultry nutrition: digestive system; digestion; mixing diets for poultry; management and feeding of chickens; Poultry Reproduction; egg formation, egg selection, care and storage of hatching eggs; incubation methods; types of incubators; incubation requirements; egg candling, embryonic development; factors influencing fertility, factors affecting hatchability; and quality of chicks; hatchery sanitation and waste management; trouble shooting during incubation; incubation records, egg candling; Management of chicks at a hatchery: evaluation of chick quality and chick sexing.. Brooding management for broiler and layer chickens: brooding types, preparation of a brooder house for the arrival of chicks; placing of chicks in the brooder; monitoring of chicks after placement; poultry records: Importance of records keeping; types of records kept for broilers and layers; culling management of chickens; Nutrients requirement poultry & feeding management: feeding of chickens at different stages, (day old chicks, grower and layers; poultry building and equipment. feed Ingredients for egg and meat chickens, cannibalisms and control vaccination of Layers chickens, layers chicken layers hen Selection, o identifying better point of lay Birds (POL) before purchasing them, identify poor and good layers in commercial layer chickens, Diseases of poultry; the maintenance of good health (biosecurity), types of disease affecting broilers and layers the prevention of disease, the importance of early recognition of disease, the early treatment of disease. Egg collection, and storage for commercial purposes. egg packaging, functions of packaging, factors that must be taken into consideration for packaging different types of egg packages; labelling, cost o packing, storage of eggs, layout of packaging and storage facilities of eggs; transportation of shell eggs and its requirement for transporting eggs, Biosecurity measures on a poultry farm; Diseases and parasites of poultry. Namibian pig industry attributes of pig farming, factors for success in pig farming; -origin and distribution of pigs, aims and advantages, limitations; Prospects and challenges of pig production in Namibia; breeds of pigs and characteristics, Pig production Systems: extensive, semi-intensive; intensive, integrated, Pig reproduction( production cycle: management of pregnant, lactating and dry sow, mating

management; type of mating, common reproduction problems, boar and gilt selection, factors affecting puberty.. Pig housing: reasons for housing

single pigs, selection of housing site, construction of pig house general design consideration; ventilation; floor space requirements; routine management from farrowing to weaning (maintaining temperatures, removal of mucus membrane cutting needle cross-fostering, split suckling, supplementation, ear notching, creep feeding. Housing systems; Mating (Boar shed) Gestation (Dry sow shed) Farrowing, weaner grower finisher Pig nutrition: digestive system; digestion; voluntary feed intake; factors affecting nutrient requirements in pigs, management and feeding of pigs. Pig records: Importance of records keeping; types of records kept; Biosecurity: reasons for biosecurity measures on a pig farm; Diseases and parasites of pigs.

#### **Student Assessment Strategies**

The assessment will include:

Continuous assessment will contribute 50 marks (50%) to the final mark composed of:

2-hour tests

1 assignment

2 quizzes

3 practicals

3-hour examination paper that will contribute 50 marks to the final mark.

The final mark will be calculated as follows: 50% CA mark + 50% Exam mark = 100 % final mark

## F. B.SC. AGRICULTURE (ANIMAL SCIENCE) HONS [17BSAS] PROGRAMME IS PHASED OUT - NO INTAKE FOR 2023

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by School of Science. English Communication and Study Skills, English for Academic Purposes, Contemporary Social Issues and Computer Literacy are University Core Modules taken by all First Year University of Namibia students.

### F.1 PROGRAMME SCHEDULE

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
UCLC 3509	Computer Literacy	5	8	C	
ULCE 3419	English Communication and Study Skills	4	16	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
SBLG 3511	Introduction to Biology	5	16	C	
SPHY 3501	Physics for Life Sciences I	5	8	C	
SMAT 3511	Basic Mathematics	5	16	C	
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 1 Semester 2</b>					
ULEA 3519	English for Academic Purposes	5	16	C	
SCHM 3532	Chemistry for Life Sciences	5	16	C	
SPHY 3532	Physics for Life Sciences II	5	16	C	
SBLG 3512	Diversity of Life	5	16	C	
<b>Total credits Semester 2</b>					<b>64</b>
<b>Total CREDITS YEAR 1</b>					<b>136</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 2 Semester 1</b>					
AAEC 3681	Principles of Microeconomics	6	12	C	None
AAEC 3691	Rural Sociology	6	12	C	None
AASC 3681	Genetics	6	12	C	None
AASC 3691	Introduction to Range Management	6	12	C	None
ACRS 3681	Biostatistics	6	12	C	None
ACSC 3691	Agronomy	6	12	C	None
AFST 3681	General Microbiology	6	12	C	
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 2 Semester 2</b>					
AAEC 3682	Production Economics	6	12	C	None
AASC 3612	Biochemistry	6	16	C	SCHM 3532 (Chemistry for Life Sciences)
AASC 3602	Livestock Production Systems	6	8	C	None
AFST 3602	Food Technology	6	8	C	None
<b>Total credits Semester 2</b>					<b>56</b>
<b>Total CREDITS YEAR 2</b>					<b>128</b>
Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 3 Semester 1</b>					
AACA 3701	Field Attachment I*	7	8	C	None
AASC 3701	Animal Nutrition	7	8	C	None

ACSE 3781	Agricultural Engineering	7	12	C	None
AASC 3701	Animal Health	6	12	C	FST 3681 (General Microbiology)
AASC3792	Animal Breeding	7	12	C	AASC3681 (Genetics)
AAEC 3781	Farm Planning and Management	7	12	C	None
AASC 3711	Animal Anatomy & Physiology	7	16	C	None
<b>Total Credits Semester 1</b>					<b>76</b>
<b>Year 3 Semester 2</b>					
ACSC 3792	Research Methods	7	12	C	ACRS 3681 (Biostatistics)
AAEC 3712	Agricultural Extension	7	16	C	None
AASF 3702	Feeds and Feeding	7	8	C	AASC 3701 (Animal Nutrition)
AASC3741	Game Ranching	7	8	C	None
AAEC 3702	Entrepreneurship	7	8	C	None
AAEC 3782	Agricultural marketing	7	12	C	None
<b>Total credits Semester 2</b>					<b>68</b>
<b>Total CREDITS YEAR 3</b>					<b>144</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 4 Semester 1</b>					
AACA 3801	Field Attachment II	8	8	C	AACA 3708 (Field Attachment I)
ACSC 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AAEC 3881	Project Planning and Management	8	12	C	None
AASC 3811	Range and Pasture Management	8	16	C	None
AASC 3881	Beef Production	8	12	C	None
AASC 3821	Poultry Production	8	8	C	None
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 4 Semester 2</b>					
AASC 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AASC3892	Small Ruminant Production	8	12	C	None
AASC 3802	Dairy Production	8	8	C	None
AASM 3882	Meat Science	8	12	C	None
AASB 3882	Biotechnology of Animal Reproduction	8	12	C	None
AASC 3822	Pig Production	8	8	C	None
<b>Total credits Semester 2</b>					<b>68</b>
<b>Total CREDITS YEAR 4</b>					<b>140</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>548</b>

## F.2 MODULE DESCRIPTORS

### F.3 FIRST YEAR

#### CLC3509 COMPUTER LITERACY

<b>Module title:</b>	COMPUTER LITERACY
<b>Code:</b>	CLC3509
<b>NQF level:</b>	5
<b>Contact hours:</b>	1 lecture theory and 1 lecture practical per week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 100%: 2 Practical Tests 50%, 2 Theory Tests 50%
<b>Prerequisites:</b>	University Entry
<b>Module Content:</b>	

The module covers the following topics. Introduction to Computers: hardware and software, types and categories of computers, usage of Computer devices and peripherals. Working with the windows operating system: File Management, working with multiple programs, using the recycle bin. Using a word processor: formatting a text and documents, spelling check, grammar and thesaurus tools, inserting tables, auto-shapes, clip arts, charts, and mail merge. Spreadsheet: worksheets and workbooks, ranges, formulas and

functions, creating graphs, charts, and printing the workbook. Databases: creating tables, relationships, queries, forms and reports. Presentation software: slide layout and master, animations, auto-content wizard and templates. Communication tools: introduction to the Internet, web browsers, search engines, downloading and uploading files, creating and sending messages, email etiquette, internet security, and digital signatures.

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### LCE3419 ENGLISH COMMUNICATION & STUDY SKILLS

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<b>Module title:</b>	ENGLISH COMMUNICATION AND STUDY SKILLS
<b>Code:</b>	LCE3419
<b>NQF Level:</b>	4
<b>Contact hours:</b>	4 hours per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment (60%): two tests (reading and writing), two reading assignments, one oral presentation, Examination (40%): one three hour examination paper
<b>Pre-requisites:</b>	None

#### Module Content:

This module is aimed at assisting students in the development of their reading, writing and speaking and listening skills, in order to cope with studying in a new academic environment and in a language which may not be their first language. The module also focuses on study skills that students need throughout their academic careers and beyond. The module serves as an introduction to university level academics, where styles of teaching and learning differ from those at secondary schools in that more responsibility is placed on the student. The module therefore, focuses on the skills that students need throughout their academic careers and beyond.

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### CSI 3580 CONTEMPORARY SOCIAL ISSUES

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<b>Module title:</b>	CONTEMPORARY SOCIAL ISSUES
<b>Code</b>	CSI 3580
<b>NQF Level</b>	5
<b>Contact hours</b>	Equivalent to 1 hour per week for two semesters (Online)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 & 2 (Year Module)

#### Module Descriptor (Rationale of the module):

The module, Contemporary Social Issues (CSI3580), is designed to encourage behavioural change among UNAM students and inculcate the primacy of moral reasoning in their social relations and their academic lives. In providing students with critical and analytical thinking the module enables students to grow and develop into well rounded citizens, capable of solving contemporary social challenges experienced in their communities and societies. The teaching of the module takes three dimensions: the intellectual, the professional and the personal dimensions. The intellectual dimension is fostered through engaging students with subject knowledge, independent learning and module assessment. The professional dimension, on the other hand, is fostered through exposing students to real life situations of case studies and practical exercises that draws attention to social issues that attract ongoing political, public and media attention and/or debate. Finally, the professional dimension is fostered through group work, online discussions and class participation

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### SBLG 3511: INTRODUCTION TO BIOLOGY

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<b>Module title</b>	INTRODUCTION TO BIOLOGY
<b>Code</b>	SBLG3511
<b>NQF Level</b>	4
<b>Contact hours</b>	4 lectures/ week for 14 weeks and one 3-hour practical session per week.
<b>NQF Credits</b>	16
<b>Module Assessment:</b>	Continuous assessment (40%): Theory (not less than 3 tests and 2 assignments), 40%. Practicals (not less than 10 marked assignment), 60%. Examination (60%): 3 hour examination paper.
<b>Prerequisite</b>	NSCC (Biology C or better)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

It will consider organization of life, chemical basis of life, carbohydrates, proteins, nucleic acids, lipids and fats, water, cell structure and function, prokaryotic and eukaryotic cells, ultra-structure of plant and animal cells, cytoskeleton, membrane structure and function, cell communication, mitosis, meiosis, cell reproduction, cell cycle, and cell death. The following topics will be covered: Introduction to systems of classification, taxonomy and binomial nomenclature, including the five kingdoms and the three domain system. Definitions and categories/groups within the five kingdoms, evolution by natural selection (microevolution vs macroevolution), phylogeny and evolutionary relationships in five kingdoms. The course content will also include genes, chromosomes, genomes, Mendelian genetics, extensions to Mendelian genetics, chromosome theory of inheritance, linkage and cross-over, recombination, sex determination. The course content will also cover an introduction to Ecology: Definitions, history, scales in ecology, application of ecology. Conditions and Resources: Environmental conditions, animals and their resources, plants and their resources.

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### SPHY 3501: PHYSICS FOR LIFE SCIENCES I

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<b>Module title:</b>	PHYSICS FOR LIFE SCIENCES I
<b>Code:</b>	SPHY3501
<b>NQF level:</b>	4
<b>NPSC:</b>	N/A
<b>Contact hours:</b>	28 Lectures and 14 Practical Sessions/Tutorials
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.
<b>Pre-requisites:</b>	None

#### Module Content:

This module is to introduce Life science students to physics concepts and applications that will be useful to them in their undergraduate studies and carrier. The course will cover the following topics:

Units and significant figures; Motion in one dimension, average velocity, acceleration, freely falling bodies; Vectors and scalars, addition and subtraction of vectors in one and two dimensions, multiplication of vectors, component method of vector addition; Projectiles; Force and weight, Newton's laws and applications, free-body diagrams, friction, motion on inclined planes; Uniform circular motion, period and frequency of motion, centripetal force, banking of curves; Newton's law of Universal gravitation, gravity near the Earth's surface, satellites; Kepler's laws; Work done by a constant force, kinetic energy, work-energy theorem, potential energy, conservation of Mechanical energy, power; Momentum, impulse, conservation of energy and momentum in collisions, elastic and inelastic collisions in one dimension.

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### SMAT 3511: BASIC MATHEMATICS

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<b>Module name:</b>	BASIC MATHEMATICS
<b>Code:</b>	SMAT 3511
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

#### Module Content:

Sets: notations and diagrams to represent sets, subset, empty set, equality of sets, intersection, union, complement.

Algebraic expressions: simplification, expansion, polynomials, remainder and factor theorem, partial fractions.

Trigonometry: trigonometric functions, basic trigonometric identities. The absolute value, linear equations, linear inequalities, quadratic equations, the quadratic formula, quadratic inequalities. Functions: domain, codomain, image, preimage, even function, odd function. Sequences: the general term, the geometric sequence, the arithmetic sequence. The Binomial Theorem.

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### LEA3519 ENGLISH FOR ACADEMIC PURPOSES

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<b>Module title:</b>	ENGLISH FOR ACADEMIC PURPOSES
<b>Code:</b>	LEA3519
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 periods per week for 14 weeks
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral Presentation; Examination (40%) : One three hour examination paper
<b>Prerequisites:</b>	None

#### Module Content:

This module develops a student's understanding, and competencies regarding academic conventions such as academic reading, writing, listening and oral presentation skills for academic purposes. Students are required to produce a referenced and researched essay written in formal academic style within the context of their university studies. Students are also required to do oral presentations based on their essays. The reading component of the course deals with academic level texts. This involves students in a detailed critical analysis of such texts. The main aim is therefore, to develop academic literacy in English.

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### SCHM 3532: CHEMISTRY FOR LIFE SCIENCES

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<b>Module Title:</b>	CHEMISTRY FOR LIFE SCIENCES
<b>Code:</b>	SCHM3532
<b>NQF Level:</b>	5
<b>Contact Hours:</b>	56 hours of lectures, 42 hours of practical sessions.
<b>Credits:</b>	16
<b>Module Assessment:</b>	CA: 50% (minimum 3 tests 80%, laboratory component 20%, tutorial assignments 10%). Final Exam: 50%; (1 x 3 hour exam paper)
<b>Pre-requisites:</b>	None

#### Module Content:

Classification of Matter: Mixtures and Pure substances; Physical States of Matter; Physical and Chemical Properties.

Extensive and Intensive properties.

Measurements: Units, Significant figures; Precision and Accuracy, Factor Label Method. Atomic structure and the Periodic table; Electron configuration; Physical and Chemical properties as predicted from groups. Ionic compounds and Molecular compounds: Writing chemical formulae and naming of ionic and molecular compounds. Average Atomic Mass. The Mole Concept; Percent Composition, Empirical formula and Molecular formula. Stoichiometry: limiting reagent, percent yield. Solutions: electrolytes and non-electrolytes, aqueous solutions, ionic equations; concentrations: percent concentration; molarity, molality; dilution of solutions; structure and solubility. Types of bonds; Lewis structures; Resonance structures; Molecular geometry: the VSEPR model, Polarity of molecules. Acid-base equilibrium: properties of acids and bases; relations of acids and bases, self ionisation of water; strengths of acids and bases; the pH scale; hydrolysis of salts; buffers; acid-base titration. Introduction to organic chemistry: organic compounds; structural formulae and conformations; functional groups; Classes of hydrocarbons: alkanes, cycloalkanes: alkanes; alkenes and alkynes; oxidation and reduction; addition reactions; stereo-isomerism. Alcohols, phenols, thiols, ethers: organic compounds of oxygen; common alcohols and phenols. Carboxylic acids and esters, amines and amides: Introduction to carbohydrates, lipids and porphyrins.

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### SPHY 3532: PHYSICS FOR LIFE SCIENCES II

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<b>Module Title:</b>	PHYSICS FOR LIFE SCIENCES II
<b>Code:</b>	SPHY 3532
<b>NQF Level:</b>	4
<b>Contact Hours:</b>	4 Lectures per week for 14 weeks, Practical Time: 14 sessions (42 hours)
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment (50%, Minimum 2 tests, 4 assignments and practical reports) and Examination (50%, 1 x 3-hour paper)
<b>Pre-requisites:</b>	NSSC Physical Science

**Co-Requisites:** SPHY 3401: Physics for Life Sciences I; SMAT3511: Basic Mathematics; SMAT3512: Pre-calculus;

**Module Content:**

This module introduces life science students to concepts of physics and their application to real life situations, new topics that were not dealt with in PHY 3101 are introduced (i.e., on electricity, magnetism and radioactivity). The content of this course is good enough to help the life science students throughout their undergraduate work and careers. The following topics will also be covered: Electric charge; insulators and conductors; Electric force and coulomb's law, Electric field and Gauss's law; Electric potential; Capacitance and capacitors; Direct current; Ohm's law and simple circuits; Magnetic field; Alternating current; Transformers; Phenomenological approach to RL and RC circuits; Temperature, gas and thermal expansion; Basic geometrical optics; Radioactivity and its detection.

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**SBLG3512: DIVERSITY OF LIFE**

**Module title:** DIVERSITY OF LIFE  
**Code:** SBLG 3512  
**Course Equivalent:** NSSC (/HIGH GRADE) Biology  
**NQF level:** 5  
**Contact hours:** 4 lecture periods / week for 14 weeks and one three hour practical session per week  
**Credits:** 16  
**Module assessment:** Continuous assessment: Theory (not less than 3 tests and 2 Assignments) 40% Practicals (not less than 10 marked assignments) 50% Examination: 60% (1 x 2 hour examination paper)  
**Prerequisites:** NSSC (Biology C or better)

**Module Content:**

This module is designed to give students a detailed understanding of the diversity of life. It gives students the broader appreciation of biodiversity in the different ecological habitats. The course shall describe diagnostic characteristics of principle taxonomic categories for each phylum. Coverage of each Phylum shall follow a phylogenetic (evolutionary) approach as well as introduce broad ecological and physiological principles. Various aspects of reproduction and development shall be highlighted. This module prepares students to understand subsequent courses such as Introduction to Ecology and Microbiology, Population Ecology, Comparative physiology, Biogeography, Plant and Animal Form and Function

Topics covered will include viral, bacterial, fungal, algal, animal and plant diversity. It then considers the characteristics and life cycles of the following important algae, animal and plant groups: Chlorophyta, Phaeophyta, Rhodophyta, Chrysophyta, Euglenophyta, Pyrrophyta, Cryptophyta, Protostomate phyla: Nemertea, Mollusca, Anellida, Arthropoda, Nematoda, Rotifera, Lophophorates, Onychophora. Deuterostomate phyla: Echinodermata, Hemichordata and Chordata (Subphyla: Urochordata, Cephalochordata and Vertebrata: Class Myxiniiformes, Petromyzontiformes, Placoderms, Chondrichthyes, Actinopterygii, Actinistia, Dipnoi, Amphibia, Reptilia, Aves, Mammalia ) bryophytes, seedless vascular plants, gymnosperms, and the angiosperms. Concepts such as Homology and analogy; body symmetry (radial, bilateral), cephalisation, body cavities: diploblastic, triploblastic (acoelomate and coelomate [deuterostomes and protostomes]) will be covered.

Examples from Namibia shall be used where possible and applicable. The course content shall be supplemented with appropriate weekly practical sessions in the laboratory and in the field.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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**F.4 SECOND YEAR**

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**AASC3681: GENETICS**

**Module Title:** GENETICS  
**Code** AASC 3681  
**NQF Level** 6  
**NQF Credits** 12  
**Contact Hours** 3 x 1 hour Lectures / week for 14 weeks (42hours); Practicals: 1X 3 hour s /fort weekly for 7 weeks (21 hours)  
**Assessment Strategies** Continuous Assessment: 40% (2 tests + at least 5x marked practicals / assignments). Exam: 60% (1 x2 hour paper).  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

This course introduce and presents principles and methods used in the study of genetics. The emphasis is on application of concepts to solve problems. The course provides a foundation for more advanced studies in the field of agriculture and veterinary medicine. The specific topics to be covered are:

The molecular structure of nucleic acids (DNA and RNA) and gene expression: The double helix model of DNA; Transcription, Translation and the Genetic Code; Regulation of gene expression – the Lac operon; DNA replication in prokaryotes and eukaryotes.

Extension of Mendelian analysis and ratio: Incomplete dominance; co-dominance; multiple allelism; gene interactions; pleiotropy; epistasis; lethal genes, additive gene action.

Chromosomal basis of heredity: Physical structure of chromosomes and DNA Packaging; Karyotypes and Variations; gene linkage; genetic mapping.

Introduction to Quantitative Genetics: Polygenic inheritance; Analysis of polygenic traits; Heritability

Other topics to be covered include: The molecular organization of prokaryotic and eukaryotic genomes; Molecular structure of genes; The Cell Cycle; Mitosis and its genetic significance; Meiosis and its genetic significance; Mutations (types, causes, detection and significance); Sex determination; Sex linkage; sex-limited and sex-influenced.

The module also introduces students to molecular biology techniques: Genetic engineering or recombinant DNA technology; DNA extraction; Polymerase Chain Reaction (PCR); DNA electrophoresis and sequencing; gene cloning; animal cloning and marker-assisted selection.

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**AASC 3691: INTRODUCTION TO RANGE MANAGEMENT**

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<b>Module Title:</b>	INTRODUCTION TO RANGE MANAGEMENT
<b>Code</b>	AASC 3691
<b>NQF Level</b>	6
<b>NQF Credits</b>	12
<b>Contact hours:</b>	3 x 1 hour Lecturers / week for 14 weeks; 03 Practical hours alternate weeks for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module content:**

This introductory module develops the students' understanding, skills and attitude regarding rangeland resources and principles of rangeland management through coverage of the following: Background and role of rangelands in Namibia, objectives of range management; Basic range terminologies; Identification of the major forage species; Grazing value and ecological status of grasses; Veld types in the farming areas of Namibia, rainfall map, soil types of Namibia, agro-ecological zones; Biotic and abiotic factors affecting rangelands, effect of climate change on rangeland condition; introduction to rangeland restoration, Sustainable range management in Namibia.

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**AASC 3612: BIOCHEMISTRY**

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<b>Module Title:</b>	BIOCHEMISTRY
<b>Code</b>	AASC 3612
<b>NQF Level</b>	6
<b>NQF Credits</b>	16
<b>Contact Hours</b>	4 x 1 hour Lectures / week for 14 weeks (56 hours); Practicals: 1X 3 hours /fort weekly for 7 weeks (21 hours)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2 tests + at least 5x marked practicals / assignments). Exam: 60% (1 x3 hour paper).
<b>Prerequisite</b>	Chemistry for Life Sciences (CHM3532)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Under this course the students will learn about:

**PHYSICAL BIOCHEMISTRY:** Acids, bases, buffers, pH, ionic strength, molarity; water (structure and ionization).

**STRUCTURAL BIOCHEMISTRY:** Structure and function of macromolecules (carbohydrates, proteins and lipids), Vitamins, Coenzymes and Cofactors.

**ENZYMOLGY:**(Enzymes as organic catalysts; Enzyme nomenclature; Factors affecting activities of enzymes; Enzyme kinetics - The Michaelis-Menten equation; The Lineweaver-Burk plot; Enzyme inhibition; Allosterism.

**BIOENERGETICS AND THERMODYNAMICS:** Free Energy, Laws of Energy, Activation Energy, Transition States, Endergonic and exergonic reactions.

**METABOLISM:** Catabolism and Anabolism; Carbohydrate catabolism (Glycolysis, Alcohol and lactic acid Metabolism, Tricarboxylic acid cycle or the TCA cycle; Electron transport chain and oxidative phosphorylation); Regulation of carbohydrate metabolism; Gluconeogenesis; Synthesis of the disaccharides (lactose and sucrose); Synthesis of polysaccharides (starch and glycogen); Lipid metabolism ( $\beta$ -oxidation, malonyl CoA); Integration of carbohydrate and fat metabolism; Amino acids and protein metabolism; Urea cycle; The Cori cycle; Pentose phosphate pathway; Glyoxylate cycle in oily seeds.

**SPECTROPHOTOMETRY:** Fundamental laws of spectrophotometry and absorbance.

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**AASC 3602: LIVESTOCK PRODUCTION SYSTEMS**

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<b>Module Title:</b>	LIVESTOCK PRODUCTION SYSTEMS
<b>Code</b>	AASC 3602
<b>NQF Level</b>	6
<b>NQF Credits</b>	8
<b>Contact hours:</b>	2 x 1 hour Lectures / week for 14 weeks; weeks 03 Practical hours alternate weeks for 14
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

This module covers the role of livestock and agriculture in the national economy and gives a broad overview of the industry, potentials, competitiveness and constraints. It covers the different production systems, their impacts on the environment, productivity levels and sustainability. Coverage also includes breed and species adaptability to the environments; drought and its effects; the management of ruminants and non-ruminants with regard to breeding, nutrition, health and housing; livestock management facilities; harvesting, handling and marketing of livestock products. The module also discusses the constraints facing communal and commercial farmers in Namibia

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**F.5 THIRD YEAR**

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**AACA 3701: FIELD ATTACHMENT I**

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<b>Module Title:</b>	FIELD ATTACHMENT I
<b>Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>NQF Credits</b>	8

<b>Contact Hours</b>	6 weeks of Field Attachment
<b>Assessment Strategies</b>	40% (Class oral presentation); 60% (report write up.)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:**

This is a practical course where students spend time at real work situations under the supervision of qualified personnel. The students are attached to suitable agricultural businesses and institutions concerned with agricultural economics and rural development and agriculture. During the attachment period University lecturers visit the students to ensure that they are doing practical work as prescribed.

**AASC 3701: ANIMAL NUTRITION**

<b>Module Title:</b>	ANIMAL NUTRITION
<b>Code</b>	AASC 3701
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours:</b>	2 x 1 hour Lectures / week for 14 weeks; weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals); Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

This module introduces students to basic animal nutrition including key concepts and terminologies and the role of animal nutrition in animal production. The module exposes students to different topics relating to animal nutrition of various livestock species, laboratory feeds analysis and feed evaluation; general comparison of plants, animals and animal feeds; plants and animals as feed sources with special focus on nutritive values, availability, affordability and laws associated with the use of either; feed fractions and their nutritional implications; digestive system and physiology of farm animals; digestibility and degradability experiments; use of near infrared Reflectance (NIR) Spectroscopy, spectrophotometer in animal nutrition; use of feed value estimates and; mineral and vitamin nutrition.

**AASC 3791: ANIMAL HEALTH**

<b>Module Title:</b>	ANIMAL HEALTH
<b>Code</b>	AASC 3791
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>NQF Credits</b>	12
<b>Contact hours:</b>	3 x 1 hour Lectures / week for 14 weeks; 03 Practical hours / week for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals); Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	FST 3681 (General Microbiology)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

VIRAL DISEASES: Gumboro Disease, Newcastle Disease, Rabies, FMD, Bovine Malignant Catarrhal Fever, Lumpy Skin Disease (LSD), African Swine Fever, Orf. PRION DISEASES: Bovine Spongiform Encephalopathy. BACTERIAL DISEASES: Anthrax, Mastitis, Brucellosis, Anaplasmosis, Heartwater, Contagious Bovine Pleuropneumonia, Caseous Lymphadenitis. NUTRITIONAL AND METABOLIC DISORDERS: Piglet anaemia, Bloat, Milk fever, Traumatic reticuloperitonitis (TRP), Phytotoxicosis (plant poisoning) in Namibia. PARASITOLOGY: -Host-parasite relationship, types of host, sources and carriers, sources of infection, modes of transmission and entry of parasites, harmful effects of parasites, immunity in parasitic infections, antibody response in parasite infections, Antigenic variation, Immunotolerance PROTOZOAN DISEASES: Coccidiosis, Trichomoniasis, Babesiosis, Anaplasmosis, Toxoplasmosis, Trypanosomiasis. HELMINTHIASIS: Ascariasis, Parasitic gastroenteritis (PGE), Trichinellosis, Cysticercosis, Stilezia hepatica, Echinococcosis, ECTOPARASITES: Mange, Sarcoptic, Chorioptic, Demodocosis. Ticks – hard and soft ticks, Lice, Flies, Fleas,

**AASC 3741: GAME RANCHING**

<b>Module Title:</b>	GAME RANCHING
<b>Code</b>	AASC 3741
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours:</b>	2 x 1 hour Lectures / week for 14 weeks; 03 Practical hours alternate weeks for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 10 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Roles of Game Ranching at the farm level & contribution to the national economy; Ethics & reasons for conserving & preserving game animals; Comparative productivity indices of selected game and domestic animals; Challenges and constraints to Game Ranching; Ecological roles, social behaviours and peculiar characteristics/identification of game species of interest i.e. small & large herbivores, carnivores, dangerous game & game birds; Eco-zones where game could be an economic asset; Game ranch management including selecting a suitable game farm; Converting a livestock ranch into a game farm; Game habitat identification & evaluation, carrying capacity

& stocking rates; Practising a crude form of grazing rotation & habitats utilization through the use of fence, fire, water & licks; Fire; Water provision; Look-out posts/towers; Dietary supplementation; Basic concepts on game population dynamics & monitoring; Game counting including mathematical computations; Effect of diseases and parasites on game populations; Systems of production and their economic returns; Consumptive and non-consumptive utilization of game animals; Game capture, infrastructure and transportation including legal and operational requirements; Meat and trophy processing with special focus on animal skinning, preparation of trophies & final trophy handling and, by-products; Importance, establishment & legal requirements of game conservancies; Game farm economics: Development capital, running costs & profitability, general trends and; Markets and marketing.

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### AASC 3711: ANIMAL ANATOMY AND PHYSIOLOGY

<b>Module Title:</b>	ANIMAL ANATOMY AND PHYSIOLOGY
<b>Code</b>	AASC 3711
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact Hours</b>	4 x 1 hour Lectures per week; practicals: 4 hr per week. Duration of 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals). Exam: 60% (1 x3 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

The course deals with the concepts pertaining to the morphology function of the circulatory, respiratory, nervous, skeletal and locomotory systems of farm animals (ruminants, mono-gastric animals, and poultry). The anatomical and functional interrelationship of these systems and their embryonic development with special reference to their progenitors and derivatives are discussed. Practical classes that involve the use of carcass dissections, examination of internal organs in dead animals, and the study of laboratory models, help in the understanding of theoretical concepts discussed in the lectures.

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### AASF 3702: FEEDS AND FEEDING

<b>Module Title:</b>	FEEDS AND FEEDING
<b>Code</b>	AASF 3702
<b>NQF Level</b>	7
<b>NQF Credits</b>	8
<b>Contact Hours</b>	2 x 1 hour Lectures / week for 14 weeks; 02 Practical hours alternate week for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Co-requisite</b>	Animal Nutrition (AASC 3701)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

This module introduces students to basic feeds and feeding concepts and terminologies. They will learn about livestock feeds and feed resources classification such as browse, cakes/concentrates, crop residues, hays, silages, supplements e.g. energy, protein, mineral & vitamins and, feed additives will be covered; comparative nutritional values of different feedstuffs; analysis and effects of phenolics, tannins and other anti-quality factors in animal feeding; acquaint students to ways of improving feeding value of low quality feedstuffs; nutrient requirements of farm animals for maintenance, growth, reproduction and other productive functions; significance and use of feeding standards & tables; applied animal feeding & ration formulation including livestock feeding systems, ration formulation methods & feed mixing for different farm animals; feed intake regulation and prediction; diagnosis, treatment and prevention of metabolic disorders.

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### AASC 3792: ANIMAL BREEDING

<b>Module Title:</b>	ANIMAL BREEDING
<b>Code</b>	AASC 3792
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 x 1 hour Lectures / week for 14 weeks; 02 Practical hours alternate week for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (7 x assignments + 2 tests + 1 written report). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	Genetics (AASC 3601)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

This module covers the application of population and quantitative genetics principles to the improvement of livestock and poultry. Concepts in population genetics including change in gene frequencies as the basis for livestock improvement by selection, Hardy-Weinberg equilibrium, forces that change gene frequencies are discussed. The module covers: causes of variation, measures of variation, variance partitioning; estimation of heritability; correlations between traits; principles of selection; genetic relationships. The practical application of the principles of selection are discussed emphasizing genetic evaluation using BLUP, methods of breed improvement by selection and utilization of different mating systems in beef cattle, dairy cattle, swine, sheep and goats. Advances in molecular genetics and their application to breeding are also covered including: types of genetic markers (RFLPs, microsatellites, SNPs); uses of DNA technologies (marker assisted selection, gene introgression); major genes affecting ovulation rate in sheep; QTL for internal nematode resistance in sheep.

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**F.6 FOURTH YEAR**

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**AACA 3801: FIELD ATTACHMENT II**

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<b>Module Title:</b>	FIELD ATTACHMENT II
<b>Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact Hours</b>	8 practical hours per day for 6 weeks
<b>Assessment Strategies</b>	40% (Class oral presentation); 60% (report write up.)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:**

This is a practical course where students spend time at real work situations under the supervision of qualified personnel. The students are attached to suitable agricultural businesses such as the Ministry of Agriculture and Forestry's Green Scheme projects, Meatboard Board of Namibia, Agronomic Board, and institutions concerned with agricultural economics and rural development and agriculture such as the Agricultural Bank of Namibia (AGRIBANK) and the Development Bank of Namibia (DBN). Students are engaged in decision-making exercises, planning, monitoring and evaluation of agricultural extension programmes and plans. Furthermore, they should be engaged in data capturing, analysis report writing and record keeping. During the attachment period University lecturers visit the students to ensure that they are doing practical work as prescribed.

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**AASC 3810: RESEARCH PROJECT**

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<b>Module Title:</b>	RESEARCH PROJECT
<b>Code</b>	AASC 3810
<b>NQF Level</b>	8
<b>NQF Credits</b>	32
<b>Contact hours:</b>	32 hours
<b>Assessment Strategies</b>	Continuous Assessment: Continuous assessment 40% (oral presentation) 60% Project write-up
<b>Prerequisite</b>	CSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:** Research based.

Methods of facilitation of learning

Lectures, written assignments, group work, class discussions and presentations.

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**AASC 3811: RANGE AND PASTURE MANAGEMENT**

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<b>Module Title:</b>	RANGE AND PASTURE MANAGEMENT
<b>Code</b>	AASC 3811
<b>NQF Level</b>	8
<b>NQF Credits</b>	16
<b>Contact Hours</b>	4 x 1 hour Lectures per week; practicals: 4 hr per week. Duration of 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x3 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

This module develops the students' understanding, skills and attitude regarding range and pasture management through coverage of the following: Namibian range types and their characteristics; Overview of the carrying capacity of Namibian range types and carrying capacity determination; Morphology of common range plants including structure of a grass plant; Flowering, stem & leaf development, elongation and tillering; Growth cycle of plants and plant & seed dormancy; Introduction to systematic botany with special focus on Annuals & Perennials range plants, C3 vs. C4, shrubs, trees & bushes; Plant succession, retrogression and die-back rate of selected range plants; Factors influencing succession; State & transition models; Animal-plant interactions on range: Animal-plant interface; The role of animal breed/size, dentition/digestive system vs. diet preference; Role of faeces, urine and trampling on range plants; Plant adaptation to herbivory; Grazing systems & stocking rates; Continuous and rotational including multi-camp, non-selective & controlled selective grazing; Deferment; Zonal/centripetal grazing; Range degradation: Bush encroachment, overgrazing, desertification and erosion; Land reclamation/restoration. Range evaluation and monitoring; Range condition & trend assessment; Fodder flow management and forage conservation.

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**AASC 3881: BEEF PRODUCTION**

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<b>Module Title:</b>	BEEF PRODUCTION
<b>Code</b>	AASC 3881
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 x 1 hour Lectures per week; practicals: 2 hr per alternate week. Duration of 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

This module familiarizes students with the Namibian beef industry including its importance, legal and policy framework, Namibia's trade partners in meat, opportunities and challenges faced by the industry. The module develops the students' understanding and skills in the following topics: Beef cattle breeds and systems of production; Major feeding systems including supplementary feeding and potential nutritional & metabolic disorders; Requisite facilities & equipment for a beef ranch; Beef cattle breeding and selection with special focus on bio-economic traits, quality attributes of a beef animal; breeding objectives in beef cattle; Commercial beef cattle breeding programmes including straight breeding, rotational crossbreeding, terminal sire system; Continuous versus restricted breeding; winter vs summer mating systems; AI vs natural service; Herd structures, grouping and replacement; Calving & calf management including dystocia and assisted calving; Sound beef cattle husbandry practices; Beef cattle growth, feed conversion ratio and efficiency; Diseases and parasites; Marketing, grading & transportation of beef animals; Hide processing and quality; Performance and progeny testing; Planning a beef cattle enterprise and; Livestock & livestock products traceability including FAN Meat Scheme.

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### AASC 3821: POULTRY PRODUCTION

<b>Module Title:</b>	POULTRY PRODUCTION
<b>Code</b>	AASC 3821
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact hours:</b>	2 x 1 hour Lectures / week for 14 weeks; 03 Practical hours alternate weeks for 14weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals)Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

This course covers theoretical and practical aspect of poultry production including production systems, routine management, feeding requirements of different classes of chicken (chicks, growers, finishers, layers), health, breeding and housing. Aspects of reproduction including egg formation and embryo development, egg incubation and hatching are also covered. Common diseases, disease prevention and control, special attention will be focused on emerging disease threats (e.g. Avian influenza). Industry stratification (breeding companies, multipliers and producers) and vertical integration (production, marketing and processing) will also be discussed. Coverage of recent developments in the Namibian poultry industry will expose the students challenges and opportunities in the sector.

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### AASC 3882: SMALL RUMINANT PRODUCTION

<b>Module Title:</b>	SMALL RUMINANT PRODUCTION
<b>Code</b>	AASC 3882
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 x 1 hour Lectures / week for 14 weeks; 02 Practical hours / week for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

This module familiarizes students with the Namibian small stock industry including its importance, legal and policy framework, Namibia's trade partners in meat, opportunities and challenges. The module also covers breed characteristics of sheep and goats, production systems, requisite facilities and equipment. Students are introduced to concepts pertaining to feeding habits of sheep and goats, grazing management and systems and the nutrient requirement of sheep and goats. The module further covers animal selection and breeding, including breeding/mating seasons and methods/systems, flock composition and selection of replacement animals. The module develops the students' understanding in lambing/kidding management including dystocia and fostering. Students are expected to conduct practicals in animal husbandry techniques. Coverage also includes selecting the right animals for marketing, marketing costs, marketing channels, transportation and slaughter, livestock traceability, processing of skins, animal welfare and health.

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### AASC 3802: DAIRY PRODUCTION

<b>Module Title:</b>	DAIRY PRODUCTION
<b>Code</b>	AASC 3802
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact hours:</b>	2 x 1 hour Lectures / week for 14 weeks; 02 Practical hours alternate weeks for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Semester Offered</b>	2

#### Module Content:

This module will cover: dairy herd health management; routine management practices on a dairy farm; dairy cattle feeding; management of pregnant and dry cows, bulls calves and heifers; breeding and breeding efficiency; farm records; physiology of lactation; milk harvesting, factors which affect milk yield and composition, production of high quality milk and quality control in milk and milk products. It will also look at milk marketing and dairy animal health. Dairy development trends in Namibia will also be covered.

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### AASM 3882: MEAT SCIENCE

<b>Module Title:</b>	MEAT SCIENCE
<b>Code</b>	AASM 3882
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 x 1 hour Lectures / week for 14 weeks; 02 Practical hours / week for 14 weeks

<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 10 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The module covers: muscle physiology; growth and carcass composition of meat animals; slaughter procedures for pigs, sheep, cattle and poultry; postmortem changes in muscle and its conversion into meat, identification of wholesale and retail cuts. Coverage also includes abattoir hygiene with emphasis on the importance of abattoir hygiene, microbiology, general layout and construction, personal hygiene, handling of waste and condemned material, pest control and sanitation. Topics such as meat hygiene, spoilage and preservation and basic meat processing are also covered. The module develops the students' understanding of physical, sensory and chemical meat quality as well as the factors affecting quality. The module also provides students with knowledge on the principles of quality management systems: Good Manufacturing Practices (GMP's); food safety; food hygiene and sanitation, food laws and regulations; codex alimentarius; Hazard Analysis Critical Control Point (HACCP) and ISO 9001:2000. Consumer concerns regarding the consumption of meat are also discussed.

**AASB 3882: BIOTECHNOLOGY OF ANIMAL REPRODUCTION**

<b>Module Title:</b>	BIOTECHNOLOGY OF ANIMAL REPRODUCTION
<b>Code</b>	AASB 3882
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 x 1 hour Lectures / week for 14 weeks; 03 Practical hours alternate for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

This module aims to develop the students' understanding, skills and attitude regarding the application of Biotechnology of Animal Reproduction through a coverage of genetic engineering in domestic animals including: introduction to the methods applied in biotechnological of animal reproduction; the use of biotechnology for animal selection; methods applied in genetic engineering; gene transfer through its insertion into zygote nucleolus; the importance and use of embryo transfer in domestic animals; theoretic and practical procedures oestrous synchronization and embryo transfer; the use of reproductive hormonal compounds for triggering multiple ovulation; regulation of herd oestrous cyclicity and/or oestrous synchronization; method applied for triggering superovulation; artificial insemination and factors affecting successful fertilization; factors affecting effective hormonal action; oocyte retrieval and fertilization; embryo retrieval, evaluation and grading; embryo dissections and cryopreservation or transfer; sperm and embryo cryopreservation; the mechanism of embryo cryopreservation and thawing; theoretic and practical aspects of embryo microsurgery; methods of embryo sexing; factors affecting embryo survival rate after cryopreservation and transfer; the effect of donor synchrony and recipient asynchrony in embryo transfer; immune-genetic aspects of embryo and respective female recipient, veterinary aspects taken into consideration in embryo donor and recipient selection. Precautions in embryo transfer, in vitro maturation and in vitro fertilization; theoretical aspects of cloning;

**AASC 3822: PIG PRODUCTION**

<b>Module Title:</b>	PIG PRODUCTION
<b>Code</b>	AASC 3822
<b>NQF Level</b>	7
<b>NQF Credits</b>	8
<b>Contact hours:</b>	2 x 1 hour Lectures / week for 14 weeks; for 14 weeks; 03 Practical hours alternate weeks for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals); Exam: 60% (1 x2 hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Contents:**

Students will be introduced to methods of pig farming in both intensive and extensive systems. The module will cover routine management practices, feeding, herd health, animal behavior and welfare, housing and marketing. Feed resources and systems of feeding will also be covered. Additional coverage shall be on factors influencing profitability of pig enterprises and trends in the pig industry worldwide and in Namibia.

## G. B.SC. AGRICULTURE (CROP SCIENCE) HONS [17BSCS] (Ogongo Campus)

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by School of Science. English Communication and Study Skills, English for Academic Purposes, Contemporary Social Issues and Computer Literacy are University Core Modules taken by all First Year University of Namibia students.

### EXEMPTIONS:

On the completion of the UNAM Diploma in Agriculture, the students will receive credits for the following first and second year courses in Bachelor of Science in Agriculture (Crop Science). Students could register for modules in the Second Year and Third Year in addition to the following modules: English for Academic Purpose, Basic Mathematics, Plant Breeding, Farm Planning and Management, Biostatistics, Principles of Micro Economics, and Genetics.

The list of equivalents for which credits (Exemption) will be given is listed below:

Diploma in Agriculture	Bachelor of Science in Agriculture (Crop Science) Honours
Course	Course
LEG2410 English for General Communication	LCE3419 English for Communication and Study Skills
CLC3509 Computer Literacy	CLC3509 Computer Literacy
CSI3580 Contemporary Social Issues	CSI3580 Contemporary Social Issues
AEC521 Intro to Rural Sociology AEC2422 Comm. and Info Systems AEC2601 Extension Methods	AEC3691 Rural Sociology
ASC2431 Biology	BLG3511 Introduction to Biology
CSC2602 Crop Production CSC2532 Vegetable & Fruits Production	CSC3681 Plant Science
CSC2602 Crop Production CSC2532 Vegetable & Fruits Production	CSC3691 Agronomy
ASC2432 Physical Science	PHY3501 Physics for Life Science
ASC2502 Applied Animal Breeding ASC2681 Intensive Animal Production ASC2642 Extensive Animal Production	ASC3602 Livestock Production Systems
ASC2431 Biology CSC2412 Principles of Crop Production ASC2502 Applied Animal Breeding ASC2411 Physical Science	BLG3512 Diversity of Life
CSC2581 Soil Science CSC2601 Water Management and Soil Conservation	CHM3532 Chemistry for Life Science
CSC2581 Soil Science	CRS3682 Soil Science for Crop Production
CSC2682 Farm Power Machinery	CSE3781 Agricultural Engineering

### G.1 PROGRAMME SCHEDULE

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
UCLC 3509	Computer Literacy	5	8	C	
ULCE 3419	English Communication and Study Skills	4	16	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
SBLG 3511	Introduction to Biology	5	16	C	
SPHY 3501	Physics for Life Sciences I	5	8	C	
SMAT 3511	Basic Mathematics	5	16	C	
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 1 Semester 2</b>					
ULEA 3519	English for Academic Purposes	5	16	C	
SCHM 3532	Chemistry for Life Sciences	5	16	C	

SPHY 3532	Physics for Life Sciences II	5	16	C	
SBLG 3512	Diversity of Life	5	16	C	
SMAT3512	Pre-calculus	5	16	C	
<b>Total credits Semester 2</b>					<b>80</b>
<b>Total CREDITS YEAR 1</b>					<b>152</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 2 Semester 1</b>					
AAEC 3681	Principles of Microeconomics	6	12	C	None
AAEC 3691	Rural Sociology	6	12	C	None
AASC 3681	Genetics	6	12	C	None
ACSC3681	Plant Science	6	12	C	None
ACRS 3681	Biostatistics	6	12	C	None
ACSC 3691	Agronomy	6	12	C	
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 2 Semester 2</b>					
AAEC 3682	Production Economics	6	12	C	None
AAEC 3692	Principles of Macroeconomics	6	12	C	None
AASC 3612	Biochemistry	6	16	C	SCHM 3532 (Chemistry for Life Sciences)
AASC 3602	Livestock Production Systems	6	8	C	None
ACRS3682	Soil Science for Crop Production	6	12	C	None
<b>Total credits Semester 2</b>					<b>60</b>
<b>Total CREDITS YEAR 2</b>					<b>132</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 3 Semester 1</b>					
ACSE 3781	Agricultural Engineering	7	12	C	None
ACSC 3791	Field Crop Production	7	12	C	ACSC 3681 (Plant Science)
ACSC 3721	Weed Science	7	8	C	None
AACA 3701	Field Attachment I	7	8	C	None
ACRS3781	Plant Breeding	7	12	C	AASC 3681 (Genetics)
AAEC 3781	Farm Planning and Management	7	12	C	None
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 3 Semester 2</b>					
ACSC 3792	Research Methods	7	12	C	ACSC 3792 (Research Methods)
ACSC 3702	Crop Ecophysiology	7	8	C	ACSC3681 (Plant Science)
ACSC 3722	Crop Handling and Storage	7	8	C	None
ACSC 3742	Farm mechanisation	7	8	C	ACSE3781 (Agricultural Engineering)
AAEC 3712	Agricultural Extension	7	16	C	None
AAEC 3782	Agricultural Marketing	7	12	C	None
<b>Total credits Semester 2</b>					<b>64</b>
<b>Total CREDITS YEAR 3</b>					<b>136</b>
Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 4 Semester 1</b>					

ACA 3801	Field Attachment II	8	8	C	ACA 3708 (Field Attachment I)
ACSC 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AAEC 3881	Project Planning and Management	8	12	C	None
ACSC3741	Horticulture I, Vegetables, Herbs and Spices	7	8	C	ACSC3681 (Plant Science) and ACSC3691 (Agronomy)
ACSC 3841	Seed Science and Technology	8	8	C	CSC 3681 (Plant Science)
ACSC 3861	Agricultural Entomology	8	8	C	None
ACSC3881	Soil Fertility and Plant Nutrition	8	12	C	ACRS3682(Soil Science for Crop Production)
<b>Total Credits Semester 1</b>					<b>64</b>
<b>Year 4 Semester 2</b>					
ACSC 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
ACSC 3892	Horticulture II—Fruit Crops and Ornamental Plants	8	12	C	ACSC 3681 (Plant Science)
ACSC 3802	Plant Pathology	8	8	C	None
ACSC 3822	Plant Biotechnology	8	8	C	AASC 3681 (Genetics)
ACSC 3812	Soil Conservation and Irrigation	8	16	C	ACRS 3682 (Soil Science for Crop Production)
<b>Total credits Semester 2</b>					<b>60</b>
<b>Total CREDITS YEAR 4</b>					<b>124</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>544</b>

## G.2 MODULE DESCRIPTORS

### G.3 FIRST YEAR

#### CLC3509 COMPUTER LITERACY

<b>Module title:</b>	COMPUTER LITERACY
<b>Code:</b>	CLC3509
<b>NQF level:</b>	5
<b>Contact hours:</b>	1 lecture theory and 1 lecture practical per week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 100%: 2 Practical Tests 50%, 2 Theory Tests 50%
<b>Prerequisites:</b>	University Entry

#### Module Content:

The module covers the following topics. Introduction to Computers: hardware and software, types and categories of computers, usage of Computer devices and peripherals. Working with the windows operating system: File Management, working with multiple programs, using the recycle bin. Using a word processor: formatting a text and documents, spelling check, grammar and thesaurus tools, inserting tables, auto-shapes, clip arts, charts, and mail merge. Spreadsheet: worksheets and workbooks, ranges, formulas and functions, creating graphs, charts, and printing the workbook. Databases: creating tables, relationships, queries, forms and reports. Presentation software: slide layout and master, animations, auto-content wizard and templates. Communication tools: introduction to the Internet, web browsers, search engines, downloading and uploading files, creating and sending messages, email etiquette, internet security, and digital signatures.

#### LCE3419 ENGLISH COMMUNICATION & STUDY SKILLS

<b>Module title:</b>	ENGLISH COMMUNICATION AND STUDY SKILLS
<b>Code:</b>	LCE3419
<b>NQF Level:</b>	4
<b>Contact hours:</b>	4 hours per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment (60%): two tests (reading and writing), two reading assignments, One oral presentation, Examination (40%): one three hour examination paper
<b>Pre-requisites:</b>	None

#### Module Content:

This module is aimed at assisting students in the development of their reading, writing and speaking and listening skills, in order to cope with studying in a new academic environment and in a language which may not be their first language. The module also focuses on study skills that students need throughout their academic careers and beyond. The module serves as an introduction to university level

academics, where styles of teaching and learning differ from those at secondary schools in that more responsibility is placed on the student. The module therefore, focuses on the skills that students need throughout their academic careers and beyond.

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### CSI 3580 CONTEMPORARY SOCIAL ISSUES

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<b>Module title:</b>	CONTEMPORARY SOCIAL ISSUES
<b>Code</b>	CSI 3580
<b>NQF Level</b>	5
<b>Contact hours</b>	Equivalent to 1 hour per week for two semesters (Online)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 & 2 (Year Module)

#### Module Descriptor (Rationale of the module):

The module, Contemporary Social Issues (CSI3580), is designed to encourage behavioural change among UNAM students and inculcate the primacy of moral reasoning in their social relations and their academic lives. In providing students with critical and analytical thinking the module enables students to grow and develop into well rounded citizens, capable of solving contemporary social challenges experienced in their communities and societies. The teaching of the module takes three dimensions: the intellectual, the professional and the personal dimensions. The intellectual dimension is fostered through engaging students with subject knowledge, independent learning and module assessment. The professional dimension, on the other hand, is fostered through exposing students to real life situations of case studies and practical exercises that draws attention to social issues that attract ongoing political, public and media attention and/or debate. Finally, the professional dimension is fostered through group work, online discussions and class participation

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### SBLG 3511: INTRODUCTION TO BIOLOGY

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<b>Module title</b>	INTRODUCTION TO BIOLOGY
<b>Code</b>	SBLG3511
<b>NQF Level</b>	4
<b>Contact hours</b>	4 lectures/ week for 14 weeks and one 3-hour practical session per week.
<b>NQF Credits</b>	16
<b>Module Assessment:</b>	Continuous assessment (40%): Theory (not less than 3 tests and 2 assignments), 40%. Practicals (not less than 10 marked assignment), 60%. Examination (60%): 3 hour examination paper.
<b>Prerequisite</b>	NSSC (Biology C or better)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

It will consider organization of life, chemical basis of life, carbohydrates, proteins, nucleic acids, lipids and fats, water, cell structure and function, prokaryotic and eukaryotic cells, ultra-structure of plant and animal cells, cytoskeleton, membrane structure and function, cell communication, mitosis, meiosis, cell reproduction, cell cycle, and cell death. The following topics will be covered: Introduction to systems of classification, taxonomy and binomial nomenclature, including the five kingdoms and the three domain system. Definitions and categories/groups within the five kingdoms, evolution by natural selection (microevolution vs macroevolution), phylogeny and evolutionary relationships in five kingdoms. The course content will also include genes, chromosomes, genomes, Mendelian genetics, extensions to Mendelian genetics, chromosome theory of inheritance, linkage and cross-over, recombination, sex determination. The course content will also cover an introduction to Ecology: Definitions, history, scales in ecology, application of ecology. Conditions and Resources: Environmental conditions, animals and their resources, plants and their resources.

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### SPHY 3501: PHYSICS FOR LIFE SCIENCES I

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<b>Module title:</b>	PHYSICS FOR LIFE SCIENCES I
<b>Code:</b>	SPHY3501
<b>NQF level:</b>	4
<b>NPSC:</b>	N/A
<b>Contact hours:</b>	28 Lectures and 14 Practical Sessions/Tutorials
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.
<b>Pre-requisites:</b>	None

#### Module Content:

This module is to introduce Life science students to physics concepts and applications that will be useful to them in their undergraduate studies and carrier. The course will cover the following topics: Units and significant figures; Motion in one dimension, average velocity, acceleration, freely falling bodies; Vectors and scalars, addition and subtraction of vectors in one and two dimensions, multiplication of vectors, component method of vector addition; Projectiles; Force and weight, Newton's laws and applications, free-body diagrams, friction, motion on inclined planes; Uniform circular motion, period and frequency of motion, centripetal force, banking of curves; Newton's law of Universal gravitation, gravity near the Earth's surface, satellites; Kepler's laws; Work done by a constant force, kinetic energy, work-energy theorem, potential energy, conservation of Mechanical energy, power; Momentum, impulse, conservation of energy and momentum in collisions, elastic and inelastic collisions in one dimension.

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### SMAT 3511: BASIC MATHEMATICS

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<b>Module name:</b>	BASIC MATHEMATICS
<b>Code:</b>	SMAT 3511
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics
<b>Module Content:</b>	

Sets: notations and diagrams to represent sets, subset, empty set, equality of sets, intersection, union, complement.  
 Algebraic expressions: simplification, expansion, polynomials, remainder and factor theorem, partial fractions.  
 Trigonometry: trigonometric functions, basic trigonometric identities. The absolute value, linear equations, linear inequalities, quadratic equations, the quadratic formula, quadratic inequalities. Functions: domain, codomain, image, preimage, even function, odd function. Sequences: the general term, the geometric sequence, the arithmetic sequence. The Binomial Theorem.

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### LEA3519 ENGLISH FOR ACADEMIC PURPOSES

<b>Module title:</b>	ENGLISH FOR ACADEMIC PURPOSES
<b>Code:</b>	LEA3519
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 periods per week for 14 weeks
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral Presentation; Examination (40%) : One three hour examination paper
<b>Prerequisites:</b>	None

#### Module Content:

This module develops a student's understanding, and competencies regarding academic conventions such as academic reading, writing, listening and oral presentation skills for academic purposes. Students are required to produce a referenced and researched essay written in formal academic style within the context of their university studies. Students are also required to do oral presentations based on their essays. The reading component of the course deals with academic level texts. This involves students in a detailed critical analysis of such texts. The main aim is therefore, to develop academic literacy in English.

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### SCHM 3532: CHEMISTRY FOR LIFE SCIENCES

<b>Module Title:</b>	CHEMISTRY FOR LIFE SCIENCES
<b>Code:</b>	SCHM3532
<b>NQF Level:</b>	5
<b>Contact Hours:</b>	56 hours of lectures, 42 hours of practical sessions.
<b>Credits:</b>	16
<b>Module Assessment:</b>	CA: 50% (minimum 3 tests 80%, laboratory component 20%, tutorial assignments 10%). Final Exam: 50%; (1 x 3 hour exam paper)
<b>Pre-requisites:</b>	None

#### Module Content:

Classification of Matter: Mixtures and Pure substances; Physical States of Matter; Physical and Chemical Properties. Extensive and Intensive properties.

Measurements: Units, Significant figures; Precision and Accuracy, Factor Label Method. Atomic structure and the Periodic table; Electron configuration; Physical and Chemical properties as predicted from groups. Ionic compounds and Molecular compounds: Writing chemical formulae and naming of ionic and molecular compounds. Average Atomic Mass. The Mole Concept; Percent Composition, Empirical formula and Molecular formula. Stoichiometry: limiting reagent, percent yield. Solutions: electrolytes and non-electrolytes, aqueous solutions, ionic equations; concentrations: percent concentration; molarity, molality; dilution of solutions; structure and solubility. Types of bonds; Lewis structures; Resonance structures; Molecular geometry: the VSEPR model, Polarity of molecules. Acid-base equilibrium: properties of acids and bases; relations of acids and bases, self ionisation of water; strengths of acids and bases; the pH scale; hydrolysis of salts; buffers; acid-base titration. Introduction to organic chemistry: organic compounds; structural formulae and conformations; functional groups; Classes of hydrocarbons: alkanes, cycloalkanes: alkanes; alkenes and alkynes; oxidation and reduction; addition reactions; stereo-isomerism. Alcohols, phenols, thiols, ethers: organic compounds of oxygen; common alcohols and phenols. Carboxylic acids and esters, amines and amides: Introduction to carbohydrates, lipids and porphyrins.

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### SPHY 3532: PHYSICS FOR LIFE SCIENCES II

<b>Module Title:</b>	PHYSICS FOR LIFE SCIENCES II
<b>Code:</b>	SPHY 3532
<b>NQF Level:</b>	4
<b>Contact Hours:</b>	4 Lectures per week for 14 weeks, Practical Time: 14 sessions (42 hours)
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment (50%, Minimum 2 tests, 4 assignments and practical reports) and Examination (50%, 1 x 3-hour paper)
<b>Pre-requisites:</b>	NSSC Physical Science
<b>Co-Requisites:</b>	SPHY 3401: Physics for Life Sciences I; SMAT3511: Basic Mathematics; SMAT3512: Pre-calculus;

#### Module Content:

This module introduces life science students to concepts of physics and their application to real life situations, new topics that were not dealt with in PHY 3101 are introduced (i.e., on electricity, magnetism and radioactivity). The content of this course is good enough to help the life science students throughout their undergraduate work and careers. The following topics will also be covered: Electric charge; insulators and conductors; Electric force and coulomb's law, Electric field and Gauss's law; Electric potential; Capacitance and capacitors; Direct current; Ohm's law and simple circuits; Magnetic field; Alternating current; Transformers; Phenomenological approach to RL and RC circuits; Temperature, gas and thermal expansion; Basic geometrical optics; Radioactivity and its detection.

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### SBLG3512: DIVERSITY OF LIFE

<b>Module title:</b>	DIVERSITY OF LIFE
<b>Code:</b>	SBLG 3512
<b>Course Equivalent:</b>	NSSC (/HIGH GRADE) Biology
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lecture periods / week for 14 weeks and one three hour practical session per week
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment: Theory (not less than 3 tests and 2 Assignments) 40% Practicals (not

less than 10 marked assignments) 50% Examination: 60% (1 x 2 hour examination paper)  
NSSC (Biology C or better)

**Prerequisites:**

**Module Content:**

This module is designed to give students a detailed understanding of the diversity of life. It gives students the broader appreciation of biodiversity in the different ecological habitats. The course shall describe diagnostic characteristics of principle taxonomic categories for each phylum. Coverage of each Phylum shall follow a phylogenetic (evolutionary) approach as well as introduce broad ecological and physiological principles. Various aspects of reproduction and development shall be highlighted. This module prepares students to understand subsequent courses such as Introduction to Ecology and Microbiology, Population Ecology, Comparative physiology, Biogeography, Plant and Animal Form and Function

Topics covered will include viral, bacterial, fungal, algal, animal and plant diversity. It then considers the characteristics and life cycles of the following important algae, animal and plant groups: Chlorophyta, Phaeophyta, Rhodophyta, Chrysophyta, Euglenophyta, Pyrrophyta, Cryptophyta, Protostomate phyla: Nemertea, Mollusca, Anellida, Arthropoda, Nematoda, Rotifera, Lophophorates, Onychophora. Deuterostomate phyla: Echinodermata, Hemichordata and Chordata (Subphyla: Urochordata, Cephalochordata and Vertebrata: Class Myxiniiformes, Petromyzontiformes, Placoderms, Chondrichthyes, Actinopterygii, Actinistia, Dipnoi, Amphibia, Reptilia, Aves, Mammalia ) bryophytes, seedless vascular plants, gymnosperms, and the angiosperms. Concepts such as Homology and analogy; body symmetry (radial, bilateral), cephalisation, body cavities: diploblastic, triploblastic (acoelomate and coelomate [deuterostomes and protostomes]) will be covered.

Examples from Namibia shall be used where possible and applicable. The course content shall be supplemented with appropriate weekly practical sessions in the laboratory and in the field.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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### SMAT 3512: PRE-CALCULUS

<b>Module Title:</b>	PRE-CALCULUS
<b>Code:</b>	SMAT 3512
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

**Module Content:**

Functions: one-to-one and onto functions, horizontal line test, composition of functions, inverse of a function. Introduction to exponential and logarithmic functions. Limit of a function: definition, left and right limits, infinite limits, limits at infinity, continuity in terms of limits. Differentiation: rate of change, derivative of a function, rules of differentiation, increasing and decreasing functions and graph sketching. Integration: antiderivatives, the definite integral, area under a graph. Trigonometry: further trigonometric identities, area of a sector and segment of a circle, derivatives and integrals of trigonometric functions.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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## G.4 SECOND YEAR

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### ACSC3681: PLANT SCIENCE

<b>Module title:</b>	Plant Science
<b>Code:</b>	ACSC3681
<b>NQF level:</b>	6
<b>Contact hours:</b>	03 Lecture hours/week for 14 weeks; 02 Practical hours/week for 14 weeks
<b>Credits:</b>	12
<b>Assessment Strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Plant Taxonomy: binomial system, use of taxonomic keys. Anatomy of angiosperms; cell types, tissues types. Morphology and anatomy of root, stem, leaves, flowers, fruits. Types of inflorescences. Pollination: process, methods. Double fertilization. Agriculturally important plant families. Photosynthesis: chemistry, energy requirements, C3/C4 plants. Respiration and photorespiration. Water: importance, uptake, transpiration, water potential and turgor pressure. Translocation: sources and sinks. Nutrient uptake and transport: passive and active transport. Plant growth regulators.

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### ACRS3681: BIOSTATISTICS

<b>Module Title:</b>	Biostatistics
<b>Code</b>	ACRS3681
<b>NQF Level</b>	6
<b>Contact hours</b>	3 Lecture hours/week for 14 weeks; 3 tutorial/practical hours alternate weeks for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40 % at least three assessments; Examination (60%): (01 x 02 hour examination paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	SMAT3511 Basic Mathematics

**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

Definition of statistics, descriptive and inferential statistics. Qualitative and quantitative data, primary versus secondary data. Sampling and sample size determinations, and replications. Presentation of data: tables, charts, graphs. Measures of central tendency: mean, mode, median. Measures of dispersion: standard deviation, coefficient of variation, standard error. Probability, Bayes' theorem, combinations and permutations, Binomial, Poisson, and Normal distributions, T-test and F- distribution mean comparisons, Analysis of variance, analysis assumptions. Single and multiple factor experiments, correlation and linear regression, transformations. Research process: research problem formulation, research objectives, hypothesis formulation. Basic experimental designs: completely randomized, randomized complete block, Latin square, Split plot.

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**ACSC 3691: AGRONOMY**

**Module Title:** AGRONOMY  
**Code** ACSC 3691  
**NQF Level** 6  
**National Hours** 80  
**Contact hours** 02 Lecture hours / week for 14 weeks; 03 Practical hours / week for 14 weeks  
**Assessment Strategies** Continuous Assessment: 40% (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hour paper)  
**NQF Credits** 12  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

Choice of land for different crops. Environmental factors affecting crop choice: temperature, rainfall, solar radiation, photoperiodism. Time of planting; pre- and post-rain planting. Land preparation: aims, tillage systems—conventional, minimum, conservation tillage. Review of tillage and cultivation equipment for large-scale and small-scale farmers. Seeding: factors affecting seed quality, seeding depth, seeding rate, plant population. Fertilizer application times and methods. Calculation of row and intra-row spacing and fertilizer rates. Cultural practices for weed control. Harvesting: physiological maturity and harvest maturity, harvest index. Cropping systems—monoculture, mixed culture and intercropping.

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**ACRS3682: SOIL SCIENCE FOR CROP PRODUCTION**

**Module Title:** SOIL SCIENCE FOR CROP PRODUCTION  
**Code** ACRS3682  
**NQF Level** 6  
**Contact hours** 03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks  
**Assessment Strategies** Continuous Assessment: 40% (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hour paper)  
**NQF Credits** 12  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

Definition of soil. Soil formation. Soil as a triphasic system: texture, soil organic matter, soil organisms and nutrient cycles. Clay minerals, soil colloids and cation exchange capacity; Soil structure. Bulk density. Soil moisture, soil water potential and movement in saturated and unsaturated soils; field capacity and water holding capacity. Basics of soil fertility and plant nutrition: macro- and micro-nutrients and their functions, pH and nutrient availability. Soil classification: soil profile, horizons, and influence of environmental factors. Common soil classification systems: USDA (soil taxonomy) and FAO classification systems. Major soil types

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**G.5 THIRD YEAR**

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**ACSC3791: FIELD CROP PRODUCTION**

**Module Title:** Field Crop Production  
**Code** ACSC 3791  
**NQF Level** 7  
**Contact hours** 03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks  
**Assessment Strategies** Continuous Assessment: 40% (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hour paper)  
**NQF Credits** 12  
**Prerequisite** None  
**Compulsory/Elective** Compulsory  
**Semester Offered** 1

**Module Content:**

Cereals crops (pearl millet, maize, wheat, sorghum, rice), oilseed crops (sunflower, soybean, groundnut, castor bean), grain legumes (cowpea, bambara nuts, kidney beans), fiber crops (cotton, sisal), root and tuber crops (sweet potatoes, cassava, Irish potatoes) grown in Namibia: their importance to the economy, uses, soil and climatic requirements and production practices. Areas where grown, limitations to production.

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**ACSE3781: AGRICULTURAL ENGINEERING**

**Module Title:** AGRICULTURAL ENGINEERING  
**Code** ACSE3781

<b>NQF Level</b>	7
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hour paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Fundamentals of Engineering; Farm Power sources; Internal Combustion Engines, electricity, wind energy, solar energy. Tractors. Machinery for different operations: Tillage; Planting; Cultivation; Harvesting. Land Surveying; Water Resources; Soil and Water Conservation (Processes of Erosion; Conservation Methods); Irrigation and Drainage; Post Harvest Handling, Storage and Processing; Farm Structures, workshop safety and technology.

**ACSC3741: HORTICULTURE I—VEGETABLES, HERBS AND SPICES**

<b>Module Title:</b>	HORTICULTURE I—VEGETABLES, HERBS AND SPICES
<b>Code</b>	ACSC 3741
<b>NQF Level</b>	7
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>NQF Credits</b>	8
<b>Prerequisite</b>	ACSC 3681 Plant Science and ACSC 3691 Agronomy
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Importance of vegetables and to human nutrition and the economy. Vegetable nursery establishment and management, transplanting. Specific environment requirements of vegetables. Specifics in cultivation systems of vegetables. Plant growth regulators and their use in commercial horticulture: improvement of fruit set; modification of sex ratios, parthenogenesis. Main vegetables – fruit vegetables, root vegetables, leaf vegetables, perennial vegetables, leguminous vegetables – their propagation, cultivation, harvest and handling. Indigenous vegetables: plant domestication and adaptation principles. Hydroponics: hydroponics principles and infrastructure. Mushroom production: cultivation technology of common mushroom species. Spices, medicinal and pharmaceutical plants: most common medicinal species – their propagation, cultivation and utilization. Harvesting of vegetable crops: properties of vegetable commodities: moisture content, shelf life.

**ACSC 3721: WEED SCIENCE**

<b>Module Title:</b>	WEED SCIENCE
<b>Code</b>	ACSC 3721
<b>NQF Level</b>	7
<b>Contact hours</b>	2 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment Strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

History of weed science. Characteristics and effects of weeds. Weed identification and classification. Weed biology and ecology; propagation, growth, seed dormancy. Weed-crop competition, allelopathy, interference. Weed control practices: preventive, mechanical, biological, cultural, chemical, integrated weed management. Herbicides: effect on plants, selectivity, fate in soil, application and safety, regulation, environmental impact. Herbicide resistance.

**AACA 3701: FIELD ATTACHMENT I**

<b>Module Title:</b>	FIELD ATTACHMENT I
<b>Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>Contact hours</b>	6 weeks
<b>Assessment Strategies</b>	Final assessment 100% (Attachment report and Oral Presentation)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Students will be attached to agricultural enterprises or organisations, such as farms and research stations to participate in physical work and management of operations taking place. Academic staffs will pay field visits to students to discuss with them and their supervising officers on site the knowledge obtained and areas of exposure needing improvement.

**ACRS 3781: PLANT BREEDING**

<b>Module Title:</b>	PLANT BREEDING
<b>Code</b>	ACRS 3781
<b>NQF Level</b>	7
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks

<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	AASC 3681 Genetics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Aims of plant breeding: Yield improvement, yield stability, biotic and abiotic stress tolerance and resistance, nutritional quality. Germplasm sources and maintenance: importance of genetic diversity, centres of diversity, wild relatives, ex situ and in situ gene banks, CGIAR plant conservation and improvement system, germplasm conservation methods. Plant reproduction mechanisms: inbreeding mechanisms—cleistogamy, flower closure, etc; out breeding mechanisms—dioecy, monoecy, male sterility, incompatibility, sex separation in time; clonally propagated crops. Inbreeding depression, hybrid vigour. Selection theory. Common conventional breeding procedures for inbreeding and out breeding crops—pedigree selection, mass selection, backcrossing, mass selection, simple recurrent selection, selection for hybrid production. Cultivars evaluation. Overview of novel breeding techniques: mutagenesis, haploid and polyploidy plants, somaclonal variation, marker assisted selection and gene transfer.

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#### ACSC 3792: RESEARCH METHODS

<b>Module Title:</b>	RESEARCH METHODS
<b>Code</b>	ACSC 3792
<b>NQF Level</b>	7
<b>Contact hours</b>	03 lecture hours / week for 14 weeks; 3 tutorial hours / practical hours alternate weeks for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	12
<b>Co-requisite</b>	ACRS 3681: BIostatISTICS
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Students will be exposed to more advanced statistical concepts and research methods above those covered in Biostatistics. Comparison between parametric and non-parametric statistics. Non-parametric statistics: goodness of fit tests; tests of association, Chi Square tests; paired comparisons, Wilcoxon's tests; rank correlation; Multivariate methods: multiple regression, discriminant analysis, canonical analysis, multidimensional scaling, principal component analysis. Review of experimental designs with emphasis to livestock, crop and game animal experimentation. Review of procedures for implementing research projects and presentation of research results with emphasis to practical field situations and case studies. Introduction to Statistical Computer packages

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#### ACSC 3702: CROP ECOPHYSIOLOGY

<b>Module Title:</b>	CROP ECOPHYSIOLOGY
<b>Code</b>	ACSC 3702
<b>NQF Level</b>	7
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	ACSC 3681 Plant Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Growth analysis. Factors affecting growth and development: light penetration into crop, amount and quality of light. Factors affecting transpiration. Development, differentiation and yield. Yield components and their limitations: Law of the minimum. Water potential. Water use efficiency. Biological nitrogen fixation. Factors affecting germination, dormancy. Factors affecting root growth and distribution. Factors affecting leaf and stem growth, branching  
Flowering. Maturation and ripening. Senescence and abscission. Physiology of stress – abiotic (heat, acidity, water) and biotic stresses.

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#### ACSC 3722: CROP STORAGE AND HANDLING

<b>Module Title:</b>	CROP STORAGE AND HANDLING
<b>Code</b>	ACSC 3722
<b>NQF Level</b>	7
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

The Post-harvest system: Post-harvest systems for various crops. Properties of crop commodities: Physical, mechanical and thermal properties of crops which affect their storage and handling. Crop drying. Energy required for drying. Natural drying, Artificial drying, Psychometrics. Equilibrium moisture relationships, Behaviour of moisture in grain bulk/stacks. Moisture content determination. Moisture metre calibration. Types and maintenance of driers: Safe temperatures for drying. Drying methods. Psychometrics. Types of driers. Types of farm storage structures: Silos, sheds, warehouses and open stacks, bunkers, Management of storage facilities. Stacking and movement

of commodities. Storage losses including loss assessment methods. Review of Biology of Storage Pests and Pest Infestation Control. Processing of agricultural crops: Threshing. Shelling. Milling. Threshing and shelling efficiency Oil expression

Rice threshing at Ogongo Handling and storage of horticultural and perishable Crops: Causes of losses e.g. physiological changes, mechanical damage, pests and diseases. Quality assessment. Conservation techniques for horticultural crops. Material handling equipment: Material movement into and within storage structures for large scale structures: Folk lift, Screw conveyor, Belt conveyor, Bucket elevator, Pneumatic conveyor

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### ACSC 3742: FARM MECHANISATION

<b>Module Title:</b>	FARM MECHANISATION
<b>Code</b>	ACSC 3742
<b>NQF Level</b>	7
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Fundamental quantities and units. Concepts of work, Power and Torque. Animal Power (Hitching, harvesting, capability, training), Machine Power (The Tractor. The internal combustion engine and other sub-systems; Power Trains: Tractor tests and Performance. Operation and maintenance; Safety), Natural Power (Solar, wind). Tillage: Primary tillage; secondary tillage: implement types and their operation. Crop planting, fertilization and weed control: Equipment types and operation, calibration and safety aspects. Crop Harvesting: Objective, combine harvester-types and operation. Farm Machinery Management: Machine capacity, performance and costs. Machinery cost and selection.

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## G.6 FOURTH YEAR

### ACSC 3810: RESEARCH PROJECT

<b>Module Title:</b>	RESEARCH PROJECT
<b>Code</b>	ACSC 3810
<b>NQF Level</b>	8
<b>Contact hours</b>	Equivalent to 1 hour per week for 28 weeks
<b>NQF Credits</b>	32
<b>Pre-requisite</b>	ACSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

#### Module Content

Senior undergraduate students carry out independent study of a current topic in Agriculture and related fields. The course includes participation in meetings organized by the coordinator, work with a faculty advisor to develop a research project, formulate hypotheses, design and carry out experiments and collect data and test the hypotheses. Students will carry out independent library research, begin experimental work, prepare a written report and make a presentation to other students of the research proposal and a final presentation of the preliminary results. The student will submit a final report written following Guidelines for Scientific Writing.

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### AACA 3801: FIELD ATTACHMENT II

<b>Module Title:</b>	FIELD ATTACHMENT II
<b>Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>Contact hours</b>	6 weeks
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

This module is designed to further expose students to the realities of farming and agro-industry operations in Namibia. They are expected to observe and participate in different facets of production, processing, marketing, extension and assist with management functions e.g. supervision of general work force and problem solving. Academic staffs will pay field visits to students to discuss with them and their supervising officers on site the knowledge obtained and areas of exposure needing improvement.

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### ACSC 3841: SEED SCIENCE AND TECHNOLOGY

<b>Module Title:</b>	SEED SCIENCE AND TECHNOLOGY
<b>Code</b>	ACSC 3841
<b>NQF Level</b>	8
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	ACSC 3681 Plant Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Importance of quality seed for crop production. Review of cultivar development: selection methods, variety evaluation and release. Types of cultivars: purelines, hybrids, synthetics, open pollinated populations. DUS-test. Seed ecology: review of plant growth and seed development: growth factors affecting seed quality. Seed germination and Seed dormancy. Seed multiplication: organization, suitable areas, and agronomy. Harvesting and threshing methods. Processing: drying, cleaning, treatment, grading. Storage: packaging, factors affecting storage: packaging, factors affecting storage life. Seed quality control: legislation, certification, inspection, testing. Marketing and distribution: demand forecasting, supply, pricing. Seed production of important crops of Namibia.

**ACSC 3861: AGRICULTURAL ENTOMOLOGY**

<b>Module Title:</b>	AGRICULTURAL ENTOMOLOGY
<b>Code</b>	ACSC 3861
<b>NQF Level</b>	8
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Effects of insects on crops. Insect structures and life cycles: Body parts, maintenance and locomotion, sensory organs, reproduction. Insect classification economically important insect orders. Grouping of insect in relation to host damage and pest control: chewing insects, piercing and sucking insects. Population dynamics: Economic threshold. Insect sampling techniques: transects, traps, mark-release-recapture. Causes of success of insects. Insect control measures: preventative, chemical, cultural, biological, physical, integrated insect control. History and classification of insecticides: organochlorine insecticides, Organophosphorus insecticides, carbamates, pyrethroids, insecticide resistance. Integrated pest management. Environmental issues related to insecticides: effects on food chain, persistent insecticides, banned insecticides, environmental protection legislation and enforcement. Field pests of horticultural and field crops in Namibia. Pests of stored crops in Namibia.

**ACSC 3881: SOIL FERTILITY AND PLANT NUTRITION**

<b>Module Title:</b>	SOIL FERTILITY AND PLANT NUTRITION
<b>Code</b>	ACSC 3881
<b>NQF Level</b>	8
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks 02 Practical hours / week for 14 weeks
<b>NQF Credits</b>	12
<b>Pre-requisite</b>	ACRS 3682 Soil Science for Crop Production
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Soil organic matter: carbon cycle, CO<sub>2</sub> global warming, bioassay, response to management practices. Review of plant nutrients: macronutrients, micronutrients. Functions of each nutrients in plant metabolism and growth. Review of basic soil chemistry concepts: soil pH and nutrient availability, soil colloids and cation exchange. Solubility equilibria as applied to nutrient and solubility and movement. Mobility of major nutrients in the soil and in the plant. Salinity: meaning measurement and amendment. Soil acidity and alkalinity and amendment: liming requirements. Fertilizers: nutrients content, solubility, fertilizer formulations, losses; types of fertilizers—single fertilizers, compound fertilizers, Law of the minimum. Soil and plant analysis. Integrated nutrient management. Brief overview of nutrient deficiency symptoms.

**ACSC 3892: HORTICULTURE II—Fruit Crops and Ornamental Plants**

<b>Module Title:</b>	HORTICULTURE II—Fruit Crops and Ornamental Plants
<b>Code</b>	ACSC 3892
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	12
<b>Pre-requisite</b>	ACSC 3681 Plant Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Fruit and Nut production: Importance of fruits and nuts to human nutrition and the economy. Plant propagation techniques applicable to fruit species: seed propagation: genetic segregation and disadvantages of seed propagation for fruit and ornamental plants; uniformity, consistent quality and vegetative—stem cuttings, air layering, grafting, in vitro culture plantlets. Specific environmental requirements of fruit trees. Specifics in cultivation systems of fruit trees. Tree nursery management. Main tropical and subtropical fruit species – their propagation, cultivation, harvest and handling. Indigenous fruit species: propagation and adaptation challenges. Stimulants – coffee, tea, cocoa – their propagation, cultivation, harvest and handling. Pollination requirements for some fruit tree species: importance of bees, establishment and maintenance of bee colonies. Fruit and nut harvesting: properties of fruits and nuts in respect to handling and shelf life. Ornamental and landscape plants – most common indoor and outdoor ornamental species – their propagation, cultivation and utilization. Use of plant growth regulators in fruit and ornamental plants.

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**ACSC 3802: PLANT PATHOLOGY**

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<b>Module Title:</b>	PLANT PATHOLOGY
<b>Code</b>	ACSC 3802
<b>NQF Level</b>	8
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 02 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Module Content:</b>	

Definition of disease. Life cycles and dispersal of fungi and bacteria. Viruses. Parasite-host interactions: antibiosis. Characteristics of major groups of plant pathogenic fungi, bacteria and viruses. Plant disease epidemiology. Methods for assessing crop losses. Methods of control: agronomic, tolerant or resistant crops and cultivars, fungicides used, seed treatment. Classification of fungicides. Effects of fungicides on environment. Biological control. Costs/benefits of control methods.

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**ACSC 3822: PLANT BIOTECHNOLOGY**

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<b>Module Title:</b>	PLANT BIOTECHNOLOGY
<b>Code</b>	ACSC 3822
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>Contact hours</b>	02Lecture hours / week for 14 weeks 02 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	AASC 3681 Genetics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Module Content:</b>	

Plant tissue culture – concept of totipotency, culture media composition and environmental conditions. Micro-propagation. Direct and indirect organogenesis and non-zygotic embryogenesis, somaclonal variation and in vitro mutagenesis. Embryo rescue. Protoplast culture and regeneration. Production of haploid plants. Production of secondary metabolites. Cryopreservation. DNA isolation and amplification (PCR). Molecular analysis of DNA, RNA, and proteins. Basics of marker assisted selection. Recombinant DNA. Direct and indirect gene transfer. GMO's and bio-safety: issues relating to bio-safety, international bio-safety protocols, bio-safety legislation and regulation in Namibia.

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**ACSC 3812: SOIL CONVERSATION AND IRRIGATION**

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<b>Module Title:</b>	SOIL CONVERSATION AND IRRIGATION
<b>Code</b>	ACSC 3812
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>Contact Hours</b>	04 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Assessment strategies</b>	Continuous Assessment: 40% (1x assignments + 2 tests + at least 3 marked practicals). Exam: 60% (1 x3 hr paper)
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	ACRS3682: Soil Science and Crop Production
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Module Content:</b>	

Soil conservation: Causes of and types of soil erosion in Namibia. Estimating soil losses (Measurement and Prediction). Erosion and control methods: Agronomic and mechanical control, Gully erosion control and wind erosion control. Soil Conservation Planning. Conservation agriculture. Land evaluation, Topographic Survey; Water Resources; Irrigation: Irrigation Agronomy Crop water requirements; irrigation water requirements, Irrigation Engineering: Planning and irrigation project, choosing an irrigation method. Operation and management of Surface irrigation, sprinkler irrigation and Trickle/drip irrigation. Irrigation scheduling. Alternatives to irrigation (water harvesting). Problem soil management and reclamation. Drainage of irrigated land.

## H. BACHELOR OF SCIENCE IN AGRICULTURAL ENGINEERING (HONS) (31BHAЕ)

### H.1 PROGRAMME SCHEDULE

Module code	Module name	NQF Level	NQF credits	Contact Hrs / week (L / P / T)	(Co-requisites) / Pre-requisites	Compulsory (C) / Elective (E)
<b>Year 1 Core Semester</b>						
U3403FS	Skills Portfolio	5	0	-	None	C
U3583AL	Academic Literacy I	5	8	2 L + 1T	None	C
I3500NI	Introduction to Mechanical Engineering	5	6	2 L + 1T	None	C
U3583DD	Digital Literacy	5	8	2 L + 1T	None	C
U3420CN	National and Global Citizenship	5	2		None	C
<b>Total credits Semester Core</b>			<b>24</b>			
<b>Year 1 Semester 1</b>						
I3511IM	Engineering Mathematics I	5	16	4 L + 1T	None	C
I3531ID	Engineering Drawing	5	16	4 L + 1T and/or 1P	None	C
I3521NP	Physics for Engineers I	5	12	3 L + 1P	None	C
I3551CC	Computing Fundamentals	5	12	3 L + 1T and/or 1P	None	C
I3511NC	Chemistry for Engineers	5	16	4 L + 1P	None	C
<b>Total credits Semester 1</b>			<b>72</b>			
<b>Year 1 Semester 2</b>						
I3512IM	Engineering Mathematics II	5	12	3 L + 1 T	(I3511IM)	C
I3542NP	Physics for Engineers II	5	12	3 L + 1P	(I3521NP)	C
I3502EE	Fundamentals of Electrical Engineering	5	8	2 L + 1T and/or 1P	(I3511IM)	C
I3572IS	Materials Science	5	12	3 L + 1T and/or 1P	None	C
I3532NM	Engineering Mechanics I	5	12	3 L + 1T and/or 1P	(I3521NP)	C
I3552IS	Statistics for Engineers	5	12	3 L + 1T	(I3511IM)	C
<b>Total credits Semester 2</b>			<b>68</b>			
<b>Total credits Year 1</b>			<b>164</b>			
<b>Year 2 Core Semester</b>						
U3683AL	Academic Literacy II	6	8	2 L + 1T	<b>U3583AL</b>	C
I3620IE	Engineering Entrepreneurship	6	8	2 L + 1T	None	C
I3640IW	Workshop Practice	6	8	3 P	None	C
<b>Total credits Semester Core</b>			<b>24</b>			
<b>Year 2 Semester 1</b>						
I3611IM	Engineering Mathematics III	6	16	4 L + 1 T	(I3512IM) <b>I3511IM</b>	C
I3601IE	Engineering Economics	6	8	2 L + 1 T	None	C
I3631IC	Computer Programming I	6	12	3 L + 1T and/or 1P	(I3551CC)	C
I3651VM	Strength of Materials I	6	12	3 L + 1T and/or 1P	(I3532NM)	C
I3642NM	Engineering Mechanics II	6	8	2 L + 1T and/or 1P	(I3532NM)	C
I3661NM	Engineering Materials	6	8	2 L + 1T and/or 1P	(I3572IS)	C
<b>Total credits Semester 1</b>			<b>64</b>			
<b>Year 2 Semester 2</b>						
I3612IM	Engineering Mathematics IV	6	16	4 L + 1T	<b>I3512IM</b> (I3611IM)	C
I3652CP	Computer Programming II	6	12	4 L + 1T and/or 1P	(I3631CP)	C

I3652EM	Electrical Machines I	6	12	4 L + 1T and/or 1P	(I3502EE)	C
I3632NF	Fluid Mechanics I	6	12	4 L + 1T and/or 1P	(I3532NM)	C
I3622ND	Mechanical Engineering Design I	6	8	2 L + 1T and/or 1P	<b>I3532NM</b>	C
I3622CM	Measurements and Instrumentation	6	8	2 L + 1T and/or 1P	(I3502EE)	C
<b>Total credits Semester 2</b>			<b>68</b>			
<b>Total credits Year 2</b>			<b>156</b>			
<b>Year 3 Core Semester</b>						
F3710TA	Research Methods in Agricultural Engineering	7	12	3 L + 2 P	I3552IS	C
F3730TB	Hydraulics and Hydrology	7	12	3 L + 2 P	I3642NM	C
<b>Total credits Core semester</b>			<b>24</b>			
<b>Year 3 Semester 1</b>						
F3751TC	Livestock and Crop production	7	12	3 L + 2P	None	C
I3731NM	Control Systems	7	12	3L + 1T and/ or 1P	(I3622CM)	C
F3771TD	Farm Power, Machinery &	7	12	3 L + 2P	I3642NM	C
F3701TE	Irrigation Theory and Practice	7	8	2 L + 2P	None	C
<b>Total credits Semester 1</b>			<b>44</b>			
<b>Year 3 Semester 2</b>						
F3722TF	Soil Mechanics and Cultivation	7	8	2 L + 2 P	None	C
F3712TG	Soil and Water Conservation	7	16	4 L + 3P	F3701TE	C
F3742TH	Project planning & management	7	8	2L + 2P	I3601IE	C
F3732TI	Irrigation and Drainage Design Engineering	7	16	4 L + 3P	F3701TE	C
I3762NH	Heat Transfer	7	8	2 L + 1T and/or P	(I3521NP)	C
<b>Total credits Semester 2</b>			<b>56</b>			
<b>Total credits Year 3</b>			<b>124</b>			
<b>Year 4 Core Semester</b>						
F3800TE	Engineering Ethics and Practice	8	8	2L + 2P	None	C
F3820TI	Industrial Attachment	8		Six (6) hours/ day for Six (6) wks.	None	C
TBC	Design thinking	8	8	2L + 2P	None	C
F3840TR	Research proposal	8	8	2L + 2P	F3710TA	C
<b>Total Credits Core Semester</b>			<b>24</b>			
<b>Year 4 Semester 1</b>						
F3821TE	Renewable Energy and	8	8	2L + 2P	I3502EE	C
F3811TS	Storage and processing of agricultural products	8	16	4 L + 3P	F3751TC	C
F3821TP	Research Project	8	16	16 hours of research work + seminar presentations +	All 3 <sup>rd</sup> Year Modules	C
F3813TD	Agricultural Engineering Design Project	8	16	14 hours of research work + seminar presentations +	All 3 <sup>rd</sup> Year Modules	C
<b>Total credits Semester 1</b>			<b>56</b>			
<b>Year 4 Semester 2</b>						
F3812TM	Farm Machinery and Implement Design	8	16	4 L + 3P	F3771TD	C
F3812TF	Farm Structures Planning and Design	8	16	4 L + 3P	I3651VM	C

F3821TP	Research Project	8	16	16 hours of research work + seminar presentations +	All 3 <sup>rd</sup> Year Modules	C
F3813TD	Agricultural Engineering Design Project	8	16	14 hours of research work + seminar presentations + Report writing	All 3 <sup>rd</sup> Year Modules	C
	<b>Total credits Semester 2</b>		64			
	<b>Total credits Year 4</b>		144			
	<b>Total Credits for the Programme</b>		<b>588</b>			

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## H.2 MODULE DESCRIPTORS

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### H.3 FIRST YEAR

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#### U3583AL

#### ACADEMIC LITERACY I

<b>Module Title:</b>	ACADEMIC LITERACY I
<b>Module Code</b>	U3583AL
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Contact Hours</b>	2 Lectures + 1 Tutorial/ week
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	0

#### Module Content

The module will cover study skills, reading (including extensive reading), listening, speaking, writing, referencing, and language usage and text organisation.

#### Student assessment strategies

Assessment will be based on Continuous Assessment.

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#### I3500NI INTRODUCTION TO MECHANICAL ENGINEERING

<b>Module Title:</b>	INTRODUCTION TO MECHANICAL ENGINEERING
<b>Module Code</b>	I3500NI
<b>NQF Level</b>	5
<b>Notional Hours</b>	60
<b>Contact hours</b>	2 Lectures
<b>Additional learning requirements</b>	Group work and Project.
<b>NQF Credits</b>	6
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core

#### Module Content

Introduction to Mechanical Engineering: What is mechanical engineering, historical perspective, the modern era and mechanical engineering. Critical skills for a mechanical engineering of today: software engineering and probability and statistics. Branches of mechanical engineering. Typical jobs of a mechanical engineer: Product design and manufacture, research and development, systems design and management, troubleshooting, safety and maintenance. Important Skills: Estimation in engineering, Problem solving and communication skills, Presenting engineering calculations. Basic principles of mechanical engineering: Introduction to mechanics (statics and dynamics), fluid mechanics, manufacturing and materials, Introduction to mechanisms, thermodynamics energy, Introduction to heat transfer. New fields of mechanical engineering and the impacts of technology.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments, Project and Presentation: 60%
  - ii) Tests (at least 2 tests):40%

Criteria for qualifying for the Examination:

No Examination

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#### U3583DD

#### DIGITAL LITERACY

<b>Module Title:</b>	DIGITAL LITERACY
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<b>Module Code</b>	U3583DD
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial/ week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1

#### Module Content

Content: Digital Proficiency: ICT-based devices (laptops, tablets, smartphones, desktop computers, digital instruments and equipment); a mouse, keyboard, touch screen, voice control and other forms of input; screens, audio headsets and other forms of output; digital capture devices; University digital learning systems and a range of personal digital services such as social media, cloud storage services, sharing sites Digital Productivity: Basic productivity software (text editing, presentation, spreadsheets, image editing); email and other digital communication services; Internet or cloud or institutional shared spaces for Organising, managing and backing up digital files; software/apps and services suitable for learning-related tasks; digital tools fit learning and managing learning time . Information Literacy: search engines, indexes or tag clouds; wikis, blog posts, scholarly journals, e-books and the open web; file spaces and folders, bookmarks, reference management software and tagging; copyright, and digital citizenship issues. Data and Media Literacy: Digital data using spreadsheets and other media; data security and privacy; digital media messages – text, graphics, video, animation, audio and multimedia. Digital Creation and Innovation: digital materials (video, audio, stories, presentations, infographics); new digital tools for learning in digital settings. Digital Communication, Collaboration and Participation: digital communication; differences between media, norms of communicating in different spaces; false or damaging digital communications; collaborative tools and online environments; online networks. Digital Learning and Development: digital learning opportunities; digital learning resources; digital tools/materials for organising, planning and reflecting on learning (mind-mapping, note-taking, e-portfolio/ learning journal/ blog). Digital Identity and Wellbeing: online profiles for different networks (personal, professional, academic); digital reputation; managing personal data and privacy; digital CV or portfolio of work; digital technologies for personal development; online etiquette; wellbeing and safety online; internet addiction; cyberbullying and other damaging online behaviour.

#### Student Assessment Strategies

1. Collaborative assessment tasks
  - 1.1 Digital productivity: cloud based collaborative digital media creation using cloud platforms
  - 1.2 Project: Digital communication, collaboration and participation/ Digital Wellbeing
2. Individual assessment tasks
  - 2.1 Assignment: information literacy assignment
  - 2.2 Test x 2
3. Practical
  - 3.1 Digital proficiency
  - 3.2 Data and Media literacy
4. No written examination

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#### U3420CN NATIONAL AND GLOBAL CITIZENSHIP

<b>Module Title:</b>	<b>NATIONAL AND GLOBAL CITIZENSHIP</b>
<b>Module Code</b>	U3420CN
<b>NQF Level</b>	4
<b>Notional Hours</b>	20
<b>Contact hours</b>	Up to 1 contact lecture periods per week for 6 Weeks
<b>Mode of Delivery Blended:</b>	Face to face and Online
<b>Additional learning requirements</b>	Each student will be required to work on a personal project which will include a site visit
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

#### Module content

UNIT 1: Constitution and its Importance

What is a constitution; Functions of a constitution; What it contains; Constitution and democracy

UNIT 2: Global Citizenship

The meaning of global citizenship; Importance of global awareness; World issues of concern to global citizens.

UNIT 3: Civic Engagement

What do we mean by civic engagement; Dimensions of civic engagement; Indicators of civic engagement;

Promoting civic engagement.

UNIT 4: Globalization

Understanding globalization; Cultural construction of neoliberal globalization; Major players; Major domains;

Major Issues; Futures of Globalization

UNIT 5: Intercultural Communication

Dealing with difference; Levels of culture; Stereotypes and generalizations; Intercultural communication Processes

UNIT 6: Sustainable Development Goals and individual action

Introduction to SDGs; Contributing to achievement of SDGs through action

#### Student Assessment Strategies

Continuous assessment of 100% - Assessment will be done by completing online pop-up quizzes; and developing their online portfolios of personal action as response to tasks assigned in class.

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**YEAR 1 SEMESTER 1**

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**I3511IM ENGINEERING MATHEMATICS I**

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<b>Module Title:</b>	ENGINEERING MATHEMATICS I
<b>Module Code</b>	I3511IM
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lectures + 1 Tutorial / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Lines and Planes: Vector equation of a line, Cartesian and parametric equation of a plane, intersection of lines and planes. Matrix Algebra: Matrix algebra, row reduced echelon form, determinant, adjoint, singular and non-singular matrices, inverse of a matrix, matrices and systems of linear equations, solution by Cramer's rule. eigenvalue-eigenvector problems. Hermitian and unitary matrices. Quadratic forms. Sequences and series of numbers: Introduction to sequences and series. Absolutely convergent series, tests for convergence. Power series. Radius of convergence and interval of convergence. Functions: Limits and continuity of functions: limit at a point, improper limit, and continuity. Exponential functions, logarithmic functions, hyperbolic functions, area functions. Polar coordinates/Graphs: Definition of polar coordinates, relate cartesian and polar coordinates, sketch and name different types of polar graphs. Differentiation: Definition of the derivative, differentiation rules, chain rule, differentiation of trigonometric functions, derivatives of higher order, concavity and curve sketching, optimization, related rates. Implicit differentiation, the chain rule, differentiation of algebraic functions. Integration: Anti-derivatives, Riemann sums, the definite integral, fundamental theorem of calculus, basic integration techniques, integration of trigonometric functions. Introduction to complex numbers: Definition of complex numbers and the complex plane, complex number representation on argand diagrams, complex number algebra. Demoivre's theorem.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes): 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 40% in the Continuous Assessment.

Criteria for passing the module

To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous Assessment and Examination.

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**I3531ID ENGINEERING DRAWING**

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<b>Module Title:</b>	ENGINEERING DRAWING
<b>Module Code</b>	I3531ID
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lectures +1 Tutorial and/or 1 Practical /Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Foundations of Representing Technical Bodies: drawing equipment, drawing formats, types of lines, construction geometry, simplified representations, scales, lettering, title block, elaboration of part drawings, Principle of orthographic projection, sectioning, dimensioning. Isometric and oblique representations. Sections, Interpenetrations and developments: cones, cylinders, pyramids. Free hand techniques: Introduction to free-hand sketching of machine parts. Assembly Drawing. Introduction to AutoCAD: Setting up the drawing Environment; Using commands and system variables; Using coordinate systems; Working in two - dimensional space: Creating objects; Drawing with precision; Controlling the drawing display; Editing methods; Using layers and object properties; Adding text to drawings; Creating dimensions; Using blocks and external references; Managing content with AutoCAD design Centre; Creating a layout to plot; Plotting (model and paper spaces). Working in three - dimensional space: Creating three-dimensional objects using solid primitives, and from 2D profiles; editing of 3D objects. Practical Exercises.

**Student Assessment Strategies**

1. Students will be assessed through Continuous Assessments activities
2. The final mark will be made of 100% Continuous Assessment.
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 4 assignments): 40%
  - ii) Mini project: 20%
  - iii) Tests (At least 3 tests): 40%

Criteria for qualifying for the Examination:

No Examination

Criteria for passing the module

To pass this course a student should obtain a minimum final mark of 50%.

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### I3521NP PHYSICS FOR ENGINEERS I

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<b>Module Title:</b>	PHYSICS FOR ENGINEERS I
<b>Module Code</b>	I3521NP
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures +1 Tutorial and/or 1 Practical /Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Measurements and Units: Instruments and Uncertainty, Standards and Units. Kinematics: One Dimensional Motion, Vectors, Projectile Motion, Circular Motion, Relative Motion. Dynamics: Newton's Laws of Motion, Newton's Law of Gravitation, Free-Body Diagrams, Friction. Work, Energy and Power. Momentum: Collisions, Impulse, Centre of Mass. Rotational Dynamics: Rolling Motion, Torque, Rotational Inertia and Energy, Angular Momentum. Planetary Motion: Kepler's Laws of Planetary Motion. Elasticity: Hooke's Law. Fluids: Pressure, Buoyancy, Fluid Dynamics: Flow Rates, Equation of Continuity and Bernoulli's Equation. Heat and Thermodynamics: Thermal Expansion, Ideal Gas, Specific Heat, Heat Capacity, Latent Heat, Calorimetry, Heat Transfer: Laws of Thermodynamics, Entropy, Enthalpy, Gibbs Free Energy.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes): 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 40% in the Continuous Assessment.

Criteria for passing the module

To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous Assessment and Examination.

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### I3551CC COMPUTING FUNDAMENTALS

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<b>Module Title:</b>	COMPUTING FUNDAMENTALS
<b>Module Code</b>	I3551CC
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures +1 Tutorial and/or 1 Practical /Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Computer Fundamentals: Development history of computer hardware and software. Hardwired vs stored program concept. Von-Neuman architecture. Harvard architecture: principle of operation, advantages, disadvantages. Single address machine. Contemporary computers. Computer system: block diagram, functions, examples, dataflow, control line. Computer Arithmetic: integer arithmetic (addition, subtraction, multiplication, division), floating-point representation (IEEE), floating-point arithmetic. arithmetic and logic unit (ALU). Introduction to CISC and RISC architecture: principle of operation, merits, demerits. Storage and Input/Output Systems: Computer function (fetch and execute cycles), interrupts, interconnection structures (Bus structure and bus types). Introduction of computer operating environment Windows and UNIX based systems. Computer Architecture: The design and structure of a computer. Information Processing and Data Analysis tools: Equations and Formulas Creation, Diagram Creation and Editing, PowerPoint Presentations Creation Advanced Spreadsheets Skills. Computer Program Planning. Flowcharts and Pseudocode Introduction to Computer Networking: Basics of Communication Systems and Computer Networks. Web Developments: Front-End Web Development, Web Page Styling and Website logic development with scripting languages such as JavaScript. Overview of memory system, memory chip organization and error correction, cache memory, memory storage devices. Introduction to Data Science Tools: Installation and basic use of Anaconda and Jupyter Notebooks.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes, reports, practical assignments): 20%
  - ii) Tests (At least 2 tests): 50%
  - iii) Semester Mini project (prototype oral presentation and development report): 30%

Criteria for qualifying for the Examination:

No Examination

Criteria for passing the course:

To pass this course a student should obtain a minimum final mark of 50%.

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**I3511NC CHEMISTRY FOR ENGINEERS**

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<b>Module Title:</b>	CHEMISTRY FOR ENGINEERS
<b>Module Code</b>	I3511NC
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lectures + 1T or 1PS /Week
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Spectroscopic techniques and Applications: Elementary idea and simple applications of Rotational, Vibrational, Ultraviolet & Visible and Raman spectroscopy. Electrochemistry: Nernst Equation and application, relation of e.m.f. with thermodynamic functions ( $\Delta H$ ,  $\Delta F$  and  $\Delta S$ ). Lead storage battery. Corrosion; causes, effects and its prevention. Phase Rule and its application to water system. Battery Technology; Introduction - Galvanic cell, electrode potential, EMF of the cell and cell representation. Batteries and their importance, Classification of batteries- primary, secondary and reserve batteries with examples. Battery characteristics - voltage, capacity, energy density, power density, energy efficiency, cycle life and shelf life. Basic requirements for commercial batteries. Construction, working and applications of: Zn-Ag<sub>2</sub>O, Ni-Cd, Zn-air and Lithium-ion battery. Fuel Cells- Differences between battery and a fuel cell, Classification of fuel cells - based on type of fuel, electrolyte and temperature. Construction, working and applications of solid oxide fuel cell. Water Analysis; Hardness of water, Techniques for water softening (Lime-soda, Zeolite, Ion exchange resin and Reverse osmosis method), Alkalinity -determination, Determination of dissolved oxygen, Determination of chemical oxygen demand, Boiler scales-formation and ill effects, prevention of scales by external method (hot lime-soda process). Desalination by electro dialysis. Fuels: classification of fuels, Analysis of coal, Determination of calorific value (Bomb calorimeter and Dulong's method). Solar energy- Photo voltaic cells- definition, working and importance of PV cells. Production of solar grade silicon by chemical vapor deposition. Polymer; Basic concepts of polymer-Blend and composites, Conducting and biodegradable polymers. Preparation and application of some industrially important polymers (BunaS, Buna-N, Neoprene, Nylon-6, nylon-6,6 and Terylene). General methods of synthesis of organometallic compounds (Grignard reagent) and their applications. Environmental Chemistry; Air Pollution, Water Pollution, Radioactive Pollution, Solid Waste Management, Green Chemistry.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes, lab and field reports): 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 50% in Continuous Assessment.

Criteria for passing the course:

1. To pass this course a student should obtain a minimum final mark of 50%.

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**I3512IM ENGINEERING MATHEMATICS II**

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<b>Module Title:</b>	ENGINEERING MATHEMATICS II
<b>Module Code</b>	I3512IM
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3511IM Engineering Mathematics I)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Further Matrix Algebra: eigenvalue-eigenvector problems. Hermitian and unitary matrices. Quadratic forms. Further Integration: Integration by parts technique. Integration by substitution. Integration of trigonometric functions. Integration of powers of trigonometric functions. Integration of trigonometric functions by substitution. Reduction formula. Applications of integration: areas, volumes of revolution, etc. Differential Equations: Meaning and solutions of differential equations. First order ordinary differential equations (separable, homogenous, Exact and linear types) and their applications. Solutions of second order linear ordinary differential equations with constant coefficients; initial or boundary value problems using the methods of undetermined coefficients and variation of parameters. Integral Transforms: Laplace Transforms (LT), Inverse transforms on derivatives and integrals, unit step functions, LT of derivatives and integrals, application to solve 1st and 2nd ordinary differential equations. Fourier Series and Transforms: Fourier series. Fourier sine and cosine series. Introduction to Fourier transforms and its applications in solving boundary value problems.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes): 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 40% in the Continuous Assessment.

Criteria for passing the module

To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous Assessment and Examination.

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### I3542NP PHYSICS FOR ENGINEERS II

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<b>Module Title:</b>	PHYSICS FOR ENGINEERS II
<b>Module Code</b>	I3542NP
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorials or 1 Practical session / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3521NP Physics for Engineers II)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Electrostatics: Electric charge, Current and Current Density, Electric field, Electric Potential, Resistance and Resistivity, Capacitance and Dielectrics. Magnetostatics: Biot-Savart law, Magnetic field, Magnetic materials, Motion of a Charged Particle in a Magnetic Field, Magnetic force, Ampere's Law; Torque and Magnetic Moments; Electromagnetic Induction: Electromagnetic Force (EMF), Faraday's Law of Electromagnetic Induction, Lenz's Law, Fleming's Right-Hand Rule, Inductance and Mutual Inductance. Vibrations and Waves: Simple harmonic motion, Oscillations, Wave Motion, Types of Waves, Standing Waves and Resonance. Sound: intensity of Sound, interference of Sound Waves, Doppler's Effect. Light and Optics: Reflection, Refraction and Diffraction, Snell's Law, Lenses, Lens Equation. Radioactivity: types of radioactivity.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes): 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 40% in the Continuous Assessment.

Criteria for passing the module

To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous Assessment and Examination.

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### I3502EE FUNDAMENTALS OF ELECTRICAL ENGINEERING

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<b>Module Title:</b>	FUNDAMENTALS OF ELECTRICAL ENGINEERING
<b>Module Code</b>	I3502EE
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial and/or 1PS/Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3511IM Engineering Mathematics I)
<b>None</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Introduction: SI Units and notations, Basic Electric Circuit (resistance, voltage and current). Resistance: Resistor coding, Series and parallel resistor networks, Y and delta resistor networks. Sources: Voltage and Current sources, dependent and independent sources, source transformations. DC Circuit Analysis Techniques: Ohm's law, Power and Energy, voltage divider and current divider rules, Kirchhoff's laws, mesh and nodal analysis, DC Circuit Theorems: Superposition Theorem, Thevenin's and Norton's Theorem, Maximum power transfer theorem. Capacitors: Capacitance, capacitors in series and parallel, Capacitor charging and time constant. Inductors: Inductance and mutual inductance. AC Voltage: AC voltage generation, AC Resistive circuit, AC capacitive circuit, AC inductive circuit. Electrical Machine Basics: Basics principles of transformers, AC generators, DC motors, three phase voltage generation and mathematical expression. Basics of circuit simulation using CAD software).

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment.
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) At least 2 quizzes, and at least 2 lab reports: 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

No Examination

Criteria for passing the course:

To pass this course a student should obtain a minimum final mark of 50%.

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**I3572IS MATERIALS SCIENCE**

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<b>Module Title:</b>	MATERIALS SCIENCE
<b>Module Code</b>	I3572IS
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial and/or 1PS/Week
<b>Additional learning requirements</b>	None.
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>None</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Materials for Engineering: Introduction to Engineering Materials, Types of Materials, Processing-Structure-Property relationship of Materials, Competition among materials, Future trends of material usage. Structure of materials: Atomic structure, electronic configuration, atomic bonding; Crystallographic planes and directions: Miller indices; Bragg's law; Defects in crystals; Solidification, Crystalline Imperfections and Diffusion in solids; Solidification of Metals, Single Crystals, Metallic Solid Solutions, Crystalline Imperfections and Atomic diffusion in Solids; Equilibrium phase diagrams: unary, binary and ternary systems. Invariant reactions: eutectic, eutectoid, peritectic, peritectoid systems. Proportion of phases based on the lever rule. Practical phase diagrams from non-ferrous alloy systems. Properties of Materials: review of Mechanical, Electrical, Optical and Thermal properties of materials. Mechanical properties of materials: Stress and Strain, Tensile testing, True stress and True strain, Deformation modes; Yield and Fracture, Hardness testing, bend test, impact test, simple fracture mechanics and strengthening mechanisms. Effects of environment on materials: corrosion and oxidation of metals, electrode potential, electrochemical cell, mechanisms of corrosion, corrosion prevention, degradation of polymeric materials. Real-world applications of Engineering materials: Functional Materials & Devices; The Relationship between Materials Science and the Fourth Industrial Revolution. Basic criteria for the selection of materials for engineering applications.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes, lab and field reports): 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 50% in Continuous Assessment.

Criteria for passing the course:

To pass this course a student should obtain a minimum final mark of 50%.

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**I3532NM ENGINEERING MECHANICS I**

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<b>Module Title:</b>	<b>ENGINEERING MECHANICS I</b>
<b>Module Code</b>	I3532NM
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial and/or 1PS/Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3521NP Physics for Engineers I)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

System of forces and moment forces: Coplanar forces, addition of forces, couples and moments, resultants and equivalent systems. Equilibrium of a rigid body in two dimensions, line of action, free body diagram, adequacy of constraints and equilibrium positions. Equilibrium in three dimensions. Forces in submerged surfaces. Distributed Forces: Centroid and Center of Gravity, Friction: Dry friction, wedges, screws, journal and thrust bearings, rolling resistance, belt friction. Beams: shear force and bending moment diagrams. Analysis of forces in a truss: Method of joints, method of sections.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 4 assignments): 20%
  - ii) Tests (At least 2 tests): 60%
  - iii) Practical and Report: 20%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 50% in Continuous Assessment.

Criteria for passing the course:

To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous Assessment and Examination.

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**I3552IS STATISTICS FOR ENGINEERS**

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<b>Module Title:</b>	<b>STATISTICS FOR ENGINEERS</b>
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<b>Module Code</b>	I3552IS
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial Session / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3511IM Engineering Mathematics I)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Probability: Theory (Random experiments, Random events), conditional probability and Bayes theorem, mathematical expectation and decision making. Probability Distributions and Densities: Binomial, Geometric, Hypergeometric, Poisson, Normal, uniform, Gamma, Beta and Weibull. Sampling Distributions: Mean, variance, inferences concerning mean and proportions: point and interval estimations, parametric tests, nonparametric tests. Regression and Correlation: Simple and multiple linear regressions, correlation. The logistic regression model. Analysis of Variance: Completely randomized and randomized block designs, multiple comparisons. Introduction to Data Analysis with R: Lab 1: Measures of Central Tendency: mean, median, and other quantiles, mode. Saving and Using Graphics etc. Lab 2: Measuring Variability: variance and standard deviation, median, Interquartile Range, coefficient of variation, covariance and correlation of variables. Lab 3: Measuring Symmetry: skewness, kurtosis, etc. Frequency distributions: histograms, bar charts, pie charts, box plots, line graphs, scatterplots.

#### Student Assessment Strategies

- Students will be assessed through continuous assessments activities and a final examination
- The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 3-hour paper).
- The Continuous Assessment will be made up of the following assessment activities:
  - Assignments (Lab assessment): 40%
  - Tests (At least 2 tests): 60%

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## H.4 SECOND YEAR

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### SEMESTER CORE

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#### U3683AL ACADEMIC LITERACY II

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<b>Module Title:</b>	<b>ACADEMIC LITERACY II</b>
<b>Module Code</b>	U3683AL
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Prerequisite</b>	U3583AL
<b>Contact Hours</b>	2 Lectures + 1 Tutorial per week
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	0

#### Module Content

The module will cover study skills, reading, listening, speaking and writing, referencing, language usage and text organisation.

#### Student assessment strategies

Assessment will be based on Continuous Assessment.

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#### I3620IE ENGINEERING ENTREPRENEURSHIP

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<b>Module Title:</b>	<b>ENGINEERING ENTREPRENEURSHIP</b>
<b>Module Code</b>	I3620IE
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core

#### Module content

Entrepreneurship: - concept of entrepreneurship, characteristics of an entrepreneur, examples of good local and international entrepreneurial ventures, feasibility studies and business plan development and its components, government policies and regulations for starting new business ventures. Entrepreneurship opportunities in Engineering: innovative ideas and process of innovation, transformative and incremental innovations, innovation and business development, product development process and market research. Risk management: types of risk, risk management process, risk control and mitigation, risk response. Change management: Importance of change management, group dynamics and communication. Strategic business management: Management functions, strategic planning and management, resource management plan. Strategic marketing management: Marketing functions, marketing mix, innovative marketing, competitor analysis

#### Student Assessment Strategies

- Students will be assessed through continuous assessments activities
- The final mark will be made of 100% Continuous Assessment

3. The Continuous Assessment will be made up of the following assessment activities:
- i) Assignments: 20%
  - ii) Tests (At least 3 tests): 50%
  - iii) Written reports: 30%

Criteria for qualifying for the Examination:

No Examination

Criteria for passing the course:

To pass this course a student should obtain a minimum final mark of 50%.

### **I3640IW WORKSHOP PRACTICE**

<b>Module Title:</b>	<b>WORKSHOP PRACTICE</b>
<b>Module Code</b>	I3640IW
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	3 PS/Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core

#### **Module Content**

Safety procedures applicable to engineering workshops: Safety equipment; Protective clothing; Signage. Use of workshop hand tools. Principles and practices of: Masonry and brickwork; Machining Operations (cutting, drilling, turning, milling, shaping); Sheet metal and fitting; Welding fabrication; Auto mechanics; Electrical wiring and installation; Soldering and de-soldering of electronic components; Carpentry and woodwork; Plumbing and pipe fitting; Refrigeration and air-conditioning systems and their installation.

#### **Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) At least 5 practical reports: 40%
  - ii) Fabricated Components: 60%

Criteria for qualifying for the Examination:

No Examination

Criteria for passing the course:

To pass this course a student should obtain a minimum final mark of 50%.

### **YEAR TWO SEMESTER 1**

#### **I3611IM ENGINEERING MATHEMATICS III**

<b>Module Title:</b>	<b>ENGINEERING MATHEMATICS III</b>
<b>Module Code</b>	I3611IM
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lectures + 1 Tutorial / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3512IM Engineering Mathematics II) I3511IM Engineering Mathematics I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content**

Vector Calculus: Vector valued functions, limits, continuity, differentiation, partial differentiation. Scalar and vector fields, space curves, tangent to curves, normal, binomial, torsion, curvature. Functions of several variables: limits, continuity, derivatives, differentials, the Jacobian, matrix and determinants, composite functions, higher order derivatives. Applications: optimization on surfaces, constrained optimization. The gradient of a scalar field, the del operator and its properties, the directional derivative, the divergence, the curl, physical and engineering applications. Power Series and their applications: Power series. Radius of convergence and interval of convergence. Power series representation of functions, Taylor and Maclaurin series, the Binomial theorem. Power series solutions to ODEs with variable coefficients. Analytic Functions: Complex functions, derivatives, Cauchy-Riemann equations, Cauchy's theorem, Cauchy's integral formulae, Taylor series, singular points, poles. Laurent series, Residues, Residue Theorem and evaluation of complex integrals.

#### **Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes): 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 40% in the Continuous Assessment.

Criteria for passing the module

To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous Assessment and Examination.

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**I3601IE ENGINEERING ECONOMICS**

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<b>Module Title:</b>	<b>ENGINEERING ECONOMICS</b>
<b>Module Code</b>	I3601IE
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(None)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module content**

Microeconomics: economic concepts, economic problems, demand and supply, consumer choice and demand theory, production functions, production costs, profit maximisation: Time value of Money: time value of money, investment analysis (NPV, ROR, IRR, ROI, CBA, etc), depreciation methods (straight line, reducing balance, some of digits) Macroeconomics: inflation and deflation, business cycle, monetary and fiscal policies, unemployment, international trade. Financial accounting: product costing, cost accounting, Cost estimation, financial statements and budgeting. Introduction to marketing: marketing principles.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 2-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments: 40%
  - ii) Tests (At least 2 tests): 60%

Criteria for qualifying for the Examination:

To qualify for the exam, a student must obtain a minimum of 40% in the Continuous Assessment.

Criteria for passing the module

To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous Assessment and Examination.

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**I3631IC COMPUTER PROGRAMMING I**

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<b>Module Title:</b>	<b>COMPUTER PROGRAMMING I</b>
<b>Module Code</b>	I3631IC
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial or 1PS /Week
<b>Additional learning requirements</b>	Include any compulsory field trips / excursions (outside the normal practical); attachments / group work / project etc.
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3551CC Computing Fundamentals)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Programming Languages – preliminaries, history, and evolution, Describing Syntax and Semantics (Lexemes, tokens, Language recognizers, Language generators, Context-free grammars, Backus-Naur Form (BNF), Extended BNF, Syntax diagrams, Parse trees, Ambiguity, Unambiguous grammar, Attribute grammar) Lexical and Syntax Analysis (Lexical analysis, Parsing problem, Top-down parsing, Bottom-up parsing, Recursive-descent parsing, LL and LR parsers). Names, Bindings, Type Checking, and Scopes. Data Types, Functional Languages, Object-Oriented (OO) Language Comparism. Annotation and Aspect-oriented programming. Declarative Language. Programming languages, data processing concepts as numerical networks using interaction time-shared terminal computer systems, writing, debugging and running programs on different digital computer systems. Problem Solving: Introduction to problem solving through basic data structures and algorithms, Fundamental concepts of programming: Data types, variables, program flow control and decisions, loops, string manipulation, functions, file manipulation, lists and vectors and their manipulations. Debugging and Testing: correctness proofs, code tracing, peer reviews and execution testing. C/MATLAB for engineers: Introduction to the C/MATLAB programming environment, charts creation and manipulation in matlab, Introduction to toolboxes in C/MATLAB, GUI development in C/MATLAB, Introduction to Simulink and its application to engineering problems.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes, reports, practical assignments): 20%
  - ii) Tests (At least 3 tests): 50%
  - iii) Semester Mini project (prototype oral presentation and development report): 30%

Criteria for qualifying for the Examination:

No Examination

Criteria for passing the course:

To pass this course a student should obtain a minimum final mark of 50%.

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**I3651VM STRENGTH OF MATERIALS**

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<b>Module Title:</b>	<b>STRENGTH OF MATERIALS</b>
<b>Module Code</b>	I3651VM

<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial or 1PS /Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Pre-requisite</b>	(I3532NM Engineering Mechanics I)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Stresses and strains in one-dimension: introduction to stresses and strains; direct tensile test; Hooke's law and Modulus of Elasticity; ductility; Normal stress and strain; Poisson's ratio; Thermal stresses and strains; Axially-loaded bars, composite bars, axially-loaded bars of varying cross sections and bars loaded at intervals; Simple indeterminate problems on direct tension and compression; Compound bars; Shear stresses and strains; Modulus of rigidity. Stresses and strains in two and three dimensions: analysis of two- and three-dimensional state of stress; transformation of stresses and strains; principal stresses and maximum shear stresses; analysis of two and three-dimensional state of strain; Mohr's circle of stress and strain; Volumetric strain; Bulk modulus. Geometrical characteristics of plane sections: centroids of simple and complex areas; second moment of area; polar moment of area; section modulus; parallel axes theorem; perpendicular axes theorem. Bending and shear stresses in beams: theory of beam bending; composite beams; shear stress distribution due to bending. Combined bending and direct stresses in structural members. Unsymmetrical bending. Shear stress in thin-walled open sections. Shear centre. Material failure: failure theories of materials; Creep; Fatigue; Fracture; Stress concentration. Elastic instability: buckling of struts. Simple torsion: pure torsion of circular bars; shear stress and shear strain in shafts; torsional rigidity; torsion of hollow shafts. Stresses in thin cylinders and spheres: thin cylindrical and spherical shells subjected to internal pressure; hoop stress; longitudinal stress. Laboratory demonstrations: direct tensile test; elastic modulus/ductility; torsion; fracture; stress concentration; buckling of struts.

#### Student Assessment Strategies

- Students will be assessed through Continuous Assessment (CA) and an end-of-semester examination
- The final mark will be made up of 50% Continuous Assessment (CA) and 50% end-of-semester examination (1 x 2-hour paper).
- The Continuous Assessment will be made up of the following assessment activities:
  - Laboratory reports: 20% of CA.
  - Assignments: 20% of CA.
  - 2 Tests: 60% of CA.
- End-of-semester examination: (1 x 2-hour paper): 50%.

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<b>I3642NM</b>	<b>ENGINEERING MECHANICS II</b>
<b>Module Title:</b>	ENGINEERING MECHANICS II
<b>Module Code</b>	I3642NM
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial or 1PS /Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3532NM Engineering Mechanics I)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Particle Dynamics: Kinematics of particles: Laws of motion, displacement, velocity, acceleration. Rectilinear Motion, rectangular coordinates. Plane curvilinear motion: normal, tangential and polar coordinates. Constrained motion of connected particles. Motion relative to translating axes, Motion relative to rotating axes. General relative motion. Projectiles. Angular motion. Cylindrical coordinates systems. Kinetics of particles: Newton's Second Law of Motion. Equations of motion and their solutions for rectilinear and plane curvilinear motion. Work-energy principle. Power and efficiency. Conservation of energy. Principle of linear impulse and momentum. Angular momentum. Kinetics of a system of particles. Generalized Newton's Second Law. Work-energy principle. Impulse-momentum principle.

#### Student Assessment Strategies

- Students will be assessed through continuous assessments activities and a final examination
- The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 2-hour paper).
- The Continuous Assessment will be made up of the following assessment activities:
  - Assignments (At least 3 assignments): 40%
  - Tests (At least 2 tests): 60%

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<b>I3661NM</b>	<b>ENGINEERING MATERIALS</b>
<b>Module Title:</b>	ENGINEERING MATERIALS
<b>Module Code</b>	I3661NM
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial or 1PS/Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3572IS Materials Science)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Classification and Characteristics of Steels: Review of the Iron-Iron Carbide phase diagram. Plain carbon steels, alloy steels, stainless steels, Special heat treatments for steels: Case hardening, austempering, martempering, Hardenability of steels, Jominy End-Quench test, Annealing and recrystallization. Characteristics of Cast Irons: Grey iron, nodular iron, austempered ductile iron (ADI). Characteristics of Non-Ferrous Alloys: Copper, aluminium, titanium, nickel and their alloys. Practical application of strain hardening and precipitation hardening on selected alloys. Polymers and Plastics: polymerization processes, degree of polymerization, classification of polymers, glass transition temperature. Common thermoplastics, common thermosetting plastics, common elastomers. Ceramics: Traditional ceramics, technical ceramics, structural and functional properties of technical ceramics. Composite Materials: Polymeric, metallic and ceramic matrices, fibres for reinforcement, effect of fibre volume fraction on properties. Longitudinal and transverse loading of composites: stress analysis and modulus of elasticity. Shear modulus of composites for parallel model (isostrain) and series model (isostress). Nanomaterials - Introduction of nanomaterials and nanotechnologies, Features of nanostructures, Background of nanostructures, Techniques of synthesis of nanomaterials, Mechanical properties of nanomaterials, Tools of the nanoscience, Applications of nanomaterials and technologies.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 2-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 2 assignments): 20%
  - ii) Practical reports: 20%
  - iii) Tests (At least 2 tests): 60%
4. To pass this course a student should obtain a minimum exam mark of 40% and average of 50% from both the Continuous

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#### I3612IM ENGINEERING MATHEMATICS IV

<b>Module Title:</b>	ENGINEERING MATHEMATICS IV
<b>Module Code</b>	I3612IM
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lectures + 1 Tutorial / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3511IM Engineering Mathematics I) I3512IM Engineering Mathematics II
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Systems of Linear Differential Equations: Homogeneous and nonhomogeneous systems and their methods of solutions: The Laplace Transform method and the matrix methods (eigenvalue-eigenvector approach). Partial Differential Equations: Partial differential equations classification; elliptic, parabolic and hyperbolic. Neumann, Dirichlet boundary conditions of PDEs. Method of separation of variables to the heat and wave equations; vibrations of a stretched elastic string fixed at both ends. Integral Calculus of Functions of Several Variables: Double and triple integrals, Double, triple and iterated integrals, Line integrals in the plane, Green's Theorem, Independence of path, Surface integral, Divergence theorem, Stoke's theorem, Irrotational and solenoidal fields, Physical and engineering applications. Numerical Methods: Zeros of functions, Polynomial interpolation and least squares approximation, numerical differentiation and integration. Numerical solution of first order ordinary differential equations and boundary value problems.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes): 40%
  - ii) Tests (At least 2 tests): 60%

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#### I3652CP COMPUTER PROGRAMMING II

<b>Module Title:</b>	COMPUTER PROGRAMMING II
<b>Module Code</b>	I3652CP
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial or 1PS /Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3631IC Computer Programming I)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Recognized standards, guidelines and models used in programming. Flowchart ANSI symbols and usage. Extensive examples, and programming exercises using pseudo-code/flowchart to solve practical problems in engineering. Code Debugging techniques. Advanced Problem Solving: Top-down stepwise refinement approach. Structured Programming: Standard Libraries in C, arithmetic and logical operators, Bitwise operators and bit masking; Precedence and Associativity of Arithmetic Operations; Unary Operators; Structs, Union and Enums. Symbols, keywords, identifiers, data types, operators, conditional and control structures, function, recursive functions Selection Structures Repetition Structures. Looping and While structures; Arrays, Strings, and Pointers: Arrays; Storing and accessing Values in Arrays; Pointers; Advanced string and file manipulation; Structures and Unions: If statements; Nested if, the switch statement; the Conditional Operator File Handling: Concept of a file, files and streams, standard file handling functions, binary files, random access files. Advanced Topics: Command line parameters, pointers to functions, creation of header files, stacks, linked lists, bitwise manipulation. Software development in C in MS Windows, UNIX/LINUX environments. Extensive examples, and exercises programming in C to solve practical problems in engineering. Advanced Functions: Functions definition; Functions declaration/prototyping; Functions calling;

Functions arguments; Recursion. Object Oriented Programming: Classes; Inheritance; Encapsulating; Polymorphism; Operators and Functions Overloading and Overriding; Debugging and Exceptions Handling: The try-catch clause. Numerical differentiation and integration using programming.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment.
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes, reports, practical assignments): 20%
  - ii) Tests (At least 3 tests): 50%
  - iii) Semester Mini project (prototype oral presentation and development report): 30%

### I3652EM ELECTRICAL MACHINES I

<b>Module Title:</b>	ELECTRICAL MACHINES I
<b>Module Code</b>	I3652EM
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial or 1PS /Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3502EE Fundamentals of Electrical Engineering)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Introduction to electric machinery (review of magnetism); Principles of rotating machines, Principle of Magnetism (Magnetic field lines and their Properties, Flux and Flux density), Production of Rotating magnetic field (EMF and Faradays laws of Electromagnetic induction, Review of Magnetic circuit. DC machines (DC generator and Motor); Construction and principle of operation, EMF equation of DC Machine, armature reaction, commutation, Equivalent circuit of DC Generator and DC Motor, Characteristic of DC. Generators (Types of DC Generators, Characteristics of DC. Motors (Types of DC Motors), Power Flow and DC Machines Efficiency. Single Phase Transformers; Construction and Principle of operation, Transformer EMF Equation, Ideal Transformer and its characteristics, Classification of Transformer and Applications, Practical Transformer and its characteristics, Transformer tests (Open circuit and short circuit), Transformer efficiency, Auto- transformer (Characteristic and principle of operation). Three phase induction motor; Construction and principle of operation, EMF equation, Equivalent circuit, Power flow and motor efficiency, Torque-slip characteristic, Motor Tests (No load test and Blocked rotor test), Starting and speed control techniques of Induction motor, Applications, Motor Drives (DC drives principle of operation and industrial Applications).

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 60% Continuous Assessment and 40% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (at least 2): 20%,
  - ii) Labs (at least 3): 30%,
  - iii) Tests (at least 2): 50%

### I3632NF FLUID MECHANICS I

<b>Module Title:</b>	FLUID MECHANICS I
<b>Module Code</b>	I3632NF
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial and/or 1 Practical Session / Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3532NM Engineering Mechanics I)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Introduction to fluid mechanics; properties of fluids (density, viscosity, vapour pressure); fluid equilibrium; units. Fluid Statics: The governing differential equations; pressure distributions, manometric pressure measurement; fluids in relative equilibrium; forces on submerged surfaces; buoyancy. One-dimensional flows with inertia: 1-D mass conservation (Continuity equation); 1-D momentum conservation (Bernoulli equation); total head diagrams; flow measurement; Flow states: laminar vs turbulent, steady vs unsteady, uniform vs non-uniform, continuous vs discontinuous, sub-critical vs super-critical. Hydraulic systems: Energy changes in systems; pipe friction (continuous hydraulic energy losses: laminar and turbulent friction factors, Moody diagram); local hydraulic energy losses: loss coefficients and applications. Lab practical: 1. Hydrostatics, 2. Fluid dynamics: Discharge determination, 3. Fluid dynamics: Energy shares in a pressurised system (pressure and velocity dependencies) and 4. Fluid dynamics: Determination of continuous and local hydraulic losses.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 3 assignments): 20%
  - ii) Practical reports: 40%
  - iii) Tests (At least 2 tests): 40%

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**I3622ND MECHANICAL ENGINEERING DESIGN I**

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<b>Module Title:</b>	MECHANICAL ENGINEERING DESIGN I
<b>Module Code</b>	I3622ND
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial or 1PS/Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	I3532NM Engineering Mechanics I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Design methodology: problem investigation and identification, the role of system requirements, solution development and assessment strategies, problem solving approaches, consideration of alternative options during the designs development, appropriate application of engineering sciences to a design problem. Technical communication: Introduction to computer aided design, part drawings, manufacturing drawings, assembly drawing, assembly and reading of drawings, particular dimensioning rules, surface finish symbols, semi-finished products, technical reports, presentations skills Consideration for tolerances, fits and reliability. Stress analysis in machine components: theories of stress analysis and failure to engineering design problems, application of shear force and bending moment diagrams, stress analysis and principal stresses and Mohr's circle in static and fatigue failure, factors of safety and analysis and sizing of various mechanical components.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 2-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 3 assignments): 20%
  - ii) Mini design projects: 40%
  - iii) Tests (At least 2 tests): 40%

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**I3622CM MEASUREMENTS AND INSTRUMENTATION**

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<b>Module Title:</b>	MEASUREMENTS AND INSTRUMENTATION
<b>Module Code</b>	I3622CM
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial or 1PS/Week
<b>Additional learning requirements</b>	Include any compulsory field trips / excursions (outside the normal practicals); attachments / group work / project etc.
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3502EE Fundamentals of Electrical Engineering)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Systems of Units and Standards of Measurement: Absolute, derived and fundamental units. Advantages of electronic and electrical measurements. Standards and types of standards. International Standards, Primary Standards, Secondary Standards, Working Standards. Errors: sources of error. Types of errors, statistical analysis of error. Performance characteristics of Instruments: Static characteristics (Accuracy, Precision, Sensitivity, Reproducibility, and Tolerance etc.) Dynamic characteristics (Speed of response, Fidelity, Lag, dynamic error etc.). Calibration: Principles of calibration, calibration chain, calibration records. Elements of generalized measurement system, Functional elements of an instrument: Primary sensing element, variable conversion element (analogue to digital conversion), variable manipulation / conditioning element- (data amplification, attenuation) - data processing element (filtering), data transmission element, data storage element (chart recorders, computers, memory storage devices etc.), data presentation element/ termination stage. Instrument classification: active or passive instruments, null and deflection type instruments, analogue and digital instruments, indicating instruments and instruments with a sound output, smart and non-smart instruments. Bridge measurement (Wheatstone, Kelvin, Maxwell Anderson, Wien etc.) Electrical indicating and test instruments: Construction and operation of Digital meters (Voltage-to-time conversion digital voltmeter, Dual-slope integration digital voltmeter), Analogue meters - Construction and operation of Analogue meters: Moving-coil meters, moving iron meter, clamp on meter, techniques for measurement of high frequency signals. Noise in Measurement Instruments: Causes/ sources of Noise (Capacitive/ electrostatic, Inductive, multiple earth, thermoelectric potentials, shot noise,). Noise reduction techniques. Measurements of electrical and non-electrical quantities: Sensors and transducers: Transducer Characteristics, Mechanical vs electrical transducers. Transducer classification: active and passive transducers, on the basis of transduction principle used, analog and digital transducers, primary and secondary transducers, Transducer types: potentiometric transducers, LVDT, thermocouple, capacitive, inductive, piezoelectric. Transducer circuits: temperature sensors, fire detector etc. Oscilloscopes: Internal architecture and operation, principle of signal display, voltage, current, period and frequency measurement. Signal generators: Requirements of a signal generator, sine wave generator, basic theory of oscillators (Wein bridge, RC phase shift, Hartley & Colpitts), RF signal generation, Lab type signal generator, function generator (specification and principle of operation), Spectrum analysers: characteristics and principle of operation.

**Student Assessment Strategies**

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 50% Continuous Assessment and 50% Examination (1 x 2-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (tutorials, quizzes): 5%
  - ii) Lab practical (At least 4 labs): 35%
  - iii) Tests (At least 2 tests): 60%

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**H.5 THIRD YEAR**

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**CORE SEMESTER**

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**F3710TA RESEARCH METHODS IN AGRICULTURAL ENGINEERING**

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<b>Module Title :</b>	RESEARCH METHODS IN AGRICULTURAL ENGINEERING
<b>Module Code</b>	F3710TA
<b>NQF Level</b>	7
<b>Notional hours</b>	120
<b>Additional learning requirements</b>	Field trips
<b>Contact Hours</b>	03 Lecture hours / week / semester; 02 Practical hours / week / semester
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	I3552IS
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1

**Module Content**

Research methodology processes in Agriculture Engineering: Proposal writing for specified audience, presentation of proposal (Orally and in writing), general structure of a research project; Problem formulation; Literature search, major data bases for agriculture engineering literature and methodological approach to solving agriculture engineering problems. Review of basic Experimental designs: Principles of experimental Designs, CRD and RCBD, Analysis of Variance and post-hoc methods. Advanced engineering experimentation: Response Surface Methodology, Analysis of Quadratic Models, Analysis of Covariance models (General regression significance test), parametric model diagnostic checks, Data transformation, and basics of non-parametric tests. Computer Packages for data handling: Students will be introduced to any one of SAS, Minitab, STATA, with application in handling experimental models. Students will be required to interpret output from the package and present the results in a scientific manner.

**Student Assessment Strategies**

Continuous Assessment: 100%

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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**F3730TB HYDRAULICS AND HYDROLOGY**

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<b>Module Title:</b>	<b>HYDRAULICS AND HYDROLOGY</b>
<b>Code:</b>	F3730TB
<b>NQF Level</b>	7
<b>Notional hours</b>	120
<b>Contact Hours:</b>	03 Lecture hours / week / semester; 02 Practical hours / week / semester
<b>Additional learning requirements</b>	Field trips
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	I3632NF
<b>Compulsory</b>	Compulsory
<b>Semester offered</b>	1

**Module Content**

Hydrological cycle: water resources, rainfall processes and data; the determination and measurement of evaporation and transpiration; Infiltration calculation and modelling; flood frequency determination and analysis, rational method, unit hydrograph analysis; time-area routing, reservoir routing, Muskingum routing, storage draft analysis; soil erosion and sediment production. Flow measurement: stream flow measurement and analysis, hydrological modeling. Review of Fluid Mechanics: Fluid properties; Hydrostatics; and Basic hydrodynamics (Bernoulli equation, force, momentum, flux equation, continuity equation; ideal flow patterns, streamlines, flow nets; real flow, laminar and turbulent flow, boundary layers and drag). Flow resistance in pipes and channels; dimensional analysis and models. Flow with pressure gradient between parallel plate, pipes and channels. Analysis of fluid machinery; Design of pipeline networks. Pipe networks (simple branching circuits, single node reservoir systems, pipe reticulation systems Permanent pressurized flows. Design of pumps. Variable pressure flows. Water hammer. Open channel flow. Flows over free surfaces: Flow resistance in channels; Flows with uniform regiments. Damper systems. Flow through spillways and stilling basins. Disturbed flows (bridges and culverts) Basic design of hydraulic structures: Spillways, stilling basins, weirs, culverts, dams, reservoirs, canals.

**Student Assessment Strategies**

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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**SEMESTER 1**

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**F3751TC LIVESTOCK AND CROP PRODUCTION SYSTEMS**

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<b>Module Title:</b>	LIVESTOCK AND CROP PRODUCTION SYSTEMS
<b>Module Code:</b>	F3751TC
<b>NQF Level</b>	7
<b>Notional hours</b>	120
<b>Contact Hours:</b>	3 Lecture hours / week / semester; 2 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursions

<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	1

#### Module Content

The role of livestock and agriculture in the national economy and gives a broad overview of the industry, potentials, competitiveness and constraints. different production systems, their impacts on the environment, productivity levels and sustainability. breed and species adaptability to the environments; drought and its effects; the management of ruminants and non-ruminants with regard to breeding, nutrition, health and housing; livestock management facilities; harvesting, handling and marketing of livestock products. constraints facing communal and commercial farmers in Namibia.

The history of Namibian agriculture, Structure of Namibia agriculture (Land tenure systems), Crop production, climate and weather, Effects of weather elements on crop production, The agro-ecological regions in Namibia, Plant nutrition management, Cropping systems, Agro-forestry, Crop rotation principles and examples of rotations in Namibia, Crop classification, growth, development and water relations; production management; production cycle of specific field crops grown in Namibia (Cereals crops (pearl millet, maize, wheat, sorghum, rice), oilseed crops (sunflower, soybean, groundnut, castor bean), grain legumes (cowpea, bambara nuts, kidney beans), fiber crops (cotton, sisal), root and tuber crops (sweet potatoes, cassava, Irish potatoes); Tillage, Aims and objectives of tillage, Timing of tillage and Tillage practices, Agronomic considerations for adopting a tillage system, Seed and seeding, Seed analysis, Plant density, Planting methods, Factors affecting plant stand, Weed, Pest and disease management, Harvesting and storage of crops, Methods of harvesting, Marketing alternatives, Managing risk in crop production. Visits to commercial agricultural production areas with lots of agricultural engineering machinery and equipment used for crop production.

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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### I3731NM CONTROL SYSTEMS

<b>Module Title:</b>	<b>CONTROL SYSTEMS</b>
<b>Module Code</b>	I3731NM
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 Lectures + 1 Tutorial and/or 1PS/Week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	(I3622CM Measurements and Instrumentation)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Control Systems Basics: Fundamentals of control Theory, applications of control systems, open and closed loops. Modelling of Physical Systems: Laplace transform review, transfer functions, poles and zeros, block diagrams reduction, signal flow graphs, state variable models, conversion of transfer function to state space and vice-versa, frequency response representation, modelling of mechanical and electrical dynamic systems Control System Analysis: system response (transient and steady state) using transfer functions, system response (transient and steady state) using state equations. System stability analysis using Routh's stability criterion, stability in state space representation, frequency response parameters and stability analysis (phase margin, gain margin and Nyquist criterion), steady state errors from transfer function, steady state errors for state space represented systems, steady state errors from frequency response, transfer function from frequency response, Root Locus Method, Analysis using Root Locus method. Control Systems Design and compensation techniques: Design using root locus (PID controllers), Design using frequency response (lead, lag and lead/lag compensators), design via state space, practical implementation of controllers/compensators.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The final mark will be made of 60% Continuous Assessment and 40% Examination (1 x 3-hour paper).
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 3 assignments): 20%
  - ii) Practical report: 20%
  - iii) Mini design projects: 30%
  - iv) Tests (At least 2 tests): 30%

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### F3771TD FARM POWER, MACHINERY AND MANAGEMENT

<b>Module Title:</b>	<b>FARM POWER, MACHINERY AND MANAGEMENT</b>
<b>Module Code:</b>	F3771TD
<b>NQF Level</b>	7
<b>Notional hours</b>	120
<b>Contact Hours:</b>	3 Lecture hours / week / semester; 2 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	13642NM
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1

#### Module content

Types of farm power, mechanization and their importance in Agricultural production. Principles of operation of internal combustion (I.C) engines, Engine and engine accessories, Diesel and petrol engines, Engine tests, Fuel supply and cooling system of engines, Electrical and ignition, Lubrication, Ignition, Steering, Power Transmission, Hydraulic and braking Systems. Primary and secondary tillage, planting, chemical application, and harvesting equipment. The selection and operation of both machinery and tractors and draught animals. Safety, use, maintenance, adjustment, calibration, and repair of the agricultural equipment and machinery. Performance of different farm power units and implements; factors determining their selection; their efficient use; and maintenance major types of tillage equipment; field capacity of various sizes of tillage equipment; Operate tillage equipment safely under field and transport conditions; Calibration of planting, fertiliser, herbicide and insecticide application rates under field conditions; pest control and chemical application equipment; major types of sprayers and pumps; methods of harvesting crops; potential field capacity for various sizes of harvesting equipment; harvest losses; harvesting equipment; machinery costs and other farm costs; power requirements for various types of machinery based on needed capacity and available time. Agricultural/farm processing equipment – Grinding, Cutting, Mixing and residue disposal. Material handling. Special farm and livestock equipment. Dairy machinery. Agricultural Machinery Management: costing, maintenance and machinery management

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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### F3701TE IRRIGATION THEORY AND PRACTICE

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<b>Module Title:</b>	<b>IRRIGATION THEORY AND PRACTICE</b>
<b>Module Code:</b>	F3701TE
<b>NQF Level</b>	7
<b>Notional hours</b>	80
<b>Contact Hours:</b>	02 Lecture hours / week / semester; 02 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	1

#### Module Content

Water Resources; Irrigation principles: Evapo-transpiration, plant-soil-water relationship, Irrigation Agronomy, Crop water requirements, Irrigation scheduling, irrigation efficiencies. Problem soil management and reclamation, Engineering: Planning and irrigation project, Land grading and field layout, choosing an irrigation method, Structures and equipment used in irrigation, measurement of irrigation water and delivery rates. Irrigation methods: Irrigation Operation and management of Surface irrigation, sprinkler irrigation and Trickle/drip irrigation border, check basin, furrow; Drainage of irrigated land: Environmental concerns related to irrigation and drainage. Alternatives to irrigation: water harvesting Robotics: use of robotics, automation and precision agriculture, use of drones for soil and field analysis for irrigation and fertigation.

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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### SEMESTER 2

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### F3722TF SOIL MECHANICS AND CULTIVATION

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<b>Module Title:</b>	<b>SOIL MECHANICS AND CULTIVATION</b>
<b>Module Code:</b>	F3722TF
<b>NQF Level</b>	7
<b>Notional hours</b>	80
<b>Contact Hours:</b>	02 Lecture hours / week /semester; 02 Practical hours / week / semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Module Content

Dynamics of Soil: History of tillage and traction, Stress and strain in soil, Soil strength, Two and three-dimensional stresses, Principal stresses, Active and passive earth pressure, Stretching of soil, Compression of soil, Emphasis on particulate mechanics. Mechanics of tillage tools: Forces acting on tillage tool, draft computation, Acceleration forces in soil, Development of theoretical equations, Work of different researchers, Similitude in tillage. Traction: Soil linkage, Traction theory, Bokker's contribution, rolling resistance. Deformation and strength of bodies of soil; mechanical properties of the soil materials and the application of the knowledge of these properties to engineering problems: shear strength tests; structure-foundation interaction of earth dams, buildings, embankments, roads, cultivation and the manipulation of the soil to produce an environment which is satisfactory for crop development, drainage and mechanization operations in agriculture.

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written

assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

<b>F3712TG SOIL AND WATER CONSERVATION ENGINEERING</b>	
<b>Module Title:</b>	<b>SOIL AND WATER CONSERVATION ENGINEERING</b>
<b>Module Code:</b>	F3712TG
<b>NQF Level</b>	7
<b>Notional hours</b>	160
<b>Contact Hours:</b>	04 Lecture hours / week / semester; 03 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3701TE
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Module content

Soil and water conservation principles, The soil erosion system; Classes, types and forms of soil erosion. Measurements of water erosion and wind erosion. Engineering principles of soil and water conservation: Estimation of Soil Loss, The Universal Soil Loss Equation (USLE), Revised Universal Soil Loss Equation (RUSLE), Modified Universal Soil Loss Equation (MUSLE); erosion control, soil conservation planning. Soil water and nutrient conservation; soil management and reclamation; Methods of estimation of runoff. Ground water recharge and water harvesting, Water Pollution. Standards of Water Quality for Different Uses, National Water Quality Monitoring Programme, Case Study-Watershed Modelling for Soil and Water Conservation and Water Quality; Hydrological Modelling for Future Water Quantity Assessment. Water quality analysis and management. Sediment transport concept. Drainage principles, design of drainage system tiles, ditches, pipes and construction. Design Criteria of Gully Control Structures; Tillage Practices; Waterways, Design of Terraces and other conservation structures, Contour bunds, water ways, stream bank protection. Design of in-situ water harvesting structures, Design, construction and maintenance of earth canals, lined canals, channels. Silt traps and sediment basins. Types of reservoirs/dams. Design criteria – Location of reservoirs, Site investigations (Geological, Soil (texture, hydraulic conductivity, and seepage), Demand, Catchment area, Reservoir volume, Useful life). Design, construction and management of drop boxes, siphons and energy dissipation structures earth ponds, earth dams – stability analysis, seepage, core, anchorage, and spillway. Gender considerations in soil and water conservation engineering. Environmental Impact assessment.

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

<b>F3742TH PROJECT PLANNING AND MANAGEMENT</b>	
<b>Module Title:</b>	<b>PROJECT PLANNING AND MANAGEMENT</b>
<b>Module Code:</b>	F3742TH
<b>NQF Level</b>	8
<b>Notional hours</b>	80
<b>Contact Hours:</b>	02 Lecture hours / week / semester; 02 Practical hours / week / semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	I3601IE
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Module Content

The module includes topics such as: planning process, project cycle, logical framework, financial and economic analysis of project; Project feasibility and appraisal techniques (payback period, the time value of money, Net Present Value, Benefit cost Ratio, and Internal Rate of Return), and sensitivity analysis; Project monitoring and evaluation, leadership, control, and the problems of identifying project costs and benefits and dealing with sustainability in project implementation

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

<b>F3732TI IRRIGATION AND DRAINAGE DESIGN ENGINEERING</b>	
<b>Module Title:</b>	<b>IRRIGATION AND DRAINAGE DESIGN ENGINEERING</b>
<b>Module Code:</b>	F3732TI
<b>NQF Level</b>	7
<b>Notional hours</b>	160
<b>Contact Hours:</b>	04 Lecture hours / week / semester; 03 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3701TE; F3712TG
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

### Module content

Engineering principles and design of both surface and pressurised irrigation systems, design of surface and subsurface drainage systems including crop water requirements surface irrigation, sprinkler irrigation, drip irrigation, Cropping programme, Soil water balance. Introduction to agro-meteorology Measurement, collection and processing of climatic data. Definition, concepts, measurements and computation of reference (ET<sub>o</sub>) and crop (ET<sub>c</sub>). Irrigation: Gross and net irrigation requirement; Irrigation efficiencies; field and scheme water supply. Irrigation depth and interval; real time scheduling; planning irrigation schedules.; Pipe sizing; Pumps; Pump performance; Pump selection; irrigation canals, irrigation wells. Irrigation in arid and semi-arid humid areas. Sources of irrigation water; Type of irrigation systems; Irrigation system planning; Performance of irrigation systems; advantages and limitations; Uniformity of water application; Design standards; Types, system components; Design criteria; automation to irrigation system management; Micro irrigation benefits and problems; Sub irrigation (seepage) systems; Seepage methods; Seepage irrigation process; Design of irrigation structures: systems layout; overhead systems design; micro-irrigation systems design; emission uniformity criteria in designs; pumping stations design; crop-salt tolerance; water quality; leaching requirements; bill of quantities and cost estimates; economic assessment of alternative options; irrigation agronomy; Drainage: Drainage principles types and specifications, design factors, planning and layout, installation, maintenance and machinery requirements. Drainage problems and improvement needs in Namibia. Management of irrigation systems. Gender considerations in planning, design, selection and management of irrigation and drainage systems.

### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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### I3762NH HEAT TRANSFER

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<b>Module Title:</b>	<b>HEAT TRANSFER</b>
<b>Module Code</b>	I3762NH
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 1 Tutorial and/or 1PS/Week/semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

### Module Content

Principles: conduction, convection, and radiation. Conduction: Thermal conductivity. Steady state and transient one- dimensional conduction. Forced external Convection: drag and heat transfer in external flows, parallel flow over flat plates and across tube banks. Forced internal Convection: average velocity and temperature, entrance region laminar and turbulent flows. and natural convection: equation of motion and the Grashof number, natural convection over surface. Radiation: Black and grey body thermal radiation. Thermal insulation. Lagging materials. Heat transfer from finned surfaces: fin equation, efficiency, effectiveness. Boiling: pool boiling. Evaporation: film evaporation on the vertical wall. Condensation: film condensation on the vertical wall. Heat exchangers: types, energy balance, analysis, design. Lab practical.

### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities and a final examination
2. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 3 assignments): 10%
  - ii) Practical reports (At least 1 practical lab and 1 mini-design project): 15%
  - iii) Tests (At least 2 tests): 25%

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## H.6 FOURTH YEAR

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### SEMESTER CORE

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### F3800TE ENGINEERING ETHICS AND PRACTICE

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<b>Module Title:</b>	<b>ENGINEERING ETHICS AND PRACTICE</b>
<b>Module Code</b>	F3800TE
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lectures + 2 Tutorial or 2PS/Week/semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

### Module Content

The lecturer will present and discuss the following topics with students and use examples and case studies to reinforce the concepts: Engineering Profession Act, 1986 (Act 18 of 1986), as amended in 1991: Categories of engineering professions; procedure and requirements for registration of professional engineers and engineers in training; conduct of practicing engineers, overview of regulations partaking to engineering practice and codes of conduct. Role of Engineering and Agricultural Associations: Engineers Professions Association (EPA); Association of Consulting Engineers in Namibia (ACEN), Namibia National Farmers Union (NNFU), Namibia Agricultural Union (NAU) and Namibia Emerging Commercial Farmers' Union. Statement of Ethical Principles for engineering

professionals: Engineering professionals work to enhance the wellbeing of society. In doing so, they are required to maintain and promote high ethical standards and challenge unethical behaviour. Honesty and integrity: Engineering professionals have a duty to uphold the highest standards of professional conduct including openness, fairness, honesty and integrity. Respect for life, law, the environment and public good: Engineering professionals have a duty to obey all applicable laws and regulations and give due weight to facts, published standards and matters of wider public interest. Accuracy and rigour: Engineering professionals have a duty to acquire and wisely use knowledge and skills to perform their roles with care and accuracy in the engineering discipline in which they are currently competent, regularly update their knowledge and skills and present their views objectively and without bias. Leadership and communication: Engineering professionals have a duty to abide by and promote high standards of leadership and communication, promote public awareness and understanding of the impact and benefits of engineering and be objective and truthful in any statement made in their professional capacity.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Assignments (At least 3 assignments): 40%
  - ii) Tests (At least 3 tests): 60%
4. No Examination
5. To pass this course a student should obtain a minimum final mark of 50%.

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#### F3820TI INDUSTRIAL ATTACHMENT

<b>Module Title :</b>	<b>INDUSTRIAL ATTACHMENT</b>
<b>Module Code:</b>	F3820TI
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Total Hours:</b>	Six (6) hours/day x 5 days/week) x 6 weeks
<b>Additional learning requirements</b>	None
<b>NQF Credits (Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	1

#### Module content

Industrial Attachment: students will work under company supervision at the level of Technologist. Trainee and will undertake at least six months of attachment at an appropriate industry for hands-on practical training. Students will maintain a logbook of daily activities and will be required to submit a comprehensive final report for assessment at the beginning of the following semester. Students will be visited at their workplaces by their Lecturers at least once during attachment.

#### Student Assessment Strategies

1. Students will be assessed through continuous assessments activities
2. The final mark will be made of 100% Continuous Assessment
3. The Continuous Assessment will be made up of the following assessment activities:
  - i) Daily Logbook Record: 20%
  - ii) Lecturer/Employer, Evaluation: 20%
  - iii) Final Report -Written report and presentation: 60%

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#### F3840TR RESEARCH PROPOSAL AGRICULTURAL ENGINEERING

<b>Module Title:</b>	<b>RESEARCH PROPOSAL AGRICULTURAL ENGINEERING</b>
<b>Module Code</b>	F3840TR
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 hours lectures / week/ semester; 2 hour tutorial sessions / week / semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3710TA
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 0

#### Module Content

Research Proposal: Written proposal, and oral presentation; Seminars: Departmental seminar (at least one) as determined by the Departmental students' research committee; Final Presentation: At least a 15 minute oral presentation of the research results; Final Report: Full Report-Literature review relevant to the problem, methodology.

#### Student Assessment Strategies

The modules will be assessed by means of continuous assessment only weighted as follows: Proposal presentation 10%, marked proposal report 10%, At least one seminar presentation 10 %, Final research presentation 20%, Final report write-up 50%. Pass mark for the module is 50%.

#### SEMESTER ONE

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#### F3821TE RENEWABLE ENERGY AND APPROPRIATE TECHNOLOGY

<b>Module Title:</b>	<b>RENEWABLE ENERGY AND APPROPRIATE TECHNOLOGY</b>
<b>Module Code:</b>	F3821TE
<b>NQF Level</b>	8

<b>Notional hours</b>	80
<b>Contact Hours:</b>	02 Lecture hours / week / semester; 02 Practical hours / alternate week / semester
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	8
<b>Pre-requisite(s):</b>	13502EE
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Module content

Current energy demands: environmental effects, Conventional & non-conventional energy sources in farm, forms of energy; Energy: Africa & World; Engineering intervention for production and productivity; Merits and limitations of different power sources; classification; Energy farming. Fundamentals of various sources of renewable energy and their applications renewable energy resources: concentrated solar plant (CSP), thermal solar, wind, hydro, geothermal, bioenergy, magneto-hydrodynamics (MHD), tidal, ocean thermal and wave energies. Solar (thermal and photovoltaic), fuel cells, hydroelectric, bio-energy, wind energy, tidal power, wave energy, geothermal energy, ocean thermal, heat pump systems. Wind Power generation. Construction of simple solar arrays for energy production. Comparison between renewable and nuclear energy. Mixture of energy sources. Smart grid technology. Power station economics. Sustainable development. Greenhouse gases. Energy efficiency. Biomass and Biogas: design of biogas plants, Fuels; Fermentation process for ethanol production, combustion chemistry, pre-mixed combustion, diffusion flames, induction and exhaust processes, Gasifiers, types and it's working ; Solar energy, solar constant ,Determination of solar time, measurement of solar radiation; Solar air collector, solar concentrator, Evacuated - tube collector; Solar Thermal energy application ; Solar water heating system, solar cooker; Solar pond, solar crop drying, solar house; Solar photovoltaic application: photovoltaic effect, material, course, cell temperature and its application; Wind energy, Potential, basis concept of lift and drag; Measurement of various types of wind mills and their application; design of renewable energy technologies and management: Economic aspects of energy planning.

#### Student assessment strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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### F3811TS STORAGE AND PROCESSING OF AGRICULTURAL PRODUCTS

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<b>Module Title:</b>	<b>STORAGE AND PROCESSING OF AGRICULTURAL PRODUCTS</b>
<b>Module Code:</b>	F3811TS
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Contact Hours:</b>	04 Lecture hours / week / semester; 03 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3771TD
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	1

#### Module Content

Fundamentals of postharvest technology and agro-processing. Agricultural Process Engineering. Postharvest handling in relation to final product quality; Intrinsic and extrinsic factors; Food waste vs. losses, types of losses; Postharvest system, Physical and Chemical Structure of Agricultural products; Physiology of respiration; Maturity Indices; Fruit maturation and development, senescence processes. Causes of losses e.g. physiological changes, mechanical damage, pests and diseases. Equipment for drying processing and storage. Conservation techniques for horticultural crops. Principles of drying: psychrometry – Drying curves –Heat and mass transfer in dryers. Drying models – Drying methods and types of dryers. Agricultural Equipment used for Processing of agricultural crops: Threshers. Grinders, cutters, mixers, residue disposers, Shellers. Millers. Threshing and shelling efficiency Oil Expressers Rice threshers. Equipment for Handling and storage of horticultural and perishable Crops: Handling system and environment Material handling equipment: Material movement into and within storage structures for large scale structures: Folk lift, Screw conveyor, Belt conveyor, Bucket elevator, Pneumatic conveyors. Farm transport, materials handling and processing structures and equipment. Design of Agricultural Processing Engineering and Food Engineering. Storage: Storage principles, Types of farm storage structures: Silos, sheds, warehouses and open stacks, bunkers, Management of storage facilities. Stacking and movement of commodities. Storage losses including loss assessment methods and control measures. Pre-treatments of horticultural produce; Packaging, storage and transportation; System Designs of packinghouse, Storage structures and equipment; Design of handling equipment in relation to product characteristics; Flow processes diagram, Computer aided design in postharvest processes. Construction and management of and storage structures; Quality evaluation and grading: Chemical quality indices and evaluation; Physical quality evaluation (colour, texture); Shelf-life evaluation of fresh produce; Non-destructive quality evaluation. Application of Heat and mass transfer as applied to food and crop processing (Modes of heat transfer, governing equation and boundary conditions of heat transfer; Heat and mass balances, Heat exchangers); Air properties and psychrometry: Moisture content, equilibrium moisture content and moisture sorption isotherms; Crop processing engineering: handling, cleaning, sorting, grading, milling, separating, pre-cooling and packaging.

#### Student Assessment Strategies

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 3 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3-hour paper). The pass mark for the module is 50%.

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### F3821TP RESEARCH PROJECT

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<b>Module Title:</b>	<b>RESEARCH PROJECT</b>
<b>Module Code:</b>	F3821TP
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Contact Hours:</b>	16 hours of Research Work per week + Seminar Presentations + report writing

<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	All third-year modules
<b>Compulsory</b>	Compulsory
<b>Semester offered</b>	1 & 2

#### Module content

Execution of research project: A project of an investigation nature carried out either as an individual or as member of a small team, involving research, literature search, data collection, analysis and presentation. Students will be taught scientific writing that can be useful for their further study and academic publications. Seminars: The module will have at least three presentations of the research work to the panel. Departmental seminar (at least one) as determined by the Departmental students' research committee; Final Presentation: At least a 15 minute oral presentation of the research results. The presentation, in the form of a dissertation, is expected to include necessary technical information and to be in accordance with relevant codes of practice and guidelines for Scientific Writing, Final Report: Full Report-Literature review relevant to the problem, methodology, results for each objective, discussion, conclusion and recommendation. Students will also be encouraged to publish their findings after completing the course.

#### Student Assessment Strategies

Continuous Assessment 100% (Progress report presentation 20%; Final Oral Presentation of Research Report 20%; Final Research Report 60%).

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### F3813TD AGRICULTURAL ENGINEERING DESIGN PROJECT

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<b>Module Title:</b>	<b>AGRICULTURAL ENGINEERING DESIGN PROJECT</b>
<b>Module Code:</b>	F3813TD
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Contact Hours:</b>	14 hours of Research Work per week + Seminar Presentations + report writing
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	16
<b>Assessment</b>	
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	All 3rd Year Courses
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	1 & 2

#### Module Content

This module provides students with opportunities to exercise and demonstrate their ability to co-ordinate their knowledge, experience and judgment in addressing major agricultural engineering design projects and presenting their proposed solutions in a concise technical manner. Introduction to agricultural engineering design: problem definition and design specification information search, idea generation and development of design concepts. Design techniques and project management methods, safety, cost estimating, and project scheduling. Time management, patents, engineering design as an iterative, parallel activity process. Understanding design as a pragmatic combination of scientific theory, technical skills, people talents and art to create solutions to problems. Philosophy of design: Components of design. Design process: major agricultural engineering design projects Modelling Software to make master model, 2D manufacturing drawing from master model. The students will be assisted to go through the practical design process, fabrication and testing of prototypes. The designs should be accompanied with manual and/or computer-generated engineering drawings or computer source codes consistent with professional engineering practice. The design process will be conducted under the guidance of a supervisor, Prototype of chosen final design produced: Intellectual property rights and patent development, Fitness of product is conducted.

#### Student Assessment Strategies

Continuous Assessment: (100% (Two Seminar Presentations of design (20%); Final Oral Presentation of Design Report (20%); Final Design Report (60%))]

### SEMESTER 2

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### F3812TM FARM MACHINERY AND IMPLEMENT DESIGN

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<b>Module Title:</b>	<b>FARM MACHINERY AND IMPLEMENT DESIGN</b>
<b>Module Code:</b>	F3812TM
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Contact Hours:</b>	04 Lecture hours / week / semester; 03 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursion
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3771TD
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Module Content

Introduction to the engineering design, problem definition and design specification information search, idea generation and development of design concepts. Design techniques and project management methods, safety, cost estimating, and project scheduling. Time management, patents, engineering design as an iterative, parallel activity process. Understanding design as a pragmatic combination of scientific theory, technical skills, people talents and art to create solutions to problems. Philosophy of design. Components of design. Agricultural machines; types, design and functional requirements. Engineering materials. Stress and deflection analysis. Theories of failure. Design against failure. Detachable fasteners. Power screws. Shafting design. Mechanical power transmission: gear drives, belt drives, chain drives, ropes and hoists, springs. Bearings, welding, brakes, clutches and couplings. Vibrations. Design process, Modelling Software to make master model, 2D manufacturing drawing from master model. Group/Team makes new components using structures design methodology. Design to conform to specific criteria (cost, quality, safety, durability and function), Generate 3D Digital Mock-ups

and 2D manufacturing drawings using 3D CAD Modelling software. Prototype of chosen final design produced. Intellectual property rights and patent development, Fitness of product is conducted. Signal conditioning, analog devices, data acquisition and sampling, fundamental sensor applications and controls.

#### Student assessment strategies

The assessment will be 100% Continuous constituting of the following: Two Seminar Presentations of design (20%); Final Oral Presentation of Design Report (20%); Final Design Report (60%)

To pass this module a student should obtain a minimum final mark of 50% and also meets the ECN exit level outcome 1, 3, 6

<b>F3812TF FARM STRUCTURES PLANNING AND DESIGN</b>	
<b>Module Title:</b>	<b>FARM STRUCTURES PLANNING AND DESIGN</b>
<b>Module Code:</b>	F3812TF
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Contact Hours:</b>	04 Lecture hours / week / semester; 03 Practical hours / week / semester
<b>Additional learning requirements</b>	Field excursion
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	13651VM
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Module content

Introduction to agricultural structures ; Developments in farm structures, Design characteristics of buildings and economic feasibility; Farmstead planning and layout; Map reading, measuring and levelling techniques, Site selection; Building arrangement in relation to other structures and farm; Types and properties of building materials; Selection of materials in relation to use; Steel, Wood, Concrete , Masonry, Metals, Plastic, Bricks, Manufactured boards, and other materials; Types of structural frames. Estimating loads, Types of loads on buildings; Stress analysis. Introduction to structural design: - philosophy of design; Elastic and plastic design concepts. Reinforced concrete design. Design for axial loadings. Components of farm structures; Building Footings, foundations, Walls, and floor, of beams, slab, columns, trusses, frames, connections and joints, roofs. Computer concept for improved analysis and design. Design project. Design and construction of agricultural structures – Drying and storage structures for different agricultural farm products and food storage structures, Specialized farm structures, family housing, Livestock housing units, Poultry units, dairy, piggery unit, Greenhouses, Farm workshop, Machinery storage, Fuel and chemical storage, Handling facilities for cattle, dairy, poultry and piggery. Management, Care and maintenance of different farm structures. Economic feasibility of farm buildings, Bills of quantities, estimating materials and cost of constructing various structures, Planning, layout, costing and construction of farm buildings. Ventilation in farm buildings and farm electricity, Waste management, Environmental consideration in design - Heat transfer, thermal resistance and solar heat load.

#### Student Assessment Strategies

The assessment will be 100% Continuous constituting of the following: Two Seminar Presentations of design (20%); Final Oral Presentation of Design Report (20%); Final Design Report (60%)

To pass this module a student should obtain a minimum final mark of 50% and also meets the ECN exit level outcome 1, 3, 6

<b>F3821TP RESEARCH PROJECT</b>	
<b>Module Title:</b>	<b>RESEARCH PROJECT</b>
<b>Module Code:</b>	F3821TP
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Contact Hours:</b>	16 hours of Research Work per week + Seminar Presentations + report writing
<b>Additional learning requirements</b>	Field excursions
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	All third-year modules
<b>Compulsory</b>	Compulsory
<b>Semester offered</b>	1 & 2

#### Module content

Execution of research project: A project of an investigation nature carried out either as an individual or as member of a small team, involving research, literature search, data collection, analysis and presentation. Students will be taught scientific writing that can be useful for their further study and academic publications. Seminars: The module will have at least three presentations of the research work to the panel. Departmental seminar (at least one) as determined by the Departmental students' research committee; Final Presentation: At least a 15 minute oral presentation of the research results. The presentation, in the form of a dissertation, is expected to include necessary technical information and to be in accordance with relevant codes of practice and guidelines for Scientific Writing, Final Report: Full Report- Literature review relevant to the problem, methodology, results for each objective, discussion, conclusion and recommendation. Students will also be encouraged to publish their findings after completing the course.

#### Student Assessment Strategies

Continuous Assessment 100% (Progress report presentation 20%; Final Oral Presentation of Research Report 20%; Final Research Report 60%).

<b>F3813TD AGRICULTURAL ENGINEERING DESIGN PROJECT</b>	
<b>Module Title:</b>	<b>AGRICULTURAL ENGINEERING DESIGN PROJECT</b>
<b>Module Code:</b>	F3813TD
<b>NQF Level</b>	8
<b>Notional hours</b>	160
<b>Contact Hours:</b>	14 hours of Research Work per week + Seminar Presentations + report writing
<b>Additional learning requirements</b>	Field excursions

<b>NQF Credits</b>	16
<b>Assessment (Co-requisites)</b>	
<b>Prerequisite</b>	All 3rd Year Courses
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester offered</b>	1 & 2

#### **Module Content**

This module provides students with opportunities to exercise and demonstrate their ability to co-ordinate their knowledge, experience and judgment in addressing major agricultural engineering design projects and presenting their proposed solutions in a concise technical manner. Introduction to agricultural engineering design: problem definition and design specification information search, idea generation and development of design concepts. Design techniques and project management methods, safety, cost estimating, and project scheduling. Time management, patents, engineering design as an iterative, parallel activity process. Understanding design as a pragmatic combination of scientific theory, technical skills, people talents and art to create solutions to problems. Philosophy of design: Components of design. Design process: major agricultural engineering design projects Modelling Software to make master model, 2D manufacturing drawing from master model. The students will be assisted to go through the practical design process, fabrication and testing of prototypes. The designs should be accompanied with manual and/or computer-generated engineering drawings or computer source codes consistent with professional engineering practice. The design process will be conducted under the guidance of a supervisor, Prototype of chosen final design produced: Intellectual property rights and patent development, Fitness of product is conducted.

#### **Student Assessment Strategies**

Continuous Assessment: (100% (Two Seminar Presentations of design (20%); Final Oral Presentation of Design Report (20%); Final Design Report (60%))

# I. BACHELOR OF SCIENCE IN FOOD SCIENCE (31BSFT)

## I.1 PROGRAMME SCHEDULE

Course code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisites)/ Pre-requisites	Contact hours per week (L/P/T)
<b>Year 1 Core Semester</b>						
U3583AL	Academic Literacy IB	5	8	C	None	40 hours
U3403FS	Skills Portfolio	4	0	C	None	
U3583DD	Digital Literacy	4	8	C	None	Sem 0: 4hr/wk Sem 1: 2hr/wk Sem 2: 2hr/wk
F3500EE	Issues in Agriculture	4	4	E	None	20 hr
F3520ZP	Basic Programming with Python	5	4	E	None	20 hr
<b>Total Credits Core Semester</b>			<b>24</b>			
<b>Year 1 Semester 1</b>						
S3531CG	Introductory Physical and Inorganic Chemistry	5	14	C	None	L (4hr/wk), P (1hr/wk)
S3511MC	Calculus 1	5	12	C	None	L (4hr/wk), T (2hr/wk)
P3511PG	General Physics I	5	14	C	None	L (4hr/wk), P/T (1hr/wk)
S3511BB	Foundations of Biochemistry and Biology	5	14	C	None	L(4hr/wk, P(1hr/week)
<b>Total Credits Semester 1</b>			<b>54</b>			
<b>Year 1 Semester 2</b>						
S3532CG	Introductory Analytical and Organic Chemistry	5	14	C	None	L (4hr/wk), P (1hr/wk)
S3512ST	Statistical Methods	5	12	C	None	L (4hr/wk), T (1hr/wk)
F3512SH	Human Nutrition	5	13	C	None	L (4hr/wk), P (3hr/alt. wk)
F3512SP	Food Processing and Technology	5	13	C	None	L (4hr/wk), P (1hr/alt. wk)
<b>Total Credits Semester 2</b>			<b>52</b>			
<b>Total credits Year 1</b>			<b>130</b>			
<b>Year 2 Core Semester</b>						
U3683AL	Academic Literacy II	6	8	C	None	L(4hr/wk)
U3520LP	Leadership Skills	5	2	C	None	L(2hr/wk)
U3420CN	National and Global Citizenship	4	2	C	None	L(2hr/wk)
U3420PJ	Project Management Skills	5	2	C	None	L(2hr/wk)
F3600ZP	Introduction to Statistical Programming with R	6	8	C	None	L(4hr/wk)
U3420SE	Sustainability and Environmental Awareness	4	2	C	None	L(2hr/wk)
<b>Total Credits Core Semester</b>			<b>24</b>			
<b>Year 2 Semester 1</b>						
F3611SG	General Microbiology	6	15	C	None	L (4hr/wk), P (3hr/alt. wk)
F3611AB	Biochemistry	6	16	C	S3511BB: Foundation of Biology and Biochemistry	L (4hr/wk), P (3hr/wk)
F3601SP	Postharvest Technology	6	7	C	None	L (2hr/wk), P (3hr/alt. wk)
F3611SM	Meat Science and Technology	6	15	C	None	L (4hr/wk), P (3hr/alt. wk)
<b>Total Credits Semester 1</b>			<b>54</b>			
<b>Year 2 Semester 2</b>						

F3612SD	Dairy Science and Technology	6	15	C	F3512SP: Food and Processing Technology	L (4hr/wk), (3hr/alt. wk)	P
F3612SS	Sea Foods Technology	6	15	C	None	L (4hr/wk), (3hr/alt. wk)	P
F3612SE	Food Engineering 1	6	15	C	S3511MS: Mathematics Support I	L (4hr/wk), (2hr/alt. wk)	P/T
F3602SW	Workplace Attachment Preparation	6	8	C	None	L (2hr/wk)	
<b>Total Credits Semester 2</b>		<b>53</b>					
<b>Year 2 Total Credits</b>		<b>130</b>					
<b>Year 3 Core Semester</b>							
W3710SW	Workplace Attachment	7	24	C	None	8 weeks	
<b>Total Credits Core Semester</b>		<b>24</b>					
<b>Year 3 Semester 1</b>							
F3711SF	Fruits and Vegetable Technology	7	17	C	F3601SP: Postharvest Technology	L (4hr/wk), (3hr/alt. wk)	P
F3701SM	Food Microbiology	7	8	C	F3611SG: General Microbiology	L (2hr/wk), (3hr/alt. wk)	P
F3711SC	Food Chemistry	7	17	C	F3611AB: Biochemistry	L (4hr/wk), (3hr/alt. wk)	P
F3701SB	Food Biotechnology	7	8	C	None	L (2hr/wk), (3hr/alt. wk)	P
<b>Total Credits Semester 1</b>		<b>50</b>					
<b>Year 3 Semester 2</b>							
F3712AB	Biometry	7	16	C	S3512ST: Statistical Methods	L(4hr/wk), (2hr/wk)	T
F3702SP	Product Development	7	9	C	F3512SP: Food Processing and Technology	L(2hr/wk), (2hr/wk)	P
F3712SS	Food and Sensory Analysis	7	17	C	F3711SC: Food Chemistry	L(4hr/wk), (3hr/alt. wk)	P
F3702SE	Food Engineering II	7	9	C	F3612SE: Food Engineering I	L (2hr/wk), (2hr/ wk)	P/T
<b>Total Credits Semester 2</b>		<b>51</b>					
<b>Year 3 total credits</b>		<b>125</b>					
<b>Year 4 Core Semester (22 credits)</b>							
F3880AD	Design thinking	8	8	C	None	L(2hr/wk)	
F3880AP	Research proposal	8	14	C	None	L(4hr/wk)	
<b>Total Credits Core Semester</b>		<b>22</b>					
<b>Year 4 Semester 1</b>							
F3811SE	Food Entrepreneurship and Management	8	18	C	None	L (4hr/wk), (2hr/alt. wk)	T
F3801SQ	Quality Management Systems	8	9	C	None	L (2hr/wk), (2hr/alt. wk)	P
F3811ST	Food Toxicology	8	19	C	Noe	L (4hr/wk), (3hr/alt. wk)	P
F3883SR	Research Project	8	8	C	F3810SR: Research Proposal; F3712CB: Biometry	L(2hr/wk)	
<b>Total Credits Semester 1</b>		<b>54</b>					
<b>Year 4 Semester 2</b>							
F3802SB	Beverage Science and Technology	8	9	C	None	L (2hr/wk), (3hr/alt. wk)	P
F3883SR	Research Project	8	8	C	F3810SR: Research Proposal; F3712CB: Biometry	L(2hr/wk)	
F3812SG	Grains and Cereals Processing	8	19	C	F3601SP: Postharvest technology; F3711SC: Food Chemistry	L (4hr/wk), (3hr/alt. wk)	P
F3812SO	Oilseeds Processing Systems	8	19	C	F3711SC: Food Chemistry; F3512SP: Food Processing Technology	L (4hr/wk), (3hr/alt. wk)	P
<b>Total Credits Semester 2</b>		<b>55</b>					
<b>Year 4 total credits</b>		<b>131</b>					
<b>TOTAL CREDITS FOR THE PROGRAMME</b>		<b>516</b>					

Extended Enrolment

NSSCAS Biology, Physics/Chemistry & NSSCO Mathematics

This option caters for students that has the required NSSCAS Biology and NSSCAS Physics/Chemistry, but not Mathematics  
Physics/Chemistry, but not Mathematics

Year	Core Semester	Level	Cr	Semester 1	Level	Cr	Semester 2	Level	Cr
Y1	Skills portfolio	5	0	Introductory Physical & Inorganic Chemistry	5	14	Introductory Analytical & Organic Chemistry	5	14
	Academic literacy I	5	8	Mathematics Support I	4	NCB	Mathematics Support II	4	NCB
	Digital literacy	5	8	General Physics I	5	14	Human Nutrition	5	13
	Introduction to Statistical Programming with python	5	4	Foundations of Biochemistry & Biology	5	14	Food Processing & Technology	5	13
	Issues in Agriculture	5	4						
			<b>24</b>			<b>42</b>			<b>40</b>
Y2	Academic Literacy II	6	8	General Microbiology	6	15	Dairy Science & Technology	6	15
	Introduction to programming with R School Specific (Elective)	6	8	Biochemistry	6	16	Seafood Technology	6	15
	Leadership	6	2	Postharvest Technology	6	7	Statistical Methods	5	12
	National and global citizenship	6	2	Calculus I	5	12	Workplace Attachment preparation	6	8
	Project management	6	2						
	Sustainability and Environmental Awareness	6	2						
			<b>24</b>			<b>38</b>			<b>50</b>
Y3	Workplace Attachment 8 weeks Mid-January to Middle March	7	24	Food Microbiology	7	8	Biometry	7	16
				Food Chemistry	7	17	Food & Sensory Analysis	7	17
				Food Biotechnology	7	8	Food Engineering 1	7	15
				Meat Science and Technology	6	15	Beverage Science & Technology	8	9
			<b>24</b>			<b>48</b>			<b>57</b>
Y4	Design Thinking	8	8	Quality Management Systems	8	9	Grains & Cereals Processing	8	19
				Food Toxicology	8	19	Food Engineering II	7	9
				Fruits and Vegetable Technology	7	17	Product development	7	9
			<b>8</b>			<b>45</b>			<b>37</b>
Y 5	Research Proposal	8	14	Food Entrepreneurship and Management Research Project	8	18	Oilseeds Processing Systems	8	19
					8	8	Research Project	8	8
			<b>14</b>			<b>26</b>			<b>27</b>
									<b>Total: 516</b>

NSSCAS Mathematics, Physics/Chemistry & NSSCO Biology

This option caters for students that has the required NSSCAS Mathematics and NSSCAS Physics/Chemistry, but not Biology

Year	Core Semester	Level	Cr	Semester 1	Level	Cr	Semester 2	Level	Cr
EY1	Skills portfolio	5	0	Introductory Physical & Inorganic Chemistry	5	14	Introductory Analytical and Organic Chemistry	5	14
	Academic literacy I	5	8	Calculus I	5	12	Statistical Methods	5	12
	Digital literacy	5	8	General Physics I	5	14	Human Nutrition	5	13
	Introduction to Statistical Programming with python	5	4	Biology Support	4	NC B	Food Processing & Technology	5	13
	Issues in Agriculture	5	4						
			<b>24</b>			<b>40</b>			<b>52</b>
EY2	Academic Literacy II	6	8	General Microbiology	6	15	Dairy Science & Technology	6	15
	Introduction to programming with R School Specific (Elective)	6	8	Postharvest Technology	6	7	Seafood Technology	6	15
	Leadership	6	2	Meat Science and Technology	6	15	Food Engineering 1	6	15
	National and global citizenship	6	2	Foundations of Biochemistry and Biology	5	14	Workplace Attachment preparation	6	8
	Project management	6	2						
	Sustainability and Environmental Awareness	6	2						
			<b>24</b>			<b>51</b>			<b>53</b>
EY3	Workplace Attachment 8 weeks Mid-January to Middle March	7	24	Fruits and Vegetable Technology	7	17	Biometry	7	16
				Food Microbiology	7	8	Product development	7	9
				Food Biotechnology	7	8	Food Engineering II	7	9
				Biochemistry	6	16			
			<b>24</b>			<b>49</b>			<b>34</b>
EY4	Design Thinking	8	8	Quality Management Systems	8	9	Beverage Science & Technology	8	9
				Food Toxicology	8	19	Grains & Cereals Processing	8	19
				Food Chemistry	7	17	Food & Sensory Analysis	7	17
			<b>8</b>			<b>45</b>			<b>45</b>
EY5	Research Proposal	8	14	Food Entrepreneurship and Management	8	18	Oilseeds Processing Systems	8	19
				Research Project	8	8	Research Project	8	8
			<b>14</b>			<b>26</b>			<b>27</b>
									<b>Total: 516</b>

## I.2 MODULE DESCRIPTORS

### I.3 FIRST YEAR

#### S3411TM

#### BIOLOGY SUPPORT

Module Title:	BIOLOGY SUPPORT
Module Code	S3411TM
NQF Level	4
Notional Hours	140
Additional learning requirements	None
Contact Hours	4 lectures and one 3-hour practical session per week for the semester
NQF Credits	14/NCB

<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/ Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

This is an introductory biology module that is designed to allow students to acquire a strong foundation into the biological sciences.

The following topics will be covered:

The 5 common themes of life (biological organization, genetic information, energy and matter, interactions with organisms and their physical environment and evolutionary adaptation). Introduction to systems of classification (systematics, including hierarchical, artificial, phenetic and phylogenetic classification); Basic techniques in biology such as microscopy: biological drawing, the scientific method and writing of scientific reports will be covered; Chemical basis of life: water, carbon, carbohydrates, proteins, nucleic acids, lipids and fats ; Cell biology: prokaryotic and eukaryotic cells, ultra-structure of plant and animal cells, cytoskeleton. Membrane structure and function, Cellular communication: Signalling molecules, signal reception, transduction and response. Mitosis and meiosis: cell cycle and stages of each process. Mendelian genetics: Genes, chromosomes, genomes, introduction to Mendelian genetics, chromosome theory of inheritance.

#### Student Assessment Strategies

Formative Assessment:

Formative assessment will make up 50% of the module grade (Tests, Assignments, Quizzes and Practical reports)

Summative Assessment:

Examination: 1 x 3h examination at the end of the semester that counts 50% towards the final mark

Final Mark: 50% CA mark and 50% Examination mark

A subminimum of 40% in the examination is required to pass, irrespective of the final mark

To pass this Module the student must obtain a minimum final mark of 50%

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### S3411MS MATHEMATICS SUPPORT I

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<b>Module Title:</b>	<b>MATHEMATICS SUPPORT I</b>
<b>Module Code</b>	S3411MS
<b>NQF level</b>	4
<b>Notional Hours</b>	120
<b>Contact Hours</b>	4 lecture hours + 1 tutorial session per week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered:</b>	1

#### Module Content:

Sets and their combinations: Sets, equality of sets, revision of intersection, union, relative complement, de Morgan's laws and other laws of algebra of sets, proving simple tautologies, the power set, cardinality, inclusion-exclusion formula, number fields, Cartesian products, ordered pairs and relations.

Intervals on the real number line: Introduction, combinations, types of inequalities – linear, absolute value, quadratic; identification of the respective solution sets in interval form.

Matrix calculus: Definition, matrix operations, (square) matrix algebras and the laws – associativity, distributivity- that hold in them, invertible matrices.

Systems of linear equations: Linear systems and their (augmented) matrices, homogeneous and inhomogeneous systems, Gaussian row and column operations, echelon form, rank of a matrix, types of solution behaviour and how to recognise them, matrix inversion with the companion method.

The concept of function: Definition of a function, when is a relation a function?, domain and range of a real-valued function, injective, surjective, bijective functions, the inverse of a bijective function, odd or even real-functions, piecewise defined functions, introduction to function graphs, graph transformations, graphical correlates of function properties already discussed.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a minimum of 3 (three) main tests and a minimum of 3 (three) tutorial tests.

A continuous assessment mark of at least 40% is required to obtain exam admission.

One examination with a minimum duration of 3 hours and worth 50% of the final mark. A subminimum of 40% in the examination is required to pass, regardless of the final mark.

A final mark of 50% is required to pass the course.

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### S3412MS MATHEMATICS SUPPORT II

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<b>Module Title:</b>	<b>MATHEMATICS SUPPORT II</b>
<b>Module Code</b>	S3412MS
<b>NQF Level</b>	4
<b>Notional Hours</b>	120
<b>Contact Hours</b>	4 lecture hours + 1 tutorial session per week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered:</b>	2

#### Module Content:

More theory of functions: Exponentials and logarithms, the exact definitions of limit and continuity, end behaviour of a graph; differentiation, definition, product, quotient, chain rules, examples from the natural sciences.  
 Function graphs: The graphs of polynomial, rational, trigonometric, exponential, logarithmic functions.  
 Integration: Definition and basic properties of the Riemann integral, the Fundamental Theorem of calculus, integrals of simple function, integration by parts and substitution rule; applications to the computation of areas and (rotational) volumes.  
 Complex numbers: Definition and basic computations, polar coordinates, complex powers, complex roots, roots of unity, complex trigonometric, exponential, logarithmic functions, the complex plane.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a minimum of 3 (three) main tests and minimum of 3 (three) tutorial tests.

A continuous assessment mark of at least 40% is required to obtain exam admission.

One examination with a minimum duration of 3 hours and worth 50% of the final mark. A subminimum of 40% in the examination is required to pass, regardless of the final mark.

A final mark of 50% is required to pass the course.

S3411PS	PHYSICS SUPPORT I
<b>Module Title:</b>	<b>PHYSICS SUPPORT I</b>
<b>Module Code</b>	S3411PS
<b>NQF Level</b>	4
<b>Notional Hours</b>	140
<b>Contact Hours</b>	Four (4) lectures and a 3-hour practical session every second week alternating with a 1-hour tutorial session every second week per week for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	13/NCB
<b>(Co-requisites)</b>	
<b>Pre-requisites</b>	Entry requirements
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Measurement & estimation: units, unit conversions, uncertainties, significant figures; Mechanics: Kinematics in 1D & 2D, vectors, dynamics, Newton's laws, circular motion, Newtonian gravitation, work & energy, linear momentum, rotational motion, static equilibrium, fluids; Waves & Acoustics: oscillations, waves, sound; Thermodynamics: temperature, kinetic theory, heat, the laws of thermodynamics.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes, assignments, and practical reports (at least 5 gradable items).

A continuous assessment mark of at least 40% is required to gain exam admission.

One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.

A final mark of 50% is required to pass this module.

To qualify for a Supplementary Exam a final mark of 45–49% is required, subject to a subminimum of 40% in the Exam.

S3412PS	PHYSICS SUPPORT II
<b>Module Title:</b>	<b>PHYSICS SUPPORT II</b>
<b>Module Code</b>	S3412PS
<b>NQF Level</b>	4
<b>Notional Hours</b>	140
<b>Contact Hours</b>	Four (4) lectures and a 3-hour practical session every second week alternating with a 1-hour tutorial session every second week per week for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	13/NCB
<b>(Co-requisites)</b>	
<b>Pre-requisites</b>	Entry requirements
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Electricity & Magnetism: electric charge & electric field, electric potential, electric currents, DC circuits, magnetism, electromagnetic induction, Faraday's law; Electromagnetic waves & light: electromagnetic waves, light, geometric optics, wave nature of light, optical instruments; Radioactivity: radioactivity, elementary nuclear physics, effects & use of radiation.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes, assignments, and practical reports (at least 5 gradable items).

A continuous assessment mark of at least 40% is required to gain exam admission.

One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.

A final mark of 50% is required to pass this module.

To qualify for a Supplementary Exam a final mark of 45–49% is required, subject to a subminimum of 40% in the Exam.

#### PART B: MODULE DESCRIPTORS

S3431CS	CHEMISTRY SUPPORT I
<b>Module Title:</b>	<b>CHEMISTRY SUPPORT I</b>

<b>Module Code</b>	S3431CS
<b>NQF Level</b>	4
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 lecture periods and 1 practical session per week
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	NCB/14
<b>Prerequisite</b>	
<b>(Co-requisites)</b>	None
<b>Compulsory/Elective</b>	
<b>Semester Offered</b>	1

#### Module Content

Introduction: Matter, Measurement and Molecules; Stoichiometry: Calculations with Chemical Formulae and Equations; Aqueous Reactions and Solutions Stoichiometry; Electronic Structure of Atoms; Periodic Properties of the Elements and Relationships Among Elements; Basic Concepts of Chemical Bonding; Intermolecular Forces; Basic Molecular Geometry and Bonding Theories; Gases.

#### Student Assessment Strategies

Tests: A minimum of three tests which counts 70% towards the continuous assessment (CA) mark.

Laboratory Mark: Laboratory work is graded and the average counts 20 % towards the CA mark.

Tutorials: Each tutorial session is graded and counts 10% towards the CA mark.

Examination: There is a one 3hr examination at the end of the semester and counts 50% towards the final mark.

Final Mark: 50% CA mark and 50% Examination mark

To pass this course, the student must obtain a minimum final mark of 50%.

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### S3432CS CHEMISTRY SUPPORT II

<b>Module Title:</b>	<b>CHEMISTRY SUPPORT II</b>
<b>Module Code</b>	S3432CS
<b>NQF Level</b>	4
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 lecture periods and 1 practical session per week
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	NCB/14
<b>Prerequisite</b>	
<b>(Co-requisites)</b>	None
<b>Compulsory/Elective</b>	
<b>Semester Offered</b>	2

#### Module Content

Thermochemistry, Chemical Equilibrium, Entropy, Free Energy and Equilibrium, Chemical Kinetics, Acid-Base Equilibria, Additional Aspects of Aqueous Equilibria: The Common-Ion Effect, Buffer Solutions, Acid-Base Titrations, Electrochemistry, Introduction to Organic Chemistry

#### Student Assessment Strategies

Tests: A minimum of three tests which counts 70% towards the continuous assessment (CA) mark.

Laboratory Mark: Laboratory work is graded and the average counts 20 % towards the CA mark.

Tutorials: Each tutorial session is graded and counts 10% towards the CA mark.

Examination: There is a one 3hr examination at the end of the semester and counts 50% towards the final mark.

Final Mark: 50% CA mark and 50% Examination mark

To pass this course, the student must obtain a minimum final mark of 50%.

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### S3512ED DIVERSITY OF LIFE

<b>Module Title:</b>	<b>DIVERSITY OF LIFE</b>
<b>Module Code</b>	S3512ED
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact Hours</b>	4 lecture periods and one 3-hour practical per week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Phylogeny and the tree of life: Prokaryotes and Protists, Domains Bacteria: Archae and Eukarya, The Evolution of Plant and Fungal Diversity. Non-vascular and Vascular Plants: Non-vascular plant phyla: Hepatophyta, Anthocerotophyta and Bryophyta. Vascular seedless plant phyla: Lyctophyta and Pterophyta. Vascular seed plant (gymnosperms and angiosperms). Gymnosperms phyla: Gingkophyta, Cycadophyta, Gnetophyta and Conifirophyta. Angiosperm's phylum: Anthophyta. The Evolution of Invertebrate Diversity: Basal Animals, phylum: Cnidaria, Deuterostomate phyla: Echinodermata (Subphyla: Urochordata, Cephalochordata), protostomate phyla: Lophophorates, Rotifera, Mollusca, Anellida, Nematoda, and Anthropoda. The Evolution of Vertebrate Diversity: Vertebrate Evolution and Diversity key shared derived traits of the chordates and the chordate Subgroups. Animal Diversity: Characteristics of following vertebrate groups: hagfishes, lampreys, chondrichthyans, ray-finned fishes, lobe-finned fishes, amphibians, reptiles, birds, and mammals. Primate Diversity. Hominin Evolution.

#### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 50% of the Module grade (i.e., at least 8 assessed practicals [40%], 3 tests [40%] and 2 assignments, assessed as written [10%]) and seminar

presentation [10%]) and a summative assessment (end of semester examination) 50% (1x 3 hours theory paper). Pass mark for the module is 50%.

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## FIRST YEAR

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U3403FS	SKILLS PORTFOLIO
<b>Module Title:</b>	<b>SKILLS PORTFOLIO</b>
<b>Module Code</b>	U3403FS
<b>NQF Level</b>	5
<b>Notional Hours</b>	N/A
<b>Contact Hours</b>	N/A
<b>Additional Learning Requirements</b>	None
<b>NQF Credits</b>	0
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester, Semester 1 & 2

### Module Content

#### UNIT 1: Academic Planning and Goal Setting

Individual Needs and Values; Steps in Reaching a Personal Vision; Proactive Approach Towards Learning; Self-Regulated Learning; Personal and Academic Goal Setting; Receptiveness to Learning; Exploring Self-Development and Self-Awareness.

#### UNIT 2: Attitude and Motivation

Understanding Motivation; Personal Attitudes, Behaviors and Interests; Self-Reflective Process; Approaches to Dealing with Negative Factors; Class Attendance and Participation; Procrastination; Self-Reliance; Discipline; Accountability; Healthy Habits.

#### UNIT 3: Learning styles

Understanding Personal Approaches to Learning; Dynamics of The Learning Process; Learning Styles and Strategies.

#### UNIT 4: Study Methods and Skills

Study Habits and Strategies; Learning Styles and Techniques; Effective Study Methods and Skills; Note Taking; Memory and Reading Skills; Critical Thinking.

#### UNIT 5: Time Management

Effective Time Management; Planning; Decision-making; Prioritization; Setting Boundaries; Time for Self – care; Procrastination.

#### UNIT 6: Assessment Preparation

In class exercise; Test and Examination preparation; Organizing academic workload; Setting daily study goals; Staying physically active; Study groups.

#### UNIT 7: Mental well-being

Understanding mental health; Signs and indicators of poor mental health; commonly experienced mental health challenges; psychosocial stressors; Seeking professional help; Coping strategies.

#### UNIT 8: Interpersonal Communication

Effective Communication Skills; Verbal and Non-Verbal Communication; Listening Skills; Problem Solving; Assertiveness; Negotiation Skills; Practicing Empathy in Communication; Self-Confidence; Receptiveness to Feedback; Building Trust; Teamwork; Leadership; Public Speaking Skills.

#### UNIT 9: Financial matters and management

Financial Literacy; Budgeting; Available Finance Options and Assistance; Managing Financial Resources.

#### UNIT 10: Student Violence

Types of Violence; Individual Roles in Violence; Myths, Forms; Consequences of Violence; Prevention Measures; Seeking for Help.

#### UNIT 11: Career Planning and Development

Defining and Selecting Career Goals; Career Exploring Different Strategies; Soft Skills Training.

### Student Assessment Strategies

100% continuous assessment

Reflective journal on each unit (portfolio)

Learning and Teaching Enhancement Strategies

Student – lecturer evaluations, conducted twice a year

Moderation of assessment tools

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U3583AL	ACADEMIC LITERACY IB
<b>Module Title:</b>	<b>ACADEMIC LITERACY IB</b>
<b>Module Code</b>	U3583AL
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Contact Hours</b>	Semester 0: 4 hours /week; Semester 1: 2 hours/week Semester 2: 2 hours/week
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	0,1&2

### Module Content

The module will cover study skills, reading, listening, speaking and writing, referencing, language usage and text organisation.

### Student assessment strategies

Assessment will be based on Continuous Assessment.

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<b>U3583DD</b>	<b>DIGITAL LITERACY</b>
<b>Module Title:</b>	<b>DIGITAL LITERACY</b>
<b>Module Code</b>	U3583DD
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>Contact Hours</b>	Semester 0: 4 hours /week; Semester 1: 2 hours/week Semester 2: 2 hours/week
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1

#### Module Content

Digital Proficiency: ICT-based devices (laptops, tablets, smartphones, desktop computers, digital instruments and equipment); a mouse, keyboard, touch screen, voice control and other forms of input; screens, audio headsets and other forms of output; digital capture devices; University digital learning systems and a range of personal digital services such as social media, cloud storage services, sharing sites

Digital Productivity: Basic productivity software (text editing, presentation, spreadsheets, image editing); email and other digital communication services; Internet or cloud or institutional shared spaces for Organising, managing and backing up digital files; software/apps and services suitable for learning-related tasks; digital tools fit learning and managing learning time

Information Literacy: search engines, indexes or tag clouds; wikis, blog posts, scholarly journals, e-books and the open web; file spaces and folders, bookmarks, reference management software and tagging; copyright, and digital citizenship issues

Data and Media Literacy: Digital data using spreadsheets and other media; data security and privacy; digital media messages – text, graphics, video, animation, audio and multimedia

Digital Creation and Innovation: digital materials (video, audio, stories, presentations, infographics); new digital tools for learning in digital settings

Digital Communication, Collaboration and Participation: digital communication; differences between media, norms of communicating in different spaces; false or damaging digital communications; collaborative tools and online environments; online networks

Digital Learning and Development: digital learning opportunities; digital learning resources; digital tools/materials for organising, planning and reflecting on learning (mind-mapping, note-taking, e-portfolio/ learning journal/ blog)

Digital Identity and Wellbeing: online profiles for different networks (personal, professional, academic); digital reputation; managing personal data and privacy; digital CV or portfolio of work; digital technologies for personal development; online etiquette; wellbeing and safety online; internet addiction; cyberbullying and other damaging online behaviour.

#### Student Assessment Strategies

Collaborative assessment tasks

Digital productivity: cloud based collaborative digital media creation using cloud platforms

Project: Digital communication, collaboration and participation/ Digital Wellbeing

Individual assessment tasks

2.1 Assignment: information literacy assignment

2.2 Test x 2

Practical

3.1 Digital proficiency

3.2 Data and Media literacy

No written examination

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<b>F3520ZP</b>	<b>BASIC PROGRAMMING WITH PYTHON</b>
<b>Module Title:</b>	<b>BASIC PROGRAMMING WITH PYTHON</b>
<b>Module Code</b>	F3520ZP
<b>NQF Level</b>	5
<b>Notional Hours</b>	40
<b>Contact hours</b>	One practical session every week for the duration of CS1
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	4
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	CS

#### Module Content

Python installation; Anaconda. Data Structures and their operations; Variables; Strings; numeric variables; Lists. Control Flow; if, else and elif statements. Functions; How to use basic functions; Numpy Arrays. Pandas; Series; DataFrames. Interaction with OS; Reading and Writing files. Data Visualization; histograms; line and scatter plots.

Learning and Teaching Strategies/Activities

Tutorials: Students will do guided practical problems. These will summarize the process from raw to final presentable results.

#### Student Assessment Strategies

Student assessment will be based on formative assessment only through 100% continuous assessment. The assessment comprises 1 programming assignment. A minimum mark of 50% is required pass the module.

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<b>F3500Z1</b>	<b>ISSUES IN AGRICULTURE</b>
<b>Module Title:</b>	<b>ISSUES IN AGRICULTURE</b>
<b>Module Code</b>	F3500Z1
<b>NQF Level</b>	5

<b>Notional Hours</b>	40
<b>Contact hours</b>	20 Contact hours
<b>Additional learning requirements</b>	Field trips, Seminars and quest lectures
<b>NQF Credits</b>	4
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core semester

#### Module content

Agriculture: Agriculture as important economic sector; Population dependence on agriculture for their livelihoods. Production systems: Production systems and production sustainability. Land tenure systems: freehold and customary tenure. Agricultural Opportunities and Restrictions: such as the veterinary cordon fence; financial collateral; and the greed in the commons. The Namibian market driven economy and agricultural contribution: Agricultural practices; Resilience of livelihoods to withstand challenges posed by climate change; land scarcity, water; drought management relation to climate change; Cause and consequences of the supply chain of agricultural sub-sectors. Overview of sub-sectors and their value chains: cattle; sheep and goats; pigs; dairy; poultry; agronomy; horticulture; game and bio-mass. Niche markets: such as Swakara and Ethical issues of Genetically Modified Organisms (GMO's) and implications to food production systems; use of examples to demonstrate how a society use result into different externalities to balance policy intervention.

#### Student Assessment strategies

Continuous assessment (100% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments, and practical reports (at least 4 gradable items).

A final mark of 50% is required to pass this course

<b>S3531CG</b>	<b>INTRODUCTORY PHYSICAL &amp; INORGANIC CHEMISTRY</b>
<b>Module Title:</b>	<b>INTRODUCTORY PHYSICAL &amp; INORGANIC CHEMISTRY</b>
<b>Module Code</b>	S3531CG
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 lecture periods and 1 practical session per week
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	14
<b>Prerequisite</b>	
<b>(Co-requisites)</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Properties of gases: Gas laws, The kinetic molecular theory of gases, Root-mean-square speed; Thermodynamics: Concepts, The First and Second laws of thermodynamics; Thermochemistry: Exothermic and endothermic reactions, Calorimetry, Standard enthalpy changes, Standard enthalpies of formation, Hess' law, Kirchhoff's law; Entropy, Free energy and Chemical Equilibrium: The Third law of thermodynamics; Gibbs free energy, Relationship between equilibrium constants  $K_p$  and  $K_c$ , Stoichiometric numbers, The response of chemical equilibria to the conditions, The ICE table, The Van't Hoff equation, The value of  $K$  at different temperatures; Properties of solutions: Molecular view of solution process, Intermolecular forces and solutions, Types of solutions, The effect of pressure on solubility of gases, Colligative properties; Phase Equilibria: Phase diagrams, Phase transitions, Gibbs phase rule, Clausius-Clapeyron equation, Trouton's law; Chemical kinetics: Rates of reactions, Rate laws, Integrated rate expressions, Half-life, Arrhenius equation, Collision theory (basics), Reaction mechanisms, Activation energy barrier diagrams, Catalysis (Heterogeneous, Homogeneous and Enzyme).  
Electronic structure of an atom: wave nature of matter, Quantum mechanics and atomic orbitals, Electron configuration and the periodic table; Periodic trends: Atomic and ionic radii, ionization energy, electron affinities; Concepts in chemical bonding: Chemical Bonds, Lewis Symbols, and the Octet Rule, Ionic Bonding and Covalent Bonding, Bond Polarity and Electronegativity, Drawing Lewis Structures, Resonance Structures, strength; Molecular geometries and bonding theories: The VSEPR Model, Molecular Shape and Molecular Polarity, Valence Bond theory and Hybridization of atomic orbitals, Molecular Orbital theory, molecular orbital diagrams, bond order, Delocalized multiple bonds.

#### Student Assessment Strategies

Tests: A minimum of three tests which counts 70% towards the continuous assessment (CA) mark.

Laboratory Mark: Laboratory work is graded and the average counts 20 % towards the CA mark.

Tutorials: Each tutorial assessment is graded and counts 10% towards the CA mark.

Examination: There is a one 3hr examination at the end of the semester and counts 50% towards the final mark.

Final Mark: 50% CA mark and 50% Examination mark

To pass this course, the student must obtain a minimum final mark of 50%.

<b>S3511MC</b>	<b>CALCULUS I</b>
<b>Module Title:</b>	<b>CALCULUS I</b>
<b>Module Code</b>	S3511MC
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	4 lecture hours + 2 tutorial hours per week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Theory of functions: What is a function? Injective, surjective, bijective functions, images and preimages, Operations on functions, inverses, maximal domains, examples, graph transformations.

Sequences and limits: What is a sequence? Subsequence, boundedness, convergence, Cauchy sequences, limits and their computation, limit of a function approaching a point.

Continuity: Definition(s) – sequential and epsilon-delta -intermediate value theorem, examples.

Differentiation: Velocity and acceleration, tangents; definition of the derivative, differentiation and continuity, differentiation rules (sum, product, quotient and chain rules, derivative), the derivatives of polynomial, rational, exponential, trigonometric functions, discussion of a function graph, local extrema, points of inflection, asymptotic behaviour.

Theory of infinite series: Definition, partial sums, absolute and conditional convergence, examples, comparison test, root and quotient tests.

Power series: Radius and interval of convergence, Taylor's theorem, Taylor polynomials, Taylor/Maclaurin series expansions of a function at a point; Taylor series of exponential and trigonometric functions.

#### Student Assessment Strategies

Continuous assessment worth 50% of the final mark consisting of a minimum of 3 (three) tests, complemented by multiple-choice quizzes or tutorial presentations at the lecturer's discretion.

A continuous assessment mark of at least 40% is required for exam admission.

One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.

A final mark of 50% is required to pass this course.

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<b>P3511PG GENERAL PHYSICS I</b>	
<b>Module Title:</b>	<b>GENERAL PHYSICS I</b>
<b>Module Code</b>	P3511PG
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact Hours</b>	Four (4) lectures, a 3-hour practical session every week with a bi-weekly 1-hour tutorial session for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Pre-requisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Mechanics: Units, Physical Quantities, and Vectors; Motion Along a Straight Line; Motion in Two or Three Dimensions; Newton's Laws of Motion; Applying Newton's Laws; Work and Kinetic Energy; Potential Energy and Energy Conservation; Momentum, Impulse, and Collisions; Rotation of Rigid Bodies; Dynamics of Rotational Motion; Equilibrium and Elasticity; Fluid Mechanics; Gravitation; Periodic Motion. Waves and Acoustics: Mechanical Waves; Sound and Hearing. Thermodynamics: Temperature and Heat; Thermal Properties of Matter; The First Law of Thermodynamics; The Second Law of Thermodynamics. Practical: Experimental techniques, reading, measuring, uncertainty/error estimation, tabulation of data, graphing, elementary hypothesis verification, practical report writing.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes, assignments, and practical reports (at least 6 gradable items).

A continuous assessment mark of at least 40% is required to gain exam admission.

One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.

A final mark of 50% is required to pass this module.

To qualify for a Supplementary Exam a final mark of 45–49% is required, subject to a subminimum of 40% in the Exam.

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<b>S3512PG GENERAL PHYSICS II</b>	
<b>Module Title:</b>	<b>GENERAL PHYSICS II</b>
<b>Module Code</b>	S3512PG
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact Hours</b>	Four (4) lectures, a 3-hour practical session every week with a bi-weekly 1-hour tutorial session for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Pre-requisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Electromagnetism: Electric Charge and Electric Field; Gauss's Law; Electric Potential; Capacitance and Dielectrics; Current, Resistance, and Electromotive Force; Direct-Current Circuits; Magnetic Field and Magnetic Forces; Sources of Magnetic Field; Electromagnetic Induction; Inductance; Alternating Current; Electromagnetic Waves. Optics: The Nature and Propagation of Light; Geometric Optics; Interference; Diffraction. Modern Physics: Relativity; Photons: Light Waves Behaving as Particles; Particles Behaving as Waves; Quantum Mechanics I: Wave Functions; Quantum Mechanics II: Atomic Structure; Molecules and Condensed Matter; Nuclear Physics; Particle Physics and Cosmology. Practical: More formal error propagation graphical representation of errors, interpreting errors, and their use in elementary hypothesis verification.

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes, assignments, and practical reports (at least 6 gradable items).

A continuous assessment mark of at least 40% is required to gain exam admission.

One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.

A final mark of 50% is required to pass this module.

To qualify for a Supplementary Exam a final mark of 45–49% is required, subject to a subminimum of 40% in the Exam.

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**S3511BB FOUNDATIONS OF BIOCHEMISTRY AND BIOLOGY**

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<b>Module Title:</b>	<b>FOUNDATIONS OF BIOCHEMISTRY AND BIOLOGY</b>
<b>Module Code</b>	S3511BB
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Additional learning requirements</b>	None
<b>Contact hours</b>	4hours lectures per week for 12 weeks and 3-hour practical for the semester
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

The following topics will be covered:

The scientific method and basic methods in Biology and Biochemistry:

Microscopy, scientific drawings, scientific method and writing of scientific reports; Cellular foundation: cells as functional units of living organisms, source of energy and biosynthetic precursors, eukaryotes versus prokaryotes, cell communication, membrane receptors, intracellular receptors, local and long distance signaling; Chemical foundation: electron configuration, biomolecules; configuration and conformation; interaction between biomolecules; Physical foundation: thermodynamics of living organisms; Early development of organisms and Evolution foundation: Homology and analogy, body symmetry, cephalization, body cavities, germ layers, protostome and deuterostome development, phylogeny, natural selection, early theories of evolution; Genetics foundation: Cell cycle, cell division, genes, chromosomes, genomes, formation of gametes, different life cycles. Mendelian genetics, extensions of mendelian genetics, chromosome theory of inheritance, mutations, linked genes, sex linkages, monohybrid and dihybrid crosses, Aneuploidy and non-disjunction, epistasis, environmental effects on gene expressions, genotypes and phenotypes, gene therapy. Foundations of Microbiology: the importance of microorganisms, impacts of microorganisms on humans, microscopy and microbial cell morphology, microbial cell membranes and cell walls, microbial growth requirements, culture media, laboratory culture of microorganisms, bacterial growth in media, measuring microbial growth.

**Student Assessment Strategies**

Formative Assessment:

Formative assessment will make up 50% of the module grade (Tests, Assignments, Quizzes and Practical reports)

Summative Assessment:

Examination: 1 x 3h examination at the end of the semester that counts 50% towards the final mark

Final Mark: 50% CA mark and 50% Examination mark

A subminimum of 40% in the examination is required to pass, irrespective of the final mark

To pass this Module the student must obtain a minimum final mark of 50%

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**S3532CG INTRODUCTORY ANALYTICAL & ORGANIC CHEMISTRY**

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<b>Module Title:</b>	<b>INTRODUCTORY ANALYTICAL &amp; ORGANIC CHEMISTRY</b>
<b>Module Code</b>	S3532CG
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact hours</b>	4 lecture periods and 1 practical session per week
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	14
<b>Prerequisite</b>	
<b>(Co-requisites)</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Review of some fundamental concepts in chemistry; sampling and sample preparation; expressions of concentration and content; evaluation of analytical data; measures of accuracy and precision; random and systematic errors; aqueous equilibria; mass and charge balance equations; principles of titrimetry; acid-base titrations; titration curves and indicators; applications of acid-base titrations; gravimetric methods of analysis; common ion and diverse ion effects; precipitation titrations; indicators used in precipitation titrations; EDTA titrations (complexometric titrations); the half-cell concept; voltaic cells; overview of separation methods; nomenclature of hydrocarbons; Functional groups and their nomenclature (with chain length up to 15); introduction to stereochemistry; introduction to organic chemistry reactions including acids and bases.

**Student Assessment Strategies**

Tests: A minimum of three tests which counts 70% towards the continuous assessment (CA) mark.

Laboratory Mark: Laboratory work is graded and the average counts 20 % towards the CA mark.

Tutorials: Each tutorial assessment is graded and counts 10% towards the CA mark.

Examination: There is a one 3hr examination at the end of the semester and counts 50% towards the final mark.

Final Mark: 50% CA mark and 50% Examination mark.

To pass this course the student must obtain a minimum final mark of 50%.

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**F3512SH HUMAN NUTRITION**

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<b>Module Title:</b>	<b>HUMAN NUTRITION</b>
<b>Module Code</b>	F3512SH

<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	4 lecture periods per week and 1 x 3 hours practical every two week for one semester.
<b>Additional Learning Requirements</b>	Students are expected to carry out human nutritional project-based tasks.
<b>NQF Credits</b>	13
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Module Content</b>	

Introduction to terminologies used in Human Nutrition: Nutrients and the major nutrients, Dietary Reference Intakes (DRI) and the 4 parts of the DRI including: Estimated Average Requirements (EAR), Recommended Dietary Allowances (RDA), Adequate Intakes (AI), and Tolerable Upper Intake Levels (UL), Estimated Energy Requirement (EER), Acceptable Macronutrient Distribution Ranges (AMDR). The nutrients in food and their role in health: chemical and physical structure and characteristics of nutrients; interactions with other nutrients, non-nutrients (phytochemicals), anti-nutrients, and drugs. Food commodities: The food and Nutrition guidelines for Namibia; Factors that determine food choices; nutrients' food sources, including food composition, the way in which foods are grown, harvested, stored, processed and prepared, and the effects of these on nutrient composition and nutritional value. Digestion of food and absorption of major nutrients; digestion, absorption, circulatory transport, and cellular uptake of the nutrient, as well as regulation of all these processes; the metabolism of the nutrient, its functions, storage, and excretion. Energy needs and food consumption; Nutrition in the Life Cycle: physiological needs (demands or requirements) for the nutrient in health and disease, and during special circumstances (pregnancy, lactation, sport events), as well as individual variability. Nutritional Disorders; Consequences of under consumption and overconsumption of nutrients; therapeutic uses of the nutrient; Diseases caused by lack /over nutrition. Nutritional value of food and diets as affected by processing; Reasons for preserving food; Methods of preservation and an understanding of the principles involved; heating; removal of moisture, reduction in temperature; Chemical preservation; general effects of cooking and preservation method; nutritional value of meals and the whole diet; Food spoilage and hygiene in the handling and storage of food.

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 50% of the Course grade (i.e., at least 8 assessed practical (40%), 3 tests [40%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 50% (1x 3 hours theory paper). Pass mark for the module is 50%.

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#### S3512ST STATISTICAL METHODS

<b>Module Title:</b>	<b>STATISTICAL METHODS</b>
<b>Module Code</b>	S3512ST
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre-requisites</b>	None
<b>Co-requisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Contact Hours</b>	4 lectures plus 1-hour tutorial per week/ semester
<b>Semester Offered</b>	2

#### Module Content:

Sampling and sampling distributions: sample mean, proportion, difference between means and difference between proportions. Sampling distributions related: to the Normal distribution, the Central Limit Theorem; Estimation of parameters: Point estimation; confidence intervals and hypothesis testing: for means, proportions, variances, difference in means and proportions. Chi-square test for: goodness of fit & independence. Construction and use of Index numbers: unweighted (simple aggregate index, average of price relative) and weighted index numbers (Laspeyres, Paasche and Fischer's ideal index, CPI).

#### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination (or subset) of the following written and/or online assessments:  
 Test(s) and quiz(es) – at least a minimum of 3 hours in total  
 Assignments – at least a minimum of 3 notional hours in total  
 Tutorial tests – at least 10 notional hours in total  
 A continuous assessment mark of 40% is required to gain exam admission.  
 One 3-hour examination (50% of the final mark).  
 A subminimum of 40% in the examination is required to pass, irrespective of the final mark.  
 Continuous Assessment (at least two tests, two tutorial test and two assignments) 50%; Examination 50% (1x3 hour Examination paper).  
 A final mark of 50% is required to pass this course.

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#### F3512SP FOOD PROCESSING AND TECHNOLOGY

<b>Module Title:</b>	<b>FOOD PROCESSING AND TECHNOLOGY</b>
<b>Module Code</b>	F3512SP
<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	4 lectures per week ; 1 practical session every two weeks for one semester.
<b>Additional learning requirements</b>	Excursion (company visit)
<b>NQF Credits</b>	13
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Overview of the food industry: characteristics of the food industry and food systems in Namibia and the region; impact of food technology advances on food security, diets and traditional foods. Food laws and regulations: Codex alimentarius; Namibian laws and regulations; Namibian Food Safety policy; National food control system. Food Properties and their significance: Carbohydrates, proteins, lipids, minerals, vitamins, water. Food preservation: basic principles of food preservation; control of microorganisms and enzymes; food preservation methods; hurdle technology. Unit operations for food processing: Pre-processing; processing by addition or removal of heat; size reduction; separation processes; irradiation; materials handling; packaging and labeling, other unit operations.

#### Student Assessment

This module will be assessed using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, at least 4 practical reports and a minimum of 2 written tests. The summative assessment will comprise a written end of semester examination (1 x 3 hr paper). The pass mark for the module is 50%.

### I.4 SECOND YEAR

U3683LA	ACADEMIC LITERACY II
<b>Module Title:</b>	ACADEMIC LITERACY II
<b>Module Code</b>	U3683LA
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact Hours</b>	Semester 0: 4 hours/week Semester 2: 2 hours/week
<b>Prerequisite</b>	Academic Literacy I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester, 1&2

#### Module content

The module is designed for students enrolled in a bachelor's degree, which requires them to do basic research, read and listen to specific academic material, produce specific written texts and give academic presentations. The module thus, focuses on enhancing academic reading, academic vocabulary, writing, listening and speaking.

#### Student assessment strategies

The module will be continuous assessment based. Assessment will include written tests, individual and group assignments, portfolio assessments and oral presentations.

U3520LP	LEADERSHIP SKILLS
<b>Module Title:</b>	LEADERSHIP SKILLS
<b>Module Code</b>	U3520LP
<b>NQF Level</b>	5
<b>Notional Hours</b>	20
<b>Contact hours</b>	1 x 2h per week for 6 weeks
<b>Mode of Delivery Blended:</b>	Face to face and online
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1 or 2

#### Module Content

Definition and scope of leadership; History and origins of leadership; Types of leadership; Leadership versus management skills; Leader (master of self, effective manager of people, active visionary); manager; Not all leaders are managers; Not all managers are leaders; Authority versus leadership; Power versus leadership; Principles of leadership (ability, adaptive, action, empowerment, creativity, problem solving, shared); Are leaders born or made?; Characteristics of a good leader; Functions of leaders in organizations; Leading for the future; Mentoring skills; The 21st century leader; Ethical leadership skills; Responsible leadership skills.

#### Student Assessment Strategies

The module will be assessed using 100% continuous assessment.

U3420CN	NATIONAL AND GLOBAL CITIZENSHIP
<b>Module Title:</b>	NATIONAL AND GLOBAL CITIZENSHIP
<b>Module Code</b>	U3420CN
<b>NQF Level</b>	4
<b>Notional Hours</b>	20
<b>Contact hours</b>	Up to 1 contact lecture periods per week for 6 Weeks
<b>Mode of Delivery</b>	Blended: Face to face and On
<b>Additional learning requirements</b>	Each student will be required to work on a personal project which will include a site visit
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

#### Module Content

**UNIT 1:** Constitution and its Importance  
What is a constitution; Functions of a constitution; What it contains; Constitution and democracy

**UNIT 2: Global Citizenship**

The meaning of global citizenship; Importance of global awareness; World issues of concern to global citizens.

**UNIT 3: Civic Engagement**

What do we mean by civic engagement; Dimensions of civic engagement; Indicators of civic engagement;

Promoting civic engagement.

**UNIT 4: Globalization**

Understanding globalization; Cultural construction of neoliberal globalization; Major players; Major domains;

Major Issues; Futures of Globalization

**UNIT 5: Intercultural Communication**

Dealing with difference; Levels of culture; Stereotypes and generalizations; Intercultural communication Processes

**UNIT 6: Sustainable Development Goals and individual action**

Introduction to SDGs; Contributing to achievement of SDGs through action

Learning and Teaching Strategies/Activities

Student learning in this module will be supported by provision of subject knowledge; engaging students in class discussions, and individual awareness and action portfolios. It will expose students to real life situation through formal lectures, guest lectures, experiential activities such as engaging local civic organizations; Students will engage in active and participatory learning in which they generate ideas and share their knowledge on a topic. Material will include journal articles, videos, PowerPoint presentations, as well as handouts for students' reflection.

**Student Assessment Strategies**

Continuous assessment of 100% - Assessment will be done by completing online pop-up quizzes; and developing their online portfolios of personal action as response to tasks assigned in class.

U3420PJ	PROJECT MANAGEMENT SKILLS
<b>Module Title:</b>	<b>PROJECT MANAGEMENT SKILLS</b>
<b>Module Code</b>	U3420PJ
<b>NQF Level</b>	5
<b>Notional Hours</b>	20
<b>Contact hours</b>	2 hour lecture per week for the first two week and field-based practical for the remaining four weeks.
<b>Mode of Delivery</b>	Blended: face-to-face
<b>Additional learning requirements</b>	The field-based practical to be undertaken in the immediate environment of the student
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1 or 2

**Module Content**

This module consist of two components: The first component is a two week theory covering the concepts (project vs programme) and the phases of project life cycle ( project initiation and planning: work breakdown, development of SMART indicators, estimation of activity duration, efforts, and costs, scheduling of activities, identification of critical path, setting of milestones, stakeholder identification and categorization, stakeholder engagement, initial risk identification, and development of the initial project plan; project implementation & management: forming the project team, managing people, resources allocation, responsibilities allocation, quality assurance, leadership style and project liaison; project monitoring and control: progress reporting and communication, quality control, time management, budget and cost management, risk management and mitigation; project closure and evaluation: project evaluation, project auditing process and the closure process, and final project report). The second component is a four week field-based practical where students participate in a real-life project in their immediate environment. Students are strictly required to apply the project management approach during the field-based practical.

**Student Assessment Strategies**

Student assessment will be 100% continuous assessment based on weekly project progress reports (50%) and the final project report (50%). A minimum pass mark for the module is 50%.

U3420SE	SUSTAINABILITY AND ENVIRONMENTAL AWARENESS
<b>Module Title:</b>	<b>SUSTAINABILITY AND ENVIRONMENTAL AWARENESS</b>
<b>Module Code</b>	U3420SE
<b>NQF Level</b>	4
<b>Notional Hours</b>	20
<b>Contact hours</b>	1 x 2h per week for 6 weeks for the first 3 weeks followed by mini-project for the remainder of semester (total of 10 hours on this aspect)c
<b>Mode of Delivery</b>	Blended: Face to face and Online
<b>Additional learning requirements</b>	Mini-project to create awareness, champion environmental cause or address an environmental issue in their immediate environment
<b>NQF Credits</b>	2
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester 1 or 2

**Module Content**

Sustainability: finite nature of elements constituting the Earthly environment, resilience and fragility of the natural environment; three distinct perspectives on sustainability: sustained yield of resources, sustained abundance and diversity of species and ecosystems, sustained economic and social development key themes in defining sustainability: (i) the human perspective, (ii) considerations of fairness and (ii) issues of scale concepts of inter- and intra-generational equity (fair and just distribution of resources), sustainable community. Natural resources: role of soil, water and minerals in supporting life on Earth; health and interdependence of ecosystems within the biosphere; dependence of human beings on natural resources for sustenance and livelihoods. . Solutions to environmental sustainability

challenges: simple inexpensive interventions aimed at reducing wastage of resources and generation of wastes through exhaustive use, reuse, recycling and refurbishing of products.

#### Student Assessment Strategies

The module will be evaluated using 100% continuous assessment. Student will be assessed based on class discussions and debates on striking a balance between socio-economic development and environmental sustainability citing real life major national projects. Students will be placed in groups based on a logical criterion that ensures mixing interspersing of students from academic discipline and programmes in each group. Groups will be expected to take on a particular environmental issue plaguing their immediate surroundings to highlight and champion. Each group will tackle one issue through either cleanup campaigns, awareness raising campaigns, community education campaigns, advocacy or devising a simple solution to the problem. A minimum pass mark for the module is 50%.

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### F3610ZR INTRODUCTION TO STATISTICAL PROGRAMMING WITH R

<b>Module Title:</b>	<b>INTRODUCTION TO STATISTICAL PROGRAMMING WITH R</b>
<b>Module Code</b>	F3610ZR
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact Hours</b>	4 lecture periods per week and one 3hour practical per week for core semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Elective
<b>Semester Offered</b>	Core semester

#### Module Content

Learn how to navigate RStudio: how to load/save a file; load a package; access help. Examine the base R objects: vectors; matrices, arrays, lists, factors and tables; their respective characteristics, naming conventions and structures. Understand sub-setting, filtering and creation of these objects. Examine the implementation of control structures (loops and functions) in R. Investigate how R can be used for mathematical and statistical calculations. Data Cleaning and Manipulation in R: Learn how to manipulate and clean data in R; importing and exporting data from other statistical packages and data bases; aggregating data; reshaping data Visualisation (Packages): Learn how basic plots are generated in R – histograms; X-Y plots, bar charts; pie charts, scatter plot. Understand the ggplot2 package for advanced plotting. Statistical Testing: Understand how R can be used for hypothesis testing. Investigate how R can be used in statistical modelling techniques (SLR)

#### Student Assessment Strategies

Continuous Assessment: 100 % (minimum of 2 tests (30%), 1 project assignment (presented in oral and written form, 40%), 3 marked practicals, 30%). The pass mark for the module is 50%

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### F3611SG GENERAL MICROBIOLOGY

<b>Module Title:</b>	<b>GENERAL MICROBIOLOGY</b>
<b>Module Code</b>	F3611SG
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact hours</b>	Four (4) hours contact lecture per week and 1 x 3 hours practical session every two week for one semester
<b>Additional learning requirements</b>	Field work
<b>NQF Credits</b>	15
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module content

This course provides students with a general overview of microbiology. The first part covers a historical perspective of microbiology; how microorganisms were discovered; ancient experiments, theories and myths. The second chapter deals with their classifications; the chronology of methods used and the diversity of environments where microorganisms are found. The third chapter covers the morphology of prokaryotic microorganisms; their structures and chemical composition and subcellular organelles. The fourth chapter discusses the role of microorganisms in nature; in biogeochemical cycles (carbon and nitrogen cycles; and their application in industries will be discussed. The fifth chapter describes the morphology, biology and habitats of eukaryotic microorganisms; fungi, algae, protozoa and viruses will be studied. The sixth chapter is a synopsis of methods to control microbial growth will be given; differentiating and highlighting various physical and chemical control methods and their respective efficacies; with direct reference to the effect of antibiotics on microorganisms including their basic classification and mode of action. The seventh chapter is an overview of the important pathogens of plants and animals; common pathogens affecting livestock and crops in the tropics will be selected and discussed; fair coverage of various groups; bacteria, fungal and viral pathogens will be made; the characteristics of the causative agents; conducive conditions for their transmission and control measures will be given. The practical aspects of this module will cover, media preparation and sterilization, aseptic and pure culture techniques, microbial isolation and identification including microscopy, staining techniques, and biochemical tests. The antibiotic sensitivity assays will also be covered.

#### Student Assessment Strategies

Assessment activities will comprise of formative assessments (50% of the final mark), comprising of at least three tests, forum discussions, practical reports and written assignments). One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.

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### F3611AB BIOCHEMISTRY

<b>Module Title:</b>	<b>BIOCHEMISTRY</b>
<b>Module Code</b>	F3611AB

<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	04 Lecture hours / week; 3 Practical hours per week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	S3511BB Foundations of Biochemistry and Biology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Structural Biochemistry: Structure and function of macromolecules (carbohydrates, proteins and lipids), Vitamins, Coenzymes and Cofactors. Enzymology: Enzymes as organic catalysts; Enzyme nomenclature; Factors affecting activities of enzymes; Enzyme kinetics - The Michaelis-Menten equation; The Lineweaver-Burk plot; Enzyme inhibition; Allosterism. Bioenergetics and Thermodynamics: Free Energy, Laws of Energy, Activation Energy, Transition States, Endergonic and exergonic reactions. Metabolism: Catabolism and Anabolism; Carbohydrate catabolism (Glycolysis, Alcohol and lactic acid Metabolism, Tricarboxylic acid cycle or the TCA cycle; Electron transport chain and oxidative phosphorylation); Regulation of carbohydrate metabolism; Gluconeogenesis; Synthesis of the disaccharides (lactose and sucrose); Lipid metabolism ( $\beta$ -oxidation, malonyl CoA); Integration of carbohydrate and fat metabolism; Amino acids and protein metabolism; Urea cycle; The Cori cycle; Pentose phosphate pathway. Spectrophotometry: Fundamental laws of spectrophotometry and absorbance, including calibration curve

#### Student Assessment Strategies

Continuous Assessment consists of 50% comprising of 2 tests, at least 3 marked practicals, quizzes / Assignment and a three-hours examination that constitutes 50% of the final grade. Pass mark for the module is 50%.

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### F3601SP POSTHARVEST TECHNOLOGY

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<b>Module Title:</b>	<b>POSTHARVEST TECHNOLOGY</b>
<b>Module Code</b>	F3601SP
<b>NQF Level</b>	6
<b>Notional Hours</b>	70
<b>Contact Hours</b>	2 lecture periods per week and one 3hour practical per alternate week for one semester
<b>Additional Learning Requirements</b>	Compulsory visit to at least 4 Agricultural Produce and storage houses.
<b>NQF Credits</b>	7
<b>(Co- requisites) Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Introduction to postharvest: Definition of postharvest terms, introduction to postharvest losses. Physiological and biochemical characteristics of agricultural products: Ripening-physical and biochemical changes, ripening methods, Respiration and its factors affecting respiration rates in selected agricultural crops; ethylene in post-harvest technology, storage life of different agriculture produce. Constraints in post-harvest management: post-harvest deterioration, post-harvest treatment for extended post-harvest shelf life. Postharvest treatments: washing, waxing, drying methods, processing, grading, packaging techniques and packaging standards. Storage methods and transportation methods: introduction to different storage facilities modern and traditional, Cooling and pre-cooling methods in the cold chain; packaging and pack-house operations, packaging- types of containers and cushion materials and packaging methods. Modes of transport and Storage practices: constraints and transit hazards, Controlled atmosphere storage (CAS) and modified atmosphere packaging (MAP), Hypobaric storage, zero energy cool chamber, cool Bot and cool room. Storage methods for domestic and export market and compatibility of horticulture produce for storage. Effects of microorganisms and pests: microorganisms and pest control, fumigation of storage facility and good house practice before and after storage of agricultural produce such as grains, fruits and vegetables.

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 50% of the module grade (i.e., at least 8 assessed practicals [combination of visiting companies and laboratory practicals] (40%), 2 tests [40%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 50% (1x 3 hours theory paper). Pass mark for the module is 50% content.

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### F3611SM MEAT SCIENCE AND TECHNOLOGY

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<b>Module Title:</b>	<b>MEAT SCIENCE AND TECHNOLOGY</b>
<b>Module Code</b>	F3611SM
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact Hours</b>	4 lecture periods per week and 1 x 3hour practical every two weeks for one semester
<b>Additional Learning Requirements</b>	Students undertakes one-day visits to industrial meat processing plants.
<b>NQF Credits</b>	15
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Overview of meat industry in Namibia, SADC: terms and definitions, beef breeds, employment and GDP contribution, factors affecting beef, mutton, game and poultry industry, major industries and statutory meat regulatory bodies in Namibia. Muscle anatomy and composition: structure and composition of meat, macro and micro nutrients of meat, factors affecting meat composition, meat functional proteins, meat and human nutrition. Food animal welfare: slaughtering animal welfare act of 1960, handling of slaughtering animals. Slaughtering of meat animals: animal stunning, carcass dressing, fabrication. Quality control and assurance in meat plants: Slaughterhouse/abattoir hygiene, Good Manufacturing Practices (GMP), Hazard Analysis Critical Control Points (HACCP). Biochemical

process and meat quality: rigor mortis, pH and meat quality (PSE and DFD), meat colour biochemistry, meat tenderness biochemistry. Meat spoilage and preservation: microbial contamination and spoilage in meat, chemical and biochemical (enzymatic) spoilage of meat, chilling and freezing of meat, meat packaging. Meat processing and value addition: overview of meat processing industries, processed meat products, equipment used in meat processing, non-meat ingredients (seasonings, curing salts, binders, marinades and tenderizers), sausage production, meat smoking, meat canning.

#### Student Assessment strategies

Continuous assessment (50% of the final mark) consisting of a combination of tests and quizzes (at least 3 assignments and 5 laboratory practical reports). A continuous assessment mark of at least 40% is required to gain exam admission. One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark. A final mark of 50% is required to pass this course.

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### F3612SD DAIRY SCIENCE AND TECHNOLOGY

<b>Module Title:</b>	<b>DAIRY SCIENCE AND TECHNOLOGY</b>
<b>Module Code</b>	F3612SD
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact hours</b>	Four hours of lectures per week, 03 hours practical every two week
<b>Additional learning requirements</b>	Field visits to Dairy farms, Dairy processing facility and Markets
<b>NQF Credits</b>	15
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3512SP: Food Processing and Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Primary production of milk; milk production trends in Namibia. The chemistry and microbiology of milk, Raw milk handling; collection, cooling, transportation and reception of milk. Quality control tests; testing of Butterfat, Total Solids, resazurin and alcohol rests, pH, acidity test, clot-on boiling test and sediment test. The building blocks of dairy processing; Milk and milk products such as: Pasteurized/ Market milk products; cultures and starter manufacture; cultured milk products; High fat dairy products; Cheese; Whey powder processing; Concentrated Dairy Products; Recombined milk products; Ice cream; Casein powder. Cleaning of dairy equipment and Dairy Effluent Management. Marketing aspects of milk and dairy products.

#### Student Assessment

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 50% of the module grade (i.e., at least 8 assessed practical [40%], 3 tests [40%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 50% (1x 3 hours theory paper). Pass mark for the module is 50%.

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### F3612SS SEA FOODS TECHNOLOGY

<b>Module Title:</b>	<b>SEA FOODS TECHNOLOGY</b>
<b>Module Code</b>	F3612SS
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact Hours</b>	4 lecture periods per week and 1 x 3hour practical every two weeks for one semester
<b>Additional learning requirements</b>	Students may undertake an academic excursion to witness seafoods processing at various fish processing industries at the coast (Walvis Bay and Luderitz). Students will also be attached at various seafoods processing plants.
<b>NQF Credits</b>	15
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Classification of main fishing and production systems: Marine, fresh water/inland and aquaculture fisheries, Major industries and ecological niches Fisheries management systems: Custodian ministry and government agencies, fishing rights, total allowable catches, fishing quotas, fishing licenses, Fishery fees and levies, Economic Exclusive Zones (EEZ), maritime and fishery observers. Fishery classification and important commercial species. Fresh water fish, Marine fisheries, aquaculture species, crustaceans and mollusks). Fish structure and composition: Morphological structure of fish, crustaceans and bivalve mollusks, fish composition and human nutrition. Fish capture technologies: definitions and terminologies, major fishing systems, technological and digital navigation systems, fish holds on board vessels until landing. Preliminary fishing operations; purpose and types of operations and equipment used. Fish preservation: Fish chilling and freezing technologies, effect of freezing on fish quality, Sea foods processing plants hygiene: Good Manufacturing Practices (GMPs), HACCP). Quality evaluation of sea foods: Terminologies and definitions related to freshness of seafood, actors affecting microbiological quality of sea foods, standardized sensory evaluation schemes/indicators for evaluating fish freshness/quality. Seafood borne illness: marine toxins and seafood-borne illness (finfish and shellfish poisoning). Fish packaging. Fish processing: Production line, fish drying, salting, smoking, canning, surimi technology, concentrated fish proteins, caviar processing, battered and breaded fish products, extruded fish products, fish meal and fish oils, processing of mollusks and crustaceans.

#### Student Assessment strategies

Continuous assessment (50% of the final mark) consisting of a combination of tests and quizzes (at least 3 assignments and laboratory practical reports). A continuous assessment mark of at least 40% is required to gain exam admission. One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark. A final mark of 50% is required to pass this course.

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### F3612SE FOOD ENGINEERING 1

<b>Module Title:</b>	<b>FOOD ENGINEERING 1</b>
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<b>Module Code</b>	F3612SE
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact Hours</b>	4 contact lectures per week for one semester; 1 practical/tutorial session per week for one semester.
<b>Additional learning requirements</b>	Virtual practicals
<b>NQF Credits</b>	15
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	S3511MS: Mathematics Support I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Units and dimensions: Identification of units commonly used in engineering calculations; conversion of units from different systems. Process variables and outcomes: Mathematical applications to determine and manipulate variables and properties common employed in food technology; determination and utilisation of process outcomes. Introduction to engineering thermodynamics applications: Application of laws of Thermodynamics in food engineering; energy calculations in common thermodynamic processes. Material and energy balances: material and energy balances to unit equipment; component balances; total material and energy balances; plant balances; use of steam tables and psychrometric charts. Heat transfer: Steady state conduction; convection; combined conduction and convection; radiation; introduction to heat exchangers. Fluid transfer: Newtonian and non-Newtonian fluids; basic Rheology; Continuity equation; application of Bernoulli's theorem. Introductory mass transfer: Analogies with heat transfer; diffusion; mass transfer coefficients; ultrafiltration; reverse osmosis.

#### Student Assessment

This module will be evaluated using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, assessment of at least 4 virtual laboratory practical reports, a minimum of 1 written tests. The summative assessment will comprise a written end of semester examination (1 x 3 hr paper). The pass mark for the module is 50%.

F3602SW	WORKPLACE ATTACHMENT PREPARATION
<b>Module Title:</b>	<b>WORKPLACE ATTACHMENT PREPARATION</b>
<b>Module Code</b>	F3602SW
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact Hours</b>	Lectures: 2 hours per week for one semester
<b>Additional Learning Requirements</b>	None
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

The importance of food science knowledge and practice in industrial attachment: Guides on how to get specific job and skill experience during field attachment. Employability-enhancing activities: gaining workplace skills and building network of company or industry contacts. Professional behavior and/or knowledge: role and expectation of student in the workplace, acceptable workplace behaviors and specific common job norms. Guide on effectiveness of field-based learning. Demonstration and discussion of ethical awareness, the ability to do ethical reflection, and the ability to apply ethical principles in decision-making. Collaboration and teamwork in a work context. Preparation to be able to identify, comment on and relate organizational, scientific and technical knowledge based on the key activities, as may be applicable, at the company/institution where attached. Organisation: Ownership, Establishment, governance and human personnel structures. Administration: Procurement procedures, adequate record keeping. Quality Assessments: Raw materials and ingredients quality and safety, Packaging Materials quality and safety, Defects and Rejects. Storage Conditions assessment: Raw Materials, Ingredients and Packaging proper storage, management and monitoring. Raw materials and Ingredients (including water) quality Analyses: Sampling Methods, Sample Preparation, Chemical, Microbiological, Physical and Instrumental tests. Plant layout: Design, materials flow, Lighting, Ventilation, Space/size. Processing Technology and Maintenance: Equipment, their design, capacity, maintenance and calibration and handling, Processing unit operation, Equipment cleaning and process control points, Embedded packaging e.g. canning (processing and packaging), Transport system (conveyor belts, screw conveyer etc); Principles of Engineering and Chemistry underlying the processing steps/unit operations. Quality Management systems: Good Manufacturing Practices (GMPs) programs, Certifications e.g. BRC, ISO, Benchmarkings (processes and/or products). Product Quality Assurance: Food safety, Hazards, CCP, HACCP system, Chemical, Microbiological, Physical and Instrumental, Shelf stability tests, Sensory tests. Packaging Technology assessments: Packaging materials (plastic, metal, wooden, paper etc), their composition, Types of packages (primary, secondary etc.), Packaging equipment: Filling/Forming and, Sealing and labelling. Consumer Perception handling: Defects and recalls, Consumer complaints, Consumer satisfaction. Warehousing and Product Storage Conditions assessment: Product storage conditions, management and monitoring, Type of client (e.g. Individuals, Retailers), Duration of Product storage. Personnel Health and safety, occupational health, dose exposures and risks assessments in workplace: Assess risks, hazards and exposures in the working environment. Waste management, handling and safe storage of waste, pollutants and contaminants: Waste and pollution control, handling, transporting and disposal of waste. Policy and legislation: Follow debates and legislative process through which policies and laws are made (processing, products, composition e.g. GMOs, packaging, Wastes etc.

#### Student Assessment Strategies

Assessment for this module will consist of formative activities, and the final mark will be made of 100% Continuous Assessment (CA). The CA will be made up of seminars (30 %) and field-based learning plan (70 %).

### I.5 THIRD YEAR

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**W3710SW                  WORKPLACE ATTACHMENT**

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<b>Module Title:</b>	<b>WORKPLACE ATTACHMENT</b>
<b>Module Code</b>	W3710SW
<b>NQF Level</b>	7
<b>Notional Hours</b>	240
<b>Contact Hours</b>	8 weeks
<b>NQF Credits</b>	24
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core semester

**Course content:**

This is a practical course where students spend time at real work situations under the supervision of qualified personnel. The students are attached to suitable food processing industries or food analytical laboratories. Students will be required to go for their industrial internship for 8 weeks in semester zero and semester 1 at the beginning of the third year. Attached students should conduct themselves in professional manner, be punctual at all times, as well as maintain a positive attitude towards others and their work. Students are required to stay on duty till the last day of the attachment period. Failure to do so may result in the repetition of the attachment at student's own cost. Absence from the site of duty may only be authorized by the site management in writing. Weekends should be considered part of the attachment period, therefore students on attachment may be required to report for duty during weekends should the need arise.

Students are engaged in activities such as: Quality Assessments: Raw materials and ingredients quality and safety, Packaging Materials quality and safety, Defects and Rejects. Storage Conditions assessment: Raw Materials, Ingredients and Packaging proper storage, management and monitoring. Raw materials and Ingredients (including water) quality Analyses: Sampling Methods, Sample Preparation, Chemical, Microbiological, Physical and Instrumental tests. Plant layout: Design, materials flow, Lighting, Ventilation, Space/size. Processing Technology and Maintenance: Equipment, their design, capacity, maintenance and calibration and handling, Processing unit operation, Equipment cleaning and process control points, Embedded packaging e.g. canning (processing and packaging), Transport system (conveyor belts, screw conveyer etc); Principles of Engineering and Chemistry underlying the processing steps/unit operations. Quality Management systems: Good Manufacturing Practices (GMPs) programs, Certifications e.g. BRC, ISO, Benchmarkings (processes and/or products). Product Quality Assurance: Food safety, Hazards, CCP, HACCP system, Chemical, Microbiological, Physical and Instrumental, Shelf stability tests, Sensory tests. Packaging Technology assessments: Packaging materials (plastic, metal, wooden, paper etc), their composition, Types of packages (primary, secondary etc.), Packaging equipment: Filling/Forming and, Sealing and labelling. Consumer Perception handling: Defects and recalls, Consumer complaints, Consumer satisfaction. Warehousing and Product Storage Conditions assessment: Product storage conditions, management and monitoring, Type of client (e.g. Individuals, Retailers), Duration of Product storage. Personnel Health and safety, occupational health, dose exposures and risks assessments in workplace: Assess risks, hazards and exposures in the working environment. Waste management, handling and safe storage of waste, pollutants and contaminants: Waste and pollution control, handling, transporting and disposal of waste. Policy and legislation: Follow debates and legislative process through which policies and laws are made (processing, products, composition e.g. GMOs, packaging, Wastes etc. Learning and Teaching Strategies/Activities  
Presentations and written reports

**Student Assessment Strategies**

Assessment by Field Supervisor = 30%  
Oral presentation = 20%  
Written report = 50%

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**F3711SF                  FRUITS AND VEGETABLES TECHNOLOGY**

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<b>Module Title:</b>	<b>FRUITS AND VEGETABLES TECHNOLOGY</b>
<b>Module Code</b>	F3711SF
<b>NQF Level</b>	7
<b>Notional Hours</b>	170
<b>Contact Hours</b>	4 lecture periods per week and one 3hour practical per alternate week for one semester
<b>Additional learning requirements</b>	Visit to fruits and vegetable processing companies and fruits and vegetables packers
<b>NQF Credits</b>	17
<b>(Co-requisites) Prerequisite</b>	F3601SP: Postharvest Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Classify fruit and vegetable: Types of fruits and vegetables, their differences, uses and economic importance, structure and composition, maturation, quality evaluation and handling. Nutritional quality of fruits and vegetables: Interpret the nutritional quality of fruits and vegetables and determine the quality of fruits and vegetables for processing and in the diet. Quality deterioration: enzymatic, chemical, physical, biological changes and stability of nutrients. Shelf life of Fruits and vegetables: Extension of shelf life of fresh fruits and vegetables and Shelf life of processed fruit and vegetable products. Preprocessing and treatments of fruits and vegetables: washing, peeling, dicing, segmenting, slicing, pitting/decoting, sulphite treatment, blanching and draining. Processing methods for fruits and vegetables: juicing, freezing, concentration, drying, canning. Chemical preservation: salting, smoking, acidification, addition of ethanol and preservatives. Others: pasteurization, sterilization, canning and irradiation. Products processing: Drinks/Concentrates; Juices, Wines, Ciders, Nectars, Squashes, Cordials and Syrups, Jams, Jellies, Marmalades, Catsup, Paste, Confectionary, Pickles, Sauerkraut, Dried fruits and vegetables, Packaging and Labelling. Fermentation and other beverages: wines, ciders, pickles and carbonated beverages. Packaging, Good Manufacturing Practice (GMP), Hazard analysis critical control points (HACCP). Quality evaluation and compliance to quality standards and legislation for processing fruits and vegetable products

**Student Assessment Strategies**

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 60% of the module grade (i.e., at least 6 assessed practicals [40%], 2 tests [40%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 40% (1x 3 hours theory paper). Pass mark for the module is 50%.

<b>F3701SM</b>	<b>FOOD MICROBIOLOGY</b>
<b>Module Title:</b>	<b>FOOD MICROBIOLOGY</b>
<b>Module Code</b>	F3701SM
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 contact lectures per week for one semester; 1 x 3 hours' practical alternate week for one semester.
<b>Additional learning requirements</b>	Excursions
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3611SG: General Microbiology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content**

The first chapter deals laboratory techniques used in the isolation, enumeration, and identification of microorganisms in food; cultural and noncultural methods of enumeration; types of growth media and methods used in the isolation and enumeration; primary, secondary identification and culture confirmation techniques; biochemical tests and rapid methods of enumeration and identification. The second chapter discusses the kinetics of multiplication of microorganisms: batch cultures, bacterial growth rates, the four growth phases, factors affecting growth of microorganisms in food and continuous culture techniques. The third chapter deals with the microbiological principles of food processing and preservation: Factors affecting the growth and survival of microorganisms in food, and how these factors are utilised in creating growth hurdles in food processing. The fourth chapter covers food microbiology and public health; it differentiates natural poisons from microbiological food poisoning; toxigenic from infectious food poisoning; the phenotypic characters of infections bacterial agents and summarises the pathogenesis and manifestations of the diseases. The fifth chapter discusses the sampling and sampling plans used in food microbiology; the rationale behind sampling plans are defined; the class attribute plans, choosing a plan stringency, variables of acceptance sampling concepts are covered. The sixth chapter covers indices of sanitation in Food; the general criteria on which indicator organisms are based; the heterotrophic plate counts; coliform counts; the count for sulphate reducing microorganisms counts are used as examples; significance, and shortfalls are highlighted; and the details used in performing the selected tests are discussed. The seventh chapter discusses the biochemical reactions of microorganisms in food: the role of microorganisms and food spoilage; the metabolism of carbohydrates, proteins, lipids; their respective metabolic products and the effect of the products on food quality and safety are introduced.

#### **Student Assessment Strategies**

Assessment activities will comprise of tests, written exams, assignments, forum discussions, practical reports, internal and external moderation/examination. Continuous Assessment will contribute 50% (minimum 2 tests, 1 forum discussion, 1 assignment and 4 practical reports). The final examination, will comprise of 1 x 3h paper contributing 50%. Pass mark for the module is 50%.

<b>F3711SC</b>	<b>FOOD CHEMISTRY</b>
<b>Module Title:</b>	<b>FOOD CHEMISTRY</b>
<b>Module Code</b>	F3711SC
<b>NQF Level</b>	7
<b>Notional Hours</b>	170
<b>Contact hours</b>	Four (4) contact lecture periods per week for one semester; Three (3) hours practical session every two weeks for one semester.
<b>Additional learning requirements</b>	Compulsory group work
<b>NQF Credits</b>	17
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3611AB: Biochemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content**

Water: Its chemistry and role in food processing and technology. The chemistry of important carbohydrates in foods: monosaccharides, oligosaccharides, polysaccharides, related compounds and their role on sensory properties. Protein and amino acids chemistry in foods: Sensory properties of amino acids and protein. Animal and plant proteins: Cereals; Legumes; Red meat; White meat; Egg; Milk; Edible insect; Truffle. Nature, function and utilization of enzymes in food industry. Lipid chemistry as applied to foods and their role on sensory properties: free fatty acids, fats, glycerides, phospholipids, glycolipids, waxes and cutins; Factors that influence lipid deterioration; Emulsions and emulsifiers; Hydrogenation; Interesterification; Fractionation. The role of minerals in foods and food processing and their role on sensory properties: Major minerals and trace elements in food processing; The fat-soluble vitamins and water-soluble vitamins in foods and food processing. Sensory compounds: Colour, texture, aroma/flavour, taste and off-flavours compounds. Food additives: Colouring agents; Sugars and sweeteners; Thickening agents and Humectants; Antioxidants; Flavour enhancers; Surface-active agents; Anti-caking agents and Bleaching agents; Clarifying agents, Propellants and protective gases. Functional foods: Chemistry mechanism of their components including phenolics.

#### **Student Assessment Strategies**

Continuous Assessment: 50%  
 At least 2 tests  
 At least 2 assignments/group work  
 Practical reports  
 Exam: 50% (1 x 3hr paper).  
 To pass this module a student should obtain a minimum final mark of 50%.

<b>F3701SB</b>	<b>FOOD BIOTECHNOLOGY</b>
<b>Module Title:</b>	<b>FOOD BIOTECHNOLOGY</b>
<b>Module Code</b>	F3701SB
<b>NQF Level</b>	7
<b>Notional Hours</b>	80

<b>Contact hours</b>	Two (2) contact lecture hours per week for one semester; one practical session every two weeks for one semester
<b>Additional learning requirements</b>	Field trips
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory.
<b>Semester Offered</b>	1

#### Module content

Food biotechnology, an overview; importance, advances, trends and implications. Genetic engineering techniques; restriction enzymes, DNA cloning; Types of cloning vectors; Plasmid vectors; cosmid vectors; viral vectors; cell transformation and selection for transformants. Enzyme engineering and immobilization techniques; Classes of enzymes; Use of selected enzymes; Proteases, Amylases, cellulases, lipases; Enzyme immobilisation techniques; adsorption; covalent binding (cross linkage); entrapment; membrane confinement (Encapsulation). Fermentations; an overview of traditional versus modern fermentation technologies; Factors affecting the fermentation process, Scale up operations. Downstream processing; The five stages of downstream processing; Solid-Liquid Separation; Release of intracellular Products; (3) Concentration; Purification; Formulation. Biosafety risk assessment and risk management; the Namibian biosafety framework.

#### Student Assessment Strategies

Assessment activities will comprise of tests, written exams, assignments, forum discussions, practical reports, internal and external moderation/examination. Continuous Assessment will contribute 50% (minimum 2 tests, 1 forum discussion, 1 assignment and 3 practical reports). The final examination (comprise of 1 x 2h paper) will contribute 50%. To pass this module a student should obtain a minimum final mark of 50%.

#### F3712CB

#### BIOMETRY

<b>Module Title:</b>	<b>BIOMETRY</b>
<b>Module Code</b>	F3712CB
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact hours</b>	4 Lecture hours per week per semester 2 hour tutorial sessions per semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	16
<b>(Co-requisites)/</b>	
<b>Prerequisite</b>	S3512ST: Statistical Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 2

#### Module Content

Experimental design: Basic experimental terms; Principles of experimental design; Types of designs CRD; RCBD; Latin Square; Factorial; Split plot; Split-split plot and Repeated Measures designs; one-way and two-way ANOVA; assumptions and ANOVA model diagnostic checks. Parametric and non-parametric tests: comparison between parametric and non-parametric tests; Non-parametric test- Goodness of fit and test of association; paired and independent test in non-parametric; Kruskal-Wallis test; Friedman and Runs test. Multivariate techniques: PCA; CA; Path Analysis; FA; Canonical Correspondence; multidimensional scaling and Genotype × environment Interaction Analysis. Response Surface Methodology: Central Composite designs and Box-Behnken designs. Multiple Linear Regression: MLR model; Analysis and building a MLR; testing the usefulness of the MLR model. Survey Methods: Sampling Frame; Modes of data collection; research designs; and questionnaire design and reliability analysis.

#### Student Assessment Strategies

Continuous assessment (at least 2 tests; 2 tutorial test and 2 assignments): 50%; Examination: 50% (1x3 hour Examination paper). To pass this module a student must obtain a minimum final mark of 50%.

#### F3702SP

#### PRODUCT DEVELOPMENT

<b>Module Title:</b>	<b>PRODUCT DEVELOPMENT</b>
<b>Module Code</b>	F3702SP
<b>NQF Level</b>	7
<b>Notional Hours</b>	90
<b>Contact Hours</b>	2 lecture periods per week and one 3hour practical per week for one semester
<b>Additional Learning Requirements</b>	Compulsory visit to at least 4 food processing company including SMS.
<b>NQF Credits</b>	9
<b>(Co- requisites)</b>	
<b>Prerequisite</b>	F3512SP: Food Processing and Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Introduction to product Development: definitions and concepts describing the process of product development, the need for new product development (NPD). Food choice: how consumers perceive food quality, children and food choices, gender and food choice. NPD process: from idea generation and screening Discuss the new product development process in detail under the following headings: Screening, Feasibility, Development, Commercialization and Maintenance. The laddering technique, the quality functions development method. The principal of food processing toward achieving a consumer perceived product. Novel approaches for consumer involvement: Qualitative and quantitative research. Marketing issues to identify product niche, Product criteria and market research and survey. Problem for product refinement diagnosis, Legislation, labeling of new food product and shelf life determination. Price determination and price discovery for product in the markets

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 70% of the module grade (i.e., at least 6 assessed practicals (40%), 2 tests [30%] and 2 assignments, assessed as written [10%]) and final Product presentation [20%]) and a summative assessment (end of semester examination) 30% (1x 2 hours theory paper). Pass mark for the module is 50%.

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### **F3712SS FOOD AND SENSORY ANALYSIS**

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<b>Module Title:</b>	<b>FOOD AND SENSORY ANALYSIS</b>
<b>Module Code</b>	F3712SS
<b>NQF Level</b>	7
<b>Notional Hours</b>	170
<b>Contact Hours</b>	4 lecture periods per week and one 3-hour practical alternating week for one semester
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	17
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3711SC: Food Chemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### **Module Content**

Introduction and Stages of Food Analysis: Selection of sample and preparation, Selection and validation of methods, Official methods versus Rapid methods, Nutritional labelling, Data analysis and evaluation, Food compositional analyses (moisture, ash, protein, fat, carbohydrate, fibre, vitamins and minerals). Food Analytical Methods: High Pressure Liquid Chromatography (HPLC), Gas Chromatography, Spectroscopy, Atomic Absorption Spectroscopy, Inductively Coupled Plasma- Mass Spectrometry (ICP-MS), Immunoassay methods, Nuclear Magnetic Resonance (NMR), Thermal Analysis, Colour analysis, Food rheological properties analyses, Protein separation and characterization techniques, Food contaminants and residues. Sensory Evaluation: The role of human senses, psychology and physiology in the sensory perception of food, product attributes and sensory perception and thresholds, sample preparation and serving, good sensory practices, sensory training and procedures, sensory evaluation of texture, colour and appearance of food, sensory evaluation facilities, sensory profiling methods, difference tests, affective tests in consumer analysis, descriptive sensory analysis, statistical methods for sensory data and interpretation, sensory quality and shelf-life studies, application of sensory evaluation in food product development

#### **Student Assessment Strategies**

Continuous Assessment: 50% (minimum 2 tests, 2 assignments and 7 x marked practicals). Examination: 50% (1 x 3hr paper). Pass mark for the module is 50%.

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### **F3702SE FOOD ENGINEERING II**

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<b>Module Title:</b>	<b>FOOD ENGINEERING II</b>
<b>Module Code</b>	F3702SE
<b>NQF Level</b>	7
<b>Notional Hours</b>	90
<b>Contact Hours</b>	4 contact lectures per week for one semester; 1 practical/tutorial session per week for one semester.
<b>Additional learning requirements</b>	Excursion (Company visits)
<b>NQF Credits</b>	9
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	F3612SE: Food Engineering I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### **Module Content**

Heat and mass transfer applications: Unsteady state heat and mass transfer; psychrometrics and dehydration; sterilisation and heat penetration; refrigeration and freezing; evaporation; distillation; extraction; membrane separation and related unit operations. Fluid transfer: Pressure drop in hydraulic systems; Pump power requirements; pump selection and applications. Plant design: plant layout; plant operation and control; structural aspects; hygienic aspects of design; auxiliary equipment. Emerging food engineering technologies: Review of emerging technologies and their current and potential applications.

#### **Student Assessment**

This module will be evaluated using both formative and summative assessment, with the formative assessment contributing 50% to the final mark while the summative assessment would contribute 50%. The formative assessments will include at least 2 assessed written assignments, assessment of oral presentation and written report of project, virtual and lab report assessment and at least one written test. The summative assessment will comprise a written end of semester examination (1x3 hr paper). The pass mark for the module is 50%.

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## **I.6 FOURTH YEAR**

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### **F3810SR RESEARCH PROPOSAL**

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<b>Module Title:</b>	<b>RESEARCH PROPOSAL</b>
<b>Module Code</b>	F3810SR
<b>NQF Level</b>	8
<b>Notional Hours</b>	140
<b>Contact hours</b>	At least 4 contact lecture per week for semester 0
<b>Additional learning requirements</b>	
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core semester

**Module Content**

Finding the research gap, principles and ethics of research. Components of research proposals.

**Student Assessment Strategies**

Assessment for this module will consist of formative tasks, and the final mark will be made of 100% Continuous Assessment (CA). The CA will be made up of a written research proposal (100%). To pass this module a student should obtain a minimum final mark of 50%.

**F3883SR RESEARCH PROJECT**

<b>Module Title:</b>	<b>RESEARCH PROJECT</b>
<b>Module Code</b>	F3883SR
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<b>Contact hours</b>	At least 2 contact lecture periods per week for two (2) semesters; practical session per week for two (2) semesters
<b>Additional learning requirements</b>	
<b>NQF Credits (Co-requisites)</b>	16
<b>Prerequisite</b>	(F3810SR, Research proposal); (F3712CB, Biometry)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content**

Principles and ethics of Research. Factors influencing research. Criteria for scientific method Components of research proposals and projects. Basics of research in a nutshell (Scientific experimentation and writing a scientific paper).

**Student Assessment Strategies**

Written Proposal: 10%

Proposal presentation: 10%

Progress presentation: 10%

Final presentation: 10%

Project Report: 60%

To pass this module a student should obtain a minimum final mark of 50%.

**F3811SE FOOD ENTREPRENEURSHIP AND MANAGEMENT**

<b>Module Title:</b>	<b>FOOD ENTREPRENEURSHIP AND MANAGEMENT</b>
<b>Module Code</b>	F3811SE
<b>NQF Level</b>	8
<b>Notional Hours</b>	180
<b>Contact Hours</b>	4 contact lectures per week for one semester
<b>Additional learning requirements</b>	Mini project
<b>NQF Credits (Co-requisites)</b>	18
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content.**

On completing the module students should be able to:

Fundamentals of economics in a global context overview: Economic resources; supply, demand and pricing; elements of regional and global trade. Business Strategy: Strategic management process; external environment evaluation; internal capabilities analysis; product differentiation; cost leadership. Development of food enterprise value chains: Mapping, analysis; management and strengthening of food enterprise value chains. Food processing venture creation: Identifying and screening business opportunities; feasibility analysis; process economics; viable business model development and operationalizing; business planning for a new venture. Food Marketing: Product attributes, market segmentation; configuring marketing mix; marketing plan development; product management. Business Ethics: Ethical values and principles; ethics issues in business resourcing and marketing; ethics in corporate governance; corporate social responsibility; sustainability. Supply Chain Management Issues: Key issues; centralized vs decentralized systems; supply chain integration; make or buy decision; distribution and logistics in supply chain. Emerging opportunities in food processing: Review of emerging food processing technologies and business opportunities; needs driven innovation.

**Student Assessment**

This module will be evaluated using both formative and summative assessment, each contributing 50% to the final mark. The formative assessments will include at least 2 assessed written assignments, a minimum of 2 written tests and one mini project submission. The summative assessment will comprise a written end of semester examination (1x3 hr paper). The pass mark for the module is 50%.

**F3801SQ QUALITY MANAGEMENT SYSTEMS**

<b>Module Title:</b>	<b>QUALITY MANAGEMENT SYSTEMS</b>
<b>Module Code</b>	F3801SQ
<b>NQF Level</b>	8
<b>Notional Hours</b>	90
<b>Additional learning requirements</b>	
<b>Contact Hours</b>	2 lecture periods per week for 12 weeks and 1 X 2 hour practical session every two weeks for one semester
<b>NQF Credits</b>	9
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

### Module Content

Introduction to food quality management systems: terms and definition, quality and safety in food industries, food quality attributes, factors influencing food quality, application of quality control to food enterprises business processes, Deming principles, Sanitary and Phyto-Sanitary (SPS) agreements. Codex Alimentarius Commission: terms, definitions, purpose and scope of the CAC. Pre-requisite requirements: GMPs (Good Manufacturing Practices); GHPs (Good Hygiene Practices), GAPs (Good Agricultural Practices), SOPs (Standards Operating Procedures). HACCP (Hazard Analysis Critical Control Points): terms and definitions, HACCP preliminary steps, development and implementation of HACCP Principles. Other food quality assurance systems: Global Food Safety Initiative (GFSI), British Retail Consortium (BRC), Fast Moving Consumer Goods (FMCG). Quality management systems (ISO 9001), FOCUS – PDCA cycle/Deming cycle. Integrated Food Safety Management Systems- ISO 2200: main elements of ISO 22000. Environmental Management Systems –ISO 14001: relate the impact of food processing operations on the environment, background and evolution of ISO 14001, elements of ISO 14001. General requirements for the competence of testing and calibration laboratories- ISO/IEC 17025:2017: Background of ISO/IEC 17025:2017, main elements of ISO/IEC 17025:2017, relate the application of the standards to laboratories serving food industries. Food laws and regulation in Namibia: structure and functions of Namibian food control systems. Risk analysis in food safety: components of food safety risk analysis.

### Student Assessment strategies

This module will be evaluated using both formative and summative assessment, each contributing 50% to the final mark. The formative assessments will include at least 2 assessed written assignments, a minimum of 2 written tests and one mini project submission. The summative assessment will comprise a written end of semester examination (1x3 hr paper). The pass mark for the module is 50%.

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### F3811ST FOOD TOXICOLOGY

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<b>Module Title:</b>	<b>FOOD TOXICOLOGY</b>
<b>Module Code</b>	F3811ST
<b>NQF Level</b>	8
<b>Notional Hours</b>	190
<b>Contact hours</b>	Four (4) contact lecture periods per week for one semester; one practical session per week for one semester
<b>Additional learning requirements</b>	None
<b>NQF Credits (Co-requisites)</b>	19
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

### Module content

Toxicology terms and definitions; toxicology; toxicity; risk acute toxicity and chronic toxicity. Toxicokinetics; absorption, distribution, biotransformation and excretion; Toxicodynamics; toxicity measurements NOEL, NOAEL (No Observed Adverse Effect Level), Median lethal dose (LD50), Median effective dose (ED50) Median toxic dose (TD50). Common effects of chemicals to cause symptoms; interference, depression or stimulation of the central nervous system (CNS), effect on internal organs (lungs, local damage). Types of toxicity; chemical, biological, physical, chronic and acute toxicity. Biochemical aspects of toxicity; Phase I and Phase II reactions; biochemical and toxic effects of toxicants. Natural toxic constituents of foods; Aquatic biotoxins, Cyanogenic glycosides, Furocoumarins, Lectins, Mycotoxins, Solanine and chaconine, poisonous mushrooms, alkaloids, how to minimize health risk from natural toxins. Contaminants and food additives; pesticides, heavy metals, nitrates and organophosphates. Food spoilage, food borne diseases; manifestations of toxic effects and their remedies will be covered. Remedial actions of food toxicity; food plant sanitation and hygiene, food inspection and food legislation in Namibia.

### Student Assessment Strategies

Continuous assessment (50% of the final mark) consisting of a combination of tests and quizzes, assignments and practical reports. A continuous assessment mark of at least 40% is required to gain exam admission. One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark. A final mark of 50% is required to pass this course.

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### F3802SB BEVERAGE SCIENCE AND TECHNOLOGY

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<b>Module Title:</b>	<b>BEVERAGE SCIENCE AND TECHNOLOGY</b>
<b>Course Code</b>	F3802SB
<b>NQF Level</b>	8
<b>Notional Hours</b>	90
<b>Additional learning requirements</b>	
<b>Contact Hours</b>	2 lecture periods per week and 1 x 3hour practical every two weeks for one semester
<b>NQF Credits</b>	9
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

### Module Content

Classification of beverages: alcoholic and non-alcoholic and their further sub-classes based on their use as natural and synthetic, carbonated and non-carbonated, hot and cold, stimulating and non-stimulating. Water: packaged drinking water, the manufacturing process of raw and processed water, methods of water treatment, quality standard (for bottled water, mineral water, natural spring water, flavoured water, carbonated water). Fruit juice and fruit nectar: composition, chemical and physical properties, reconstituted juice, not-from-concentrate juice, processing technologies, standards and specifications. Milk: plant and animal milk, fermented and non-fermented milk, processing technologies, quality assurance, traditional products. Tea, Coffee, Cocoa: types of tea unfermented, fully fermented and semi-fermented, instant tea and coffee, iced tea and coffee, powder coffee, traditional products. Beer: ales and lager beer, malting technologies, mashing, fermentation, traditional products. Wine: white and red wine, sparkling and non-sparkling wine, champagne, fermentation. Spirits: ingredients, liquor, liqueur, fermentation, distillation, traditional products.

### Student Assessment Strategies



## J. B.SC. AGRICULTURE (FOOD SCIENCE & TECHNOLOGY) HONS\_[17BSFS] PROGRAMME IS PHASED OUT - NO INTAKE FOR 2023

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by School of Science. English Communication and Study Skills, English for Academic Purposes, Contemporary Social Issues and Computer Literacy are University Core Modules taken by all First Year University of Namibia students.

### J.1 PROGRAMME SCHEDULE

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
UCLC 3509	Computer Literacy	5	8	C	
ULCE 3419	English Communication and Study Skills	4	16	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
SBLG 3511	Introduction to Biology	5	16	C	
SPHY 3501	Physics for Life Sciences I	5	8	C	
SMAT 3511	Basic Mathematics	5	16	C	
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 1 Semester 2</b>					
ULEA 3519	English for Academic Purposes	5	16	C	
SCHM 3532	Chemistry for Life Sciences	5	16	C	
SPHY 3532	Physics for Life Sciences II	5	16	C	
SBLG 3512	Diversity of Life	5	16	C	
SMAT3512	Pre-calculus	5	16	C	
<b>Total credits Semester 2</b>					<b>80</b>
<b>Total CREDITS YEAR 1</b>					<b>152</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 2 Semester 1</b>					
AAEC 3681	Principles of Microeconomics	6	12	C	None
AAEC 3691	Rural Sociology	6	12	C	None
AASC 3681	Genetics	6	12	C	None
AFST 3681	General Microbiology	6	12	C	None
ACRS 3681	Biostatistics	6	12	C	None
AFST 3691	Post-Harvest Technology	6	12	C	None
AFST 3601	Human Nutrition	6	8	C	None
<b>Total Credits Semester 1</b>					<b>80</b>
<b>Year 2 Semester 2</b>					
AFST 3682	Fruits and Vegetable Technology	6	12	C	None
AFST 3602	Food Technology	6	8	C	None
AASC 3612	Biochemistry	6	16	C	SCHM 3532 (Chemistry for Life Sciences)
AASC 3602	Livestock Production Systems	6	8	C	None
AFST 3692	Food Biotechnology	6	12	C	None
<b>Total credits Semester 2</b>					<b>56</b>
<b>Total CREDITS YEAR 2</b>					<b>136</b>
Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 3 Semester 1</b>					

AACA 3701	Field Attachment I	7	8	C	None
AFST 3781	Food Chemistry	7	12	C	ASC 3612 (Biochemistry)
AFST 3791	Food Microbiology	7	12	C	FST 3681 (General Microbiology)
AFST 3701	Product Development and Sensory Evaluation	7	8	C	None
AFSC 3791	Food Processing Technology	7	12	C	AFST 3602 (Food Technology)
AFSC 3781	Meat Science & Technology	7	12	C	None
<b>Total Credits Semester 1</b>					<b>64</b>
<b>Year 3 Semester 2</b>					
ACSC 3792	Research Methods	7	12	C	ACRS3681 (Biostatistics)
AFST 3702	Food Toxicology	7	8	C	FST 3781 Food Chemistry
AFST 3722	Food Analysis and Instrumentation	7	8	C	None
AAEC 3702	Entrepreneurship	7	8	C	None
AFSC 3782	Principles of Food Engineering	7	12	C	None
AAEC 3782	Agricultural Marketing	7	12	C	None
<b>Total credits Semester 2</b>					<b>60</b>
<b>Total CREDITS YEAR 3</b>					<b>124</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 4 Semester 1</b>					
AACA 3801	Field Attachment II	8	8	C	AACA 3708 (Field Attachment I)
AFST 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AFST 3841	Quality Management Systems	8	8	C	FST 3602 (Food Technology)
AFST 3881	Dairy Science & Technology	8	12	C	FSC 3791 (Food Processing Technology)
AFST 3891	Applied Food Engineering	8	12	C	FSC 3782 Principles of Food Engineering
AFST 3861	Food Packaging, Storage & Distribution	8	8	C	None
<b>Total Credits Semester 1</b>					<b>64</b>
<b>Year 4 Semester 2</b>					
AFST 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AFST 3862	Sea Foods Technology	8	8	C	FST 3602 (Food Technology)
AFST 3882	Cereal Science & Technology	8	12	C	None
AFSC 3802	Edible Fats & Oils Technology	8	8	C	FST 3781 (Food Chemistry)
AAEA 3882	Agric. Business Management	8	12	C	None
AFST 3822	Plant Equipment & Management	8	8	C	FSC 3791 (Food Processing Technology)
<b>Total credits Semester 2</b>					<b>64</b>
<b>Total CREDITS YEAR 4</b>					<b>128</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>540</b>

## J.2 MODULE DESCRIPTORS

### J.3 FIRST YEAR

#### CLC3509 COMPUTER LITERACY

Module title:	COMPUTER LITERACY
Code:	CLC3509
NQF level:	5
Contact hours:	1 lecture theory and 1 lecture practical per week for 14 weeks

<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 100%: 2 Practical Tests 50%, 2 Theory Tests 50%
<b>Prerequisites:</b>	University Entry

**Module Content:**

The module covers the following topics. Introduction to Computers: hardware and software, types and categories of computers, usage of Computer devices and peripherals. Working with the windows operating system: File Management, working with multiple programs, using the recycle bin. Using a word processor: formatting a text and documents, spelling check, grammar and thesaurus tools, inserting tables, auto-shapes, clip arts, charts, and mail merge. Spreadsheet: worksheets and workbooks, ranges, formulas and functions, creating graphs, charts, and printing the workbook. Databases: creating tables, relationships, queries, forms and reports. Presentation software: slide layout and master, animations, auto-content wizard and templates. Communication tools: introduction to the Internet, web browsers, search engines, downloading and uploading files, creating and sending messages, email etiquette, internet security, and digital signatures.

**LCE3419 ENGLISH COMMUNICATION & STUDY SKILLS**

<b>Module title:</b>	ENGLISH COMMUNICATION AND STUDY SKILLS
<b>Code:</b>	LCE3419
<b>NQF Level:</b>	4
<b>Contact hours:</b>	4 hours per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment (60%): two tests (reading and writing), two reading assignments, one oral presentation, Examination (40%): one three hour examination paper
<b>Pre-requisites:</b>	None

**Module Content:**

This module is aimed at assisting students in the development of their reading, writing and speaking and listening skills, in order to cope with studying in a new academic environment and in a language which may not be their first language. The module also focuses on study skills that students need throughout their academic careers and beyond. The module serves as an introduction to university level academics, where styles of teaching and learning differ from those at secondary schools in that more responsibility is placed on the student. The module therefore, focuses on the skills that students need throughout their academic careers and beyond.

**CSI 3580 CONTEMPORARY SOCIAL ISSUES**

<b>Module title:</b>	CONTEMPORARY SOCIAL ISSUES
<b>Code</b>	CSI 3580
<b>NQF Level</b>	5
<b>Contact hours</b>	Equivalent to 1 hour per week for two semesters (Online)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 & 2 (Year Module)

**Module Descriptor (Rationale of the module):**

The module, Contemporary Social Issues (CSI3580), is designed to encourage behavioural change among UNAM students and inculcate the primacy of moral reasoning in their social relations and their academic lives. In providing students with critical and analytical thinking the module enables students to grow and develop into well rounded citizens, capable of solving contemporary social challenges experienced in their communities and societies. The teaching of the module takes three dimensions: the intellectual, the professional and the personal dimensions. The intellectual dimension is fostered through engaging students with subject knowledge, independent learning and module assessment. The professional dimension, on the other hand, is fostered through exposing students to real life situations of case studies and practical exercises that draws attention to social issues that attract ongoing political, public and media attention and/or debate. Finally, the professional dimension is fostered through group work, online discussions and class participation

**SBLG 3511: INTRODUCTION TO BIOLOGY**

<b>Module title</b>	INTRODUCTION TO BIOLOGY
<b>Code</b>	SBLG3511
<b>NQF Level</b>	4
<b>Contact hours</b>	4 lectures/ week for 14 weeks and one 3-hour practical session per week.
<b>NQF Credits</b>	16
<b>Module Assessment:</b>	Continuous assessment (40%): Theory (not less than 3 tests and 2 assignments), 40%. Practicals (not less than 10 marked assignment), 60%. Examination (60%): 3 hour examination paper.
<b>Prerequisite</b>	NSCC (Biology C or better)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

It will consider organization of life, chemical basis of life, carbohydrates, proteins, nucleic acids, lipids and fats, water, cell structure and function, prokaryotic and eukaryotic cells, ultra-structure of plant and animal cells, cytoskeleton, membrane structure and function, cell communication, mitosis, meiosis, cell reproduction, cell cycle, and cell death. The following topics will be covered: Introduction to systems of classification, taxonomy and binomial nomenclature, including the five kingdoms and the three domain system. Definitions and categories/groups within the five kingdoms, evolution by natural selection (microevolution vs macroevolution), phylogeny and evolutionary relationships in five kingdoms. The course content will also include genes, chromosomes, genomes, Mendelian genetics, extensions to Mendelian genetics, chromosome theory of inheritance, linkage and cross-over, recombination, sex determination. The course content will also cover an introduction to Ecology: Definitions, history, scales in ecology, application of ecology. Conditions and Resources: Environmental conditions, animals and their resources, plants and their resources.

**SPHY 3501: PHYSICS FOR LIFE SCIENCES I**

<b>Module title:</b>	PHYSICS FOR LIFE SCIENCES I
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<b>Code:</b>	SPHY3501
<b>NQF level:</b>	4
<b>NPSC:</b>	N/A
<b>Contact hours:</b>	28 Lectures and 14 Practical Sessions/Tutorials
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.
<b>Pre-requisites:</b>	None

**Module Content:**

This module is to introduce Life science students to physics concepts and applications that will be useful to them in their undergraduate studies and carrier. The course will cover the following topics:

Units and significant figures; Motion in one dimension, average velocity, acceleration, freely falling bodies; Vectors and scalars, addition and subtraction of vectors in one and two dimensions, multiplication of vectors, component method of vector addition; Projectiles; Force and weight, Newton's laws and applications, free-body diagrams, friction, motion on inclined planes; Uniform circular motion, period and frequency of motion, centripetal force, banking of curves; Newton's law of Universal gravitation, gravity near the Earth's surface, satellites; Kepler's laws; Work done by a constant force, kinetic energy, work-energy theorem, potential energy, conservation of Mechanical energy, power; Momentum, impulse, conservation of energy and momentum in collisions, elastic and inelastic collisions in one dimension.

**SMAT 3511: BASIC MATHEMATICS**

<b>Module Title:</b>	BASIC MATHEMATICS
<b>Code:</b>	SMAT 3511
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

**Module Content:**

Sets: notations and diagrams to represent sets, subset, empty set, equality of sets, intersection, union, complement.

Algebraic expressions: simplification, expansion, polynomials, remainder and factor theorem, partial fractions.

Trigonometry: trigonometric functions, basic trigonometric identities. The absolute value, linear equations, linear inequalities, quadratic equations, the quadratic formula, quadratic inequalities. Functions: domain, codomain, image, preimage, even function, odd function. Sequences: the general term, the geometric sequence, the arithmetic sequence. The Binomial Theorem.

**LEA3519 ENGLISH FOR ACADEMIC PURPOSES**

<b>Module title:</b>	ENGLISH FOR ACADEMIC PURPOSES
<b>Code:</b>	LEA3519
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 periods per week for 14 weeks
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral Presentation; Examination (40%) : One three hour examination paper
<b>Prerequisites:</b>	None

**Module Content:**

This module develops a student's understanding, and competencies regarding academic conventions such as academic reading, writing, listening and oral presentation skills for academic purposes. Students are required to produce a referenced and researched essay written in formal academic style within the context of their university studies. Students are also required to do oral presentations based on their essays. The reading component of the course deals with academic level texts. This involves students in a detailed critical analysis of such texts. The main aim is therefore, to develop academic literacy in English.

**SCHM 3532: CHEMISTRY FOR LIFE SCIENCES**

<b>Module Title:</b>	CHEMISTRY FOR LIFE SCIENCES
<b>Code:</b>	SCHM3532
<b>NQF Level:</b>	5
<b>Contact Hours:</b>	56 hours of lectures, 42 hours of practical sessions.
<b>Credits:</b>	16
<b>Module Assessment:</b>	CA: 50% (minimum 3 tests 80%, laboratory component 20%, tutorial assignments 10%). Final Exam: 50%; (1 x 3 hour exam paper)
<b>Pre-requisites:</b>	None

**Module Content:**

Classification of Matter: Mixtures and Pure substances; Physical States of Matter; Physical and Chemical Properties.

Extensive and Intensive properties.

Measurements: Units, Significant figures; Precision and Accuracy, Factor Label Method. Atomic structure and the Periodic table; Electron configuration; Physical and Chemical properties as predicted from groups. Ionic compounds and Molecular compounds: Writing chemical formulae and naming of ionic and molecular compounds. Average Atomic Mass. The Mole Concept; Percent Composition, Empirical formula and Molecular formula. Stoichiometry: limiting reagent, percent yield. Solutions: electrolytes and non-electrolytes, aqueous solutions, ionic equations; concentrations: percent concentration; molarity, molality; dilution of solutions; structure and solubility. Types of bonds; Lewis structures; Resonance structures; Molecular geometry: the VSEPR model, Polarity of molecules. Acid-base equilibrium: properties of acids and bases; relations of acids and bases, self ionisation of water; strengths of acids and bases; the pH scale; hydrolysis of salts; buffers; acid-base titration. Introduction to organic chemistry: organic compounds; structural formulae and conformations; functional groups; Classes of hydrocarbons: alkanes, cycloalkanes: alkanes; alkenes and alkynes; oxidation and reduction; addition reactions; stereo-isomerism. Alcohols, phenols, thiols, ethers: organic compounds of oxygen; common alcohols and phenols. Carboxylic acids and esters, amines and amides: Introduction to carbohydrates, lipids and porphyrins.

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**SPHY 3532: PHYSICS FOR LIFE SCIENCES II**

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<b>Module Title:</b>	PHYSICS FOR LIFE SCIENCES II
<b>Code:</b>	SPHY 3532
<b>NQF Level:</b>	4
<b>Contact Hours:</b>	4 Lectures per week for 14 weeks, Practical Time: 14 sessions (42 hours)
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment (50%, Minimum 2 tests, 4 assignments and practical reports) and Examination (50%, 1 x 3-hour paper)
<b>Pre-requisites:</b>	NSSC Physical Science
<b>Co-Requisites:</b>	SPHY 3401: Physics for Life Sciences I; SMAT3511: Basic Mathematics; SMAT3512: Pre-calculus;

**Module Content:**

This module introduces life science students to concepts of physics and their application to real life situations, new topics that were not dealt with in PHY 3101 are introduced (i.e., on electricity, magnetism and radioactivity). The content of this course is good enough to help the life science students throughout their undergraduate work and careers. The following topics will also be covered: Electric charge; insulators and conductors; Electric force and coulomb's law, Electric field and Gauss's law; Electric potential; Capacitance and capacitors; Direct current; Ohm's law and simple circuits; Magnetic field; Alternating current; Transformers; Phenomenological approach to RL and RC circuits; Temperature, gas and thermal expansion; Basic geometrical optics; Radioactivity and its detection.

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**SBLG3512: DIVERSITY OF LIFE**

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<b>Module title:</b>	DIVERSITY OF LIFE
<b>Code:</b>	SBLG 3512
<b>Course Equivalent:</b>	NSSC (/HIGH GRADE) Biology
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lecture periods / week for 14 weeks and one three hour practical session per week
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment: Theory (not less than 3 tests and 2 Assignments) 40% Practicals (not less than 10 marked assignments) 50% Examination: 60% (1 x 2 hour examination paper)
<b>Prerequisites:</b>	NSSC (Biology C or better)

**Module Content:**

This module is designed to give students a detailed understanding of the diversity of life. It gives students the broader appreciation of biodiversity in the different ecological habitats. The course shall describe diagnostic characteristics of principle taxonomic categories for each phylum. Coverage of each Phylum shall follow a phylogenetic (evolutionary) approach as well as introduce broad ecological and physiological principles. Various aspects of reproduction and development shall be highlighted. This module prepares students to understand subsequent courses such as Introduction to Ecology and Microbiology, Population Ecology, Comparative physiology, Biogeography, Plant and Animal Form and Function

Topics covered will include viral, bacterial, fungal, algal, animal and plant diversity. It then considers the characteristics and life cycles of the following important algae, animal and plant groups: Chlorophyta, Phaeophyta, Rhodophyta, Chrysophyta, Euglenophyta, Pyrrophyta, Cryptophyta, Protostomate phyla: Nemertea, Mollusca, Anellida, Arthropoda, Nematoda, Rotifera, Lophophorates, Onychophora. Deuterostomate phyla: Echinodermata, Hemichordata and Chordata (Subphyla: Urochordata, Cephalochordata and Vertebrata: Class Myxiniiformes, Petromyzontiformes, Placoderms, Chondrichthyes, Actinopterygii, Actinistia, Dipnoi, Amphibia, Reptilia, Aves, Mammalia) bryophytes, seedless vascular plants, gymnosperms, and the angiosperms. Concepts such as Homology and analogy; body symmetry (radial, bilateral), cephalisation, body cavities: diploblastic, triploblastic (acoelomate and coelomate [deuterostomes and protostomes]) will be covered.

Examples from Namibia shall be used where possible and applicable. The course content shall be supplemented with appropriate weekly practical sessions in the laboratory and in the field.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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**SMAT 3512: PRE-CALCULUS**

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<b>Module Title:</b>	PRE-CALCULUS
<b>Code:</b>	SMAT 3512
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

**Module Content:**

Functions: one-to-one and onto functions, horizontal line test, composition of functions, inverse of a function. Introduction to exponential and logarithmic functions. Limit of a function: definition, left and right limits, infinite limits, limits at infinity, continuity in terms of limits. Differentiation: rate of change, derivative of a function, rules of differentiation, increasing and decreasing functions and graph sketching. Integration: antiderivatives, the definite integral, area under a graph. Trigonometry: further trigonometric identities, area of a sector and segment of a circle, derivatives and integrals of trigonometric functions.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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**J.4 SECOND YEAR**

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**AFST3691: POST HARVEST TECHNOLOGY**

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<b>Module Title:</b>	POST HARVEST TECHNOLOGY
<b>Code</b>	AFST3691
<b>NQF Level</b>	6
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three Lecture hours / week for 14 weeks; 03 Practical hours / week for alternating weeks. Duration of 14 weeks.
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Exam: 60% (1 x 3 hr paper).
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

This course includes issues such as postharvest losses; physiological and biochemical characteristics of agricultural products with respect to maturation, ripening and storage life; respiration and its factors affecting respiration rates in selected agricultural crops; controlled atmosphere storage (CAS) and modified atmosphere packaging (MAP); postharvest treatments; postharvest handling, drying and storage of selected crops; pest control and fumigation, and other factors influencing quality. This course develops the students understanding of the ethics and practices employed in food processing. In addition, students are given an understanding of food preservation techniques and factors that affect food quality and shelf life.

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**AFST 3681: GENERAL MICROBIOLOGY**

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<b>Module Title:</b>	GENERAL MICROBIOLOGY
<b>Code</b>	AFST 3681
<b>NQF Level</b>	6
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three Lecture hours / week for 14 weeks; 03 Practical hours / week for alternating weeks. Duration of 14 weeks.
<b>Assessment Strategies</b>	Continuous Assessment 40% (minimum 2 tests, 2 assignments and 4 practicals). Examination: 60% (1 x 2hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

This course provides students with a general overview of microbiology, their environment, classifications, their morphology, structures and chemical composition. The biology of bacteria, fungi, algae, protozoa and viruses. Effect of antibiotics on microorganisms, important pathogens of plants and animals. The role of microorganisms in nature; in biogeochemical cycles, in general industries, food industries and in the soils. Concept of microbiology with special reference to microscopy, staining procedure, sterilization, aseptic, pure culture techniques and media preparation.

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**AFST 3601: HUMAN NUTRITION**

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<b>Module Title:</b>	HUMAN NUTRITION
<b>Code</b>	AFST 3601
<b>NQF Level</b>	6
<b>Contact hours</b>	Two Lecture hours / week for 14 weeks; 03 Practical hours / week for alternating weeks. Duration of 14 weeks.
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals). Exam: 60% (1 x2hr paper)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

This course gives students an overview of the locally available foods in Namibia and SADC region, basic nutritional aspects, food digestion system and fluctuations of nutrients in the body. Topics include Students anthropometric measurements: Body Mass Index (BMI), Basal Metabolic Rate (BMR) and Physical Activity Level (PAL); nutritional disorders resulting from deficiencies and excesses e.g. Blindness, Marasmus, Kwashiorkor and Obesity and other macronutrient deficiencies such as Rickets and Anaemia. Balanced ration for each group of people. Students will acquire knowledge in the areas of preservation of nutrients, processing, packaging, GMPs & HACCP, food laws, food toxicology, intolerances and allergies. The role of nutrition with respect to HIV/AIDS will be covered.

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**AFST 3682: FRUITS AND VEGETABLES TECHNOLOGY**

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<b>Module Title:</b>	FRUITS AND VEGETABLES TECHNOLOGY
<b>Code:</b>	AFST 3682
<b>NQF Level</b>	6
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three hours of lectures per week, 03 hrs practicals every two week. Duration of 14 weeks.
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Students acquaint themselves with types of fruits and vegetables, their definitions, differences, uses, nutrition and economic importance including structure, composition and maturation of fruits and vegetables. They also analyse quality, handling procedures in order to extend shelf life of fresh produce and processed products. Students also learn processing and preservation of juices, concentrates, carbonated beverages, fermentation of wines, ciders, pickles, sauerkraut and drying, freezing, canning techniques. They evaluate quality and shelf life of processed fruits and vegetable products including packaging and labeling. They learn how to apply good manufacturing practices (GMPs) and Hazard analysis critical control points (HACCP).

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### AFST 3602: FOOD TECHNOLOGY

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<b>Module Title:</b>	FOOD TECHNOLOGY
<b>Code</b>	AFST 3602
<b>NQF Level</b>	6
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two hours of lectures per week, three hours practicals every two week. Duration of 14 weeks.
<b>Assessment strategies</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Exam: 60% (1 x 2hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

This course will introduce students to food industry in Namibia and SADC region on principles of food handling; food processing and preservation; food packaging and labeling. Impact of food technology on traditional foods and diet; influence of food technology on the culture and civilization of food consumption in Namibia; implications of population growth on the advancement of food technology. Food laws and quality management systems.

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### AFST 3692: FOOD BIOTECHNOLOGY

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<b>Module Title:</b>	FOOD BIOTECHNOLOGY
<b>Code</b>	AFST 3692
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three hours of lectures per week, 03 hours practicals every two week. Duration of 14 weeks.
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 3 hour paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

The course includes topics such as Food biotechnology, an overview; importance, advances, trends and implications. Genetic engineering techniques; restriction enzymes, DNA cloning-cell transformation and transfection, Enzyme engineering and immobilization techniques. Downstream processing, Fermentations. Scale up operations. Biosafety risk assessment and risk management.

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## J.5 THIRD YEAR

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### AACA3701: FIELD ATTACHMENT 1

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<b>Module Title:</b>	FIELD ATTACHMENT 1
<b>Code</b>	AACA3701
<b>NQF level</b>	7
<b>NQF credits</b>	8
<b>Contact hours</b>	
<b>Assessment strategies:</b>	Final assessment 100% (Attachment report and oral presentation).
<b>Prerequisite</b>	None
<b>Compulsory/elective</b>	Compulsory
<b>Semester offered</b>	1

#### Module Content:

The module is designed to expose students to practical experience of actual operations on food-industries research and quality assurance institution. It enables students to observe and participate in food processing, quality control and management of operations.

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### AFST 3781: FOOD CHEMISTRY

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<b>Module Title:</b>	FOOD CHEMISTRY
<b>Code</b>	AFST 3781
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three hours of lectures per week, three hours practicals every two week. Duration of 14 weeks.
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Exam: 60% (1 x 2hr paper)
<b>Prerequisite</b>	Biochemistry AASC 3612:
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

This course is intended to provide students with knowledge on water chemistry in food processing and technology. The chemistry of important carbohydrates in foods: monosaccharides, oligosaccharides, polysaccharides, related compounds and sensory properties. Amino acid and protein chemistry in foods: Sensory properties of amino acids and protein. Animal and plant proteins: Texturised proteins. Lipid chemistry as applied to foods: free fatty acids, fats, glycerides phospholipids, glycolipids, waxes and cutins. Emulsions, emulsifiers

and Flavour reversion. The role of minerals in foods and food processing. Major minerals and trace elements in food processing. The fat-soluble vitamins and water-soluble vitamins in foods and food processing. Aroma compounds; Food tastes and off-flavours. Nature, function and utilization of enzymes in food industry. Food additives including flavour enhancers; colouring agents; sugars and sweeteners; antioxidants. Surface-active agents; Thickening agents; Humectants; Anti-caking agents; Bleaching agents; Clarifying agents; Propellants and protective gases. Food texture, texture profile and measurement.

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#### **AFST 3791: FOOD MICROBIOLOGY**

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<b>Module Title:</b>	FOOD MICROBIOLOGY
<b>Code</b>	AFST 3791
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three hours of lectures per week, 03 hours practicals every two week. Duration of 14 weeks
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 1 assignment and 3 practicals). Exam: 60% (1 x 2hr paper)
<b>Prerequisite</b>	General Microbiology AFST 3681:
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

This course is intended to provide students with in depth knowledge on microorganisms of interest in food. The laboratory techniques used in the isolation, enumeration and identification of microorganisms in food. Kinetics of multiplication of microorganisms. Microbiological principles of food processing and preservation. Food poisoning and intoxication. Sampling and sampling plans. Indices of sanitation in food. Biochemical reactions of microorganisms in food.

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#### **AFST 3701: PRODUCT DEVELOPMENT AND SENSORY EVALUATION**

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<b>Module Title:</b>	PRODUCT DEVELOPMENT AND SENSORY EVALUATION
<b>Code</b>	AFST 3701
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two hours of lectures per week, three hours practicals every two week. Duration of 14 weeks.
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

This course includes key concepts such as the process of product development, legislation and labeling of food products. Marketing issues relating to the identification of product niche markets and product criteria, market research, evaluation and trends are also covered. Further, the application of problem diagnosis for product refinement is covered. With regard to sensory evaluation, topics covered include physiological and psychological foundations, senses, scales and ratings, time-intensity scaling. Also included are: application of sensory evaluation, types of panels, types of tests and their specific functions when conducting statistical analysis and during interpretation of data, and the application of a SACCP system.

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#### **AFST 3791: FOOD PROCESSING TECHNOLOGY**

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<b>Module Title:</b>	FOOD PROCESSING TECHNOLOGY
<b>Code</b>	AFST 3791
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact hours</b>	Two hours of lectures per week, 03 hours practicals every two week. Duration of 14 weeks.
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>Prerequisite</b>	AFST 3602 Food Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

This course includes issues such as handling of raw materials, food preparation processes e.g. size reduction, extrusion, preservation techniques e.g. pasteurization, sterilization, refrigeration, dehydration.

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#### **AFSC 3781: MEAT SCIENCE AND TECHNOLOGY**

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<b>Module Title:</b>	MEAT SCIENCE AND TECHNOLOGY
<b>Code</b>	AFSC 3781
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three hours of lectures per week, 03 hours practicals every two week. Duration of 14 weeks
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)
<b>Prerequisite</b>	AFST 3602: Food Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

This course is intended to provide students with knowledge on meat industry in Namibia and the SADC region. Structure and composition of meat. Meat proteins and their functionality. Handling of slaughter animals. Slaughtering techniques. Selected topics related to animal anatomy. Grading and pricing of carcasses. Slaughterhouse hygiene. Carcass composition and characteristics and meat quality. Wholesale and retail of meat cuts. Meat processing, equipment and handling: meat packaging, meat storage, chilling of meat, freezing of meat, smoking of meat, curing of meat, luncheon meats, sausages, sausage casings, meat fermentation. Quality factors and shelf life of processed meat products.

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### AFST 3702: FOOD TOXICOLOGY

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<b>Module Title:</b>	FOOD TOXICOLOGY
<b>Code</b>	AFST 3702
<b>NQF Level</b>	7
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two lecture hours / week for 14 weeks; 03 practical hours alternate weeks for 14 weeks.
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>Prerequisite</b>	FST 3781 Food Chemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

This course includes issues such as types of toxicity, toxicity measurements, biochemical aspects of toxicity, natural toxic constituents of foods, food spoilage and food borne diseases, manifestations of toxic effects and their remedies, food plant sanitation and hygiene, food inspection and legislation in Namibia.

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### AFST 3722: FOOD ANALYSIS AND INSTRUMENTATION

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<b>Module Title:</b>	FOOD ANALYSIS AND INSTRUMENTATION
<b>Code</b>	AFST 3722
<b>NQF Level</b>	7
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two lecture hours / week for 14 weeks; 03 practical hours alternate weeks for 14 weeks.
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)
<b>Prerequisite</b>	Food Chemistry AFST 3781
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

This course builds on concepts and principles of providing students with skills and dispositions regarding food analysis and instrumentation. Key concepts covered in the module include the scope of food analysis, analytical methods and procedures, assessment and validation of analytical data. The course explores issues on the importance of precision, accuracy, sensitivity, specificity, standard deviation, co-efficient of variation, good laboratory practice and quality assurance, health and safety when conducting food analysis. The module exposes the student to concepts and theories of AOAC, conventional analytical methods; analytical techniques: titrimetry, gravimetry; separation techniques: chromatography, electrophoresis; introduction to analytical spectroscopy: atomic spectroscopy, molecular spectroscopy and radiochemical methods.

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### AFSC 3782: PRINCIPLES OF FOOD ENGINEERING

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<b>Module Title:</b>	PRINCIPLES OF FOOD ENGINEERING
<b>Code</b>	AFSC 3782
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact Hours</b>	Three hours lectures per week for 14 weeks; 03 hours practical alternate week for 14 weeks.
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

This course covers: dimensions and units, unit operation calculations, heat and mass balance, heat and mass transfer, heat exchangers, fluid dynamics, rheology, psychrometrics and refrigeration calculations.

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## J.6 FOURTH YEAR

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### AFST 3810: RESEARCH PROJECT

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<b>Module Title:</b>	RESEARCH PROJECT
<b>Code</b>	AFST 3810
<b>NQF Level</b>	8
<b>NQF Credits</b>	16
<b>Contact Hours</b>	Equivalent to 1 hour per week for 14 weeks.
<b>Assessment Strategies:</b>	Oral Presentations 20% (10% x 2 presentations) Project Write-up 80%
<b>Prerequisite</b>	ACSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

The course includes writing of research proposal in Food Science and Technology field, carrying out research under supervision of lecturer, analyzing data and report presentation and research project write-up.

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#### **AACA 3801: FIELD ATTACHMENT II**

<b>Module Title:</b>	FIELD ATTACHMENT II
<b>Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>NQF Credits</b>	6
<b>Contact hours</b>	None
<b>Assessment strategies:</b>	Final assessment 100% (Attachment report, oral presentations, and confidential reports by field supervisors).
<b>Prerequisite</b>	AACA3701: Field Attachment I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

The module is designed to expose students to practical experience of actual operations in food industries and research institutions. It enables students to observe and participate in food processing, management of operations and quality control.

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#### **AFST 3841: QUALITY MANAGEMENT SYSTEMS**

<b>Module Title:</b>	QUALITY MANAGEMENT SYSTEMS
<b>Code</b>	AFST 3841
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two lectures per week for 14 weeks
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>Prerequisite</b>	AFST 3602: Food Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

This course is intended to provide students with knowledge on the basic principles of quality management; Good Manufacturing Practices (GMPs); Food Safety; Food Hygiene and Sanitation; Food laws and regulations; Codex Alimentarius; Hazard Analysis Critical Control Point (HACCP); ISO 9001:2000, ISO 22000, ISO/IEC 17025, ISO 14 001; World Organization for Animal Health (OIE) and World Organization for Plant Health. Cleaner productions and food risk assessment and/or analysis.

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#### **AFST 3881: DAIRY SCIENCE AND TECHNOLOGY**

<b>Module Title:</b>	DAIRY SCIENCE AND TECHNOLOGY
<b>Code</b>	AFST 3881
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three lectures per week for 14 weeks; 03 hours Practical every alternate week for 14 weeks.
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper).
<b>Prerequisite</b>	Food Processing Technology (AFSC 3791); Food Microbiology (AFST 3791)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

Students acquaint themselves with the knowledge of udder anatomy, milk synthesis, secretion, milk let down assisted by hormones (oxytocin and adrenalin), clean production, collection, transportation, preservation and quality assessment (chemical, physical and microbiological). They also learn how to process milk into various products, handling, packaging, storage, quality assurance and distribution of pasteurized milks (toned, recombined and reconstituted milks), cream, butter, fermented milk products, cheeses, ice cream, condensed/evaporated milk and milk powders. Marketing aspects of milk and dairy products are included.

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#### **AFST 3891: APPLIED FOOD ENGINEERING**

<b>Module Title:</b>	APPLIED FOOD ENGINEERING
<b>Code</b>	AFST 3891
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three lectures per week for 14 weeks; 03 hour Practical every alternate week for 14 weeks.
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### **Module Content:**

This course includes: Applied aspects of process and auxiliary equipment selection and operation of equipment for heating, cooling, pressure and vacuum development and fluid transport. Basic aspects of process control are also covered as well as advanced preservation technologies. Emerging Food Engineering technologies are discussed as well as their implication on future food processing. Aspects of computer modeling in food technology are covered.

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#### **AFST 3861: FOOD PACKAGING, STORAGE AND DISTRIBUTION**

<b>Module Title:</b>	FOOD PACKAGING, STORAGE AND DISTRIBUTION
<b>Code</b>	AFST 3861

<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two lectures per week for 14 weeks; 03 hours Practical for 3 hours every alternate week for 14 weeks.
<b>Assessment strategies</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practical). Examination: 60% (1 x 2hr paper).
<b>Prerequisite</b>	AFST 3602 Food Technology; AFST 3791 Post Harvest Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Students will acquaint themselves with essentials and importance of packaging, functions of packaging, types of packaging, methods of manufacturing packaging materials, their chemical and physical effects on food. They also learn the properties of packaging materials such as permeability to water, air and microbes including methods of prevention such as lamination and lacquering of packaging materials, shelf life and storage of packaging materials. They are also taught new packaging technologies to prevent food spoilage; aseptic packaging, free oxygen scavenging packaging, types of oxygen absorbers, gas-exchange packaging, vacuum packaging, alcohol generating agent, labeling and distribution of products.

**AFST 3862: SEA FOODS TECHNOLOGY**

<b>Module Title:</b>	SEA FOODS TECHNOLOGY
<b>Code</b>	AFST 3862
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two lectures per week for 14 weeks; 03 hours Practical for every alternate week for 14 weeks.
<b>Assessment strategies:</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)
<b>Prerequisite</b>	AFST 3602 Food technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

This course covers the fishing industry in Namibia and the concepts and principles involved in Fish-catching technology. The course focuses on the composition and chemistry of seafood components. The course exposes the students to the concepts and theories involved in processing surimi from fatty fish, Fish protein hydrolysates/ concentrates, Fish-meal and Fish-oil. Seafood processing by-products will also be covered. The course focuses on the Quality of seafoods e.g. freshness quality of seafoods, the uses of sensory assessment of fish and Seafoods and preservation of seafood quality. The topics of microbiological quality of seafoods e.g. virus, bacteria and parasites and marine toxins will be covered. Students are further exposed to principles and applications of Quality control and management in seafood.

**AFST 3882: CEREAL SCIENCE AND TECHNOLOGY**

<b>Module Title:</b>	CEREAL SCIENCE AND TECHNOLOGY
<b>Code</b>	AFST 3882
<b>NQF Level</b>	8
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three lectures per week for 14 weeks; 03 hours Practical for every alternate week for 14 weeks.
<b>Assessment strategies</b>	Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2 hr paper).
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

This course focuses on the types of cereals, their differences, uses and economic importance. The Physico-chemical composition and nutritional value of cereals grains are explored. Key concepts of quality assessment of cereal grains, grain handling and storage are covered in this course. Students are exposed to principles and applications involved in milling of different cereals e.g. Dry milling of maize, wet milling of maize, milling of wheat and milling of rice. The issues of flour quality, starch and its uses will be covered. These concepts are applied to the rheology of wheat flour dough and processing and characterization of cereal products. The course exposes the student to concepts involved in Baking technology e.g. bread, cakes, and biscuits; Breakfast cereals e.g. cornflakes, weetabix, puff products; Pasta Products e.g. spaghetti, macaroni and noodles. Key concepts, theories and applications in Brewing technology e.g. malting, malt milling, yeast growth kinetics, fermenter design, wort preparation and fermentation to beer, beer ageing and Quality assurance and control will be covered.

**AFSC 3802: EDIBLE FATS AND OILS TECHNOLOGY**

<b>Module Title:</b>	EDIBLE FATS AND OILS TECHNOLOGY
<b>Code</b>	AFSC 3802
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact hours</b>	Three lectures per week for 14 weeks; 03 hours Practical for every alternate week for 14 weeks.
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests, 1 assignment and 4 marked practicals) Examination 60% (1 x 2 hour paper)
<b>Prerequisite</b>	AFST 3781: Food Chemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The module includes a comprehensive Lipid chemistry review including the structure of common chemical reactions and simple physical properties. The module exposes the student to concepts and theories of seed decortications and simple decorticators, graters, pulverisers, heaters, roasters, expellers and presses. The issues relating to establishing a small scale and commercial extraction of fats and oils, Oil

refinery, Oil storage and packaging will be covered. The module also focuses on the importance of Shelf life, Side reactions during processing and food preparation. The module introduces students to Oil products e.g. cooking oil, margarine, lard, butter and salad oils. Product utilization and quality control is explored in this module.

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**FST 3822: PLANT EQUIPMENT AND MANAGEMENT**

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<b>Module Title:</b>	PLANT EQUIPMENT AND MANAGEMENT
<b>Code</b>	FST 3822
<b>NQF Level</b>	8
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two lecture hours per week for 14 weeks; 03hours Practical every alternate week for 14 weeks.
<b>Assessment Strategies:</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

The course includes: food processing plant layout, water/ waste water treatment, electrical power installation and safety, steam generation and utilization, Plant maintenance, plant records and accounts.

## K. BACHELOR OF SCIENCE IN FISHERIES AND OCEAN SCIENCES (LEVEL 7) (31BFOS) (SAM NUYOMA)

### K.1 PROGRAMME SCHEDULE

Course code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisites)/ Pre-requisites	Contact hours per week (L/P/T)
<b>Year 1 Core Semester</b>						
U3583AL	Academic Literacy IB	5	8	C	None	40 hours
U3403FS	Skills Portfolio	4	0	C	None	
U3583DD	Digital Literacy	4	8	C	None	Sem 0: 4hr/wk Sem 1: 2hr/wk Sem 2: 2hr/wk
F3500EE	Issues in Agriculture	4	4	E	None	20 hr
F3520ZP	Basic Programming with Python	5	4	E	None	20 hr
<b>Total Credits Core Semester</b>			<b>24</b>			
<b>Year 1 Semester 1</b>						
F3511OL	Introduction to Aquatic Life	5	13	C	None	L (4hr/wk)/p (3hr/Alt wk)
F3511OA	Aquatic Microbiology	5	13	C	None	L (4hr/wk)/p (3hr/Alt wk)
F3511OC	Aquatic Chemistry	5	13	C	None	L (4hr/wk)/p (3hr/Alt wk)
F3511OI	Ichthyology I	5	13	C	None	L (4hr/wk)/p (3hr/ Alt wk)
<b>Total Credits Semester 1</b>			<b>52</b>			
<b>Year 1 Semester 2</b>						
F3531CA	Mathematics for Agriculture	5	14	C	None	L (4hr/wk) /T (2hr/wk)
F3512OB	Biostatistics I	5	13	C	None	L(4hr/wk) /p (3hr/Alt wk)
F3502OF	Freshwater and Intertidal Ecology	5	7	C	None	L (2hr/wk) /p (3hr/Alt wk)
F3512OT	Biochemistry	5	13	C	None	L (4hr/wk) /p (3hr/Alt wk)
F3502OE	Natural Resources Economics	5	7	C	None	L (2hr/wk) /p (3hr/Alt wk)
<b>Total Credits Semester 2</b>			<b>54</b>			
<b>Total credits Year 1</b>			<b>130</b>			
<b>Year 2 Core Semester</b>						
U3683AL	Academic Literacy II	6	8	C	None	40 hours
U3520LP	Leadership Skills	5	2	C	None	10 hours
U3420CN	National and Global Citizenship	4	2	C	None	10 hours
F3600ZP	Introduction to Statistical Programming with R	6	8	C	None	20 hours
F3630OB	Business and entrepreneurship	6	8	C	None	40 hours
<b>Total Credits Core Semester</b>			<b>24</b>			
<b>Year 2 Semester 1</b>						
F3631OB	Biostatistics II	6	15	C	Biostatistics I	L(4hr/wk) /p (3hr/Alt wk)
F3631OG	Genetics for Aquatic Resources	6	15	C	None	L (4hr/wk) /p (3hr/Alt wk)
F3621OR	Physical Oceanography	6	8	C	None	L (2hr/wk) /p (3hr/Alt wk)
F3631OY	Ichthyology II	6	15	C	Ichthyology I	
<b>Total Credits Semester 1</b>			<b>53</b>			
<b>Year 2 Semester 2</b>						

F3632OS	Seafood Processing and Quality Control	6	16	C	None	L (4hr/wk) /p (3hr/wk)
F3632OQ	Aquaculture	6	16	C	Ichthyology I	L (4hr/wk) /p (3hr/wk)
F3632OC	Conservation Biology	6	16	C	None	L (4hr/wk) /p (3hr/wk)
F3622ON	Field Attachment Preparation	6	8	C	None	L (2hr/wk)
<b>Total Credits Semester 2</b>		<b>56</b>				
<b>Year 2 Total Credits</b>		<b>133</b>				
<b>Year 3 Core Semester</b>						
W3750OT	Field attachment	7	24	C	None	22 -25 weeks
<b>Total Credits Core Semester</b>		<b>24</b>				
<b>Year 3 Semester 1</b>						
F3751OM	Fisheries Management	7	16	C	None	L (4hr/wk)
F3751OE	Fisheries and Aquaculture Extension	7	16	C	Aquaculture	L (4hr/wk)
F3751OC	Ocean and Coastal Governance	7	16	C	None	L (4hr/wk)
<b>Total Credits Semester 1</b>		<b>48</b>				
<b>Year 3 Semester 2</b>						
F3742OT	Fishing Technology	7	9	C	None	L(2hr/wk) /p (3hr/Alt wk)
F3742OP	Production Technology in Aquaculture	7	9	C	None	L(2hr/wk) /p (3hr/Alt wk)
F3752OP	Dynamics of Aquatic Populations	7	18	C	Biostatistics II	L(4hr/wk) /p (3hr/wk)
F3752OO	Biological Oceanography	7	17	C	Physical Oceanography	L (4hr/wk) /p (3hr/Alt wk)
<b>Total Credits Semester 2</b>		<b>53</b>				
<b>Year 3 total credits</b>		<b>125</b>				
<b>TOTAL CREDITS FOR THE PROGRAMME</b>		<b>388</b>				

## K.2 MODULE DESCRIPTORS

### K.3 FIRST YEAR

#### F3500ZI ISSUES IN AGRICULTURE

<b>Module Title:</b>	<b>ISSUES IN AGRICULTURE</b>
<b>Module Code</b>	F3500ZI
<b>NQF Level</b>	5
<b>Notional Hours</b>	40
<b>Contact hours</b>	20 Contact hours
<b>Additional learning requirements</b>	Field trips, Seminars, and quest lectures
<b>NQF Credits (Co-requisites)</b>	4
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core Semester

#### Module content

Agriculture: Agriculture as important economic sector; Population dependence on agriculture for their livelihoods. Production systems: Production systems and production sustainability. Land tenure systems: freehold and customary tenure. Agricultural Opportunities and Restrictions: such as the veterinary cordon fence; financial collateral; and the greed in the commons. The Namibian market-driven economy and agricultural contribution: Agricultural practices; Resilience of livelihoods to withstand challenges posed by climate change; land scarcity, water; drought management relation to climate change; Cause and consequences of the supply chain of agricultural sub-sectors. Overview of sub-sectors and their value chains: cattle; sheep and goats; pigs; dairy; poultry; agronomy; horticulture; game and bio-mass. Niche markets: such as Swakara and Ethical issues of Genetically Modified Organisms (GMO's) and implications to food production systems; use of examples to demonstrate how a society use result into different externalities to balance policy intervention.

#### Student Assessment strategies

- Continuous assessment (100% of the final mark) consisting of a combination (or subset) of tests and quizzes (at least 3 hours in total), assignments, and practical reports (at least 4 gradable items).
- A final mark of 50% is required to pass this course

<b>F3511OA AQUATIC MICROBIOLOGY</b>	
<b>Module Title:</b>	<b>AQUATIC MICROBIOLOGY</b>
<b>Module Code</b>	F3511OA
<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	Lectures: 4 x 1hr/week per semester. Practical: 1 x 3 hr. Alternate week per semester
<b>Additional Learning Requirements</b>	Projects, Group and individual assignments
<b>NQF Credits</b>	13
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Overview to Microbiology: Microorganisms; Their aquatic environment; Classifications; Their morphology; Structures and chemical composition; The biology of aquatic bacteria; Fungi; Microalgae; Protozoa and viruses; Effects of antibiotics on microorganisms, Important aquatic pathogens of humans and aquatic organisms. The role of aquatic microorganisms: In general industries; food industries and the aquatic ecosystems. The concept of microbiology with reference to: Microscopy; Staining procedure; Sterilization; aseptic; pure culture techniques; Media preparation.

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 40% of the module grade (i.e., at least 8 assessed practicals (40%), tests [40%], and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 60% (1x 3 hours theory paper). Pass mark for the module is 50%.

<b>F3531CA MATHEMATICS FOR AGRICULTURE</b>	
<b>Module Title:</b>	<b>MATHEMATICS FOR AGRICULTURE</b>
<b>Module Code</b>	F3531CA
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>Contact hours</b>	4 Lecture hours / week / semester; 4 Tutorial hours / week / semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	12
<b>(Co-requisites)/</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Semester 1

#### Module Content

Ratios and Proportions: Share a given quantity in a specified ratio; and Use proportion to scale down or scale up quantities given a specific rate. Mathematics applications in agriculture: Calculation of various fertilizer contents; application rates; conversions in foreign markets; areas and volumes of various shapes; figures and Interest rates calculations Sets: Definition of a set; notation; equality of sets; subsets; characterization of equality via the subset relation; empty set; Venn diagrams; intersection; union; complement; proofs of simple results on set equality. Standard examples of sets: natural numbers; integers; rationals; real numbers. Cardinality of sets (examples of finite; infinite; countable; uncountable sets). Matrix Algebra: Matrices and vectors; principle of matrix multiplication; determinants; minors; cofactors and; transpose matrix; the cofactor matrix; adjoint and inverse; Cramer's rule; Solution of systems of equation; Gauss-Jordan elimination. Functions: Definition of function; Linear and non-linear function; selected nonlinear functions (exponents; and logarithms) and application in the biological field. Calculus: Differentiation and Integration of basic functions. Optimization: Review of inequalities; Linear; constrained and non-constrained problems: Review of series: Binomial and Geometric; factorial and summations notations.

#### Student Assessment Strategies

- Continuous assessment (at least 2 tests; 2 tutorial tests and 2 assignments): 40%; Examination 60% (1 x 3 hour paper).
- To pass this module a student must obtain a minimum final mark of 50%.
- Learning and Teaching Enhancement Strategies
- Internal moderation of examination papers and scripts.
- Peer review of course outlines and teaching.
- Review by Departmental Quality Assurance Committee.
- Student evaluation of teaching and materials.
- Regular reviews of course content and prescribed material.
- Effective supervision and monitoring of assignments; tests and examinations.

<b>P3511PG GENERAL PHYSICS I</b>	
<b>Module Title:</b>	<b>GENERAL PHYSICS I</b>
<b>Module Code</b>	P3511PG
<b>NQF Level</b>	5
<b>Notional Hours</b>	140
<b>Contact Hours</b>	Four (4) lectures, a 3-hour practical session every week with a bi-weekly 1-hour tutorial session for one semester.
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	14
<b>(Co-requisites)</b>	
<b>Pre-requisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Mechanics: Units, Physical Quantities, and Vectors; Motion Along a Straight Line; Motion in Two or Three Dimensions; Newton's Laws of Motion; Applying Newton's Laws; Work and Kinetic Energy; Potential Energy and Energy Conservation; Momentum, Impulse, and Collisions; Rotation of Rigid Bodies; Dynamics of Rotational Motion; Equilibrium and Elasticity; Fluid Mechanics; Gravitation; Periodic Motion. Waves and Acoustics: Mechanical Waves; Sound and Hearing. Thermodynamics: Temperature and Heat; Thermal Properties of Matter; The First Law of Thermodynamics; The Second Law of Thermodynamics. Practical: Experimental techniques, reading, measuring, uncertainty/error estimation, tabulation of data, graphing, elementary hypothesis verification, practical report writing.

#### Student Assessment Strategies

- Continuous assessment (50% of the final mark) consisting of a combination (or subset) of tests and quizzes, assignments, and practical reports (at least 6 gradable items).  
A continuous assessment mark of at least 40% is required to gain exam admission.
- One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.
- A final mark of 50% is required to pass this module.
- To qualify for a Supplementary Exam a final mark of 45–49% is required, subject to a subminimum of 40% in the Exam.

<b>F3511OL INTRODUCTION TO AQUATIC LIFE</b>	
<b>Module Title:</b>	<b>INTRODUCTION TO AQUATIC LIFE</b>
<b>Module Code</b>	F3511OL
<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	Lectures: 4 x 1h/week per semester. Practicals: 1 x 3 hr alternate week per semester
<b>Additional learning requirements</b>	Practical sessions will involve sampling to introduce students to the different aquatic life forms
<b>NQF Credits</b>	13
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Introduction to biodiversity: Definitions and Concepts; Scales of Biodiversity; Threats to Biodiversity. Classification and naming of Species: Systems of classification; Scientific names; Nomenclature. The Kingdoms of Life: Animalia; Plantae; Fungi; Protista and Monera. The Aquatic flora of Namibia: The major algal groupings of the Benguela(form and function). The Aquatic Fauna of Namibia: The major animal phyla of the Benguela (form and function). Exploitation and Conservation: The value of biodiversity; the economic benefits of aquatic life; Factors affecting biodiversity loss; Society and biodiversity.

#### Student Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. Formative assessments will make up 60% of the module grade (i.e., at least 8 assessed practical reports (40%), 2 tests [30%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 40% (1x 3 hours theory paper). Pass mark for the module is 50%.

<b>F3511OI ICHTHYOLOGY I</b>	
<b>Module Title:</b>	<b>ICHTHYOLOGY I</b>
<b>Module Code</b>	F3511OI
<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	Lectures: 4 x 1h/week per semester. Practicals: 1 x 3 h alternate week per semester
<b>Additional learning requirements</b>	Practical sessions will involve sampling to introduce students to the different fish species
<b>NQF Credits</b>	13
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Fish biosystematics: Phylogeny and classification methods; Overview of the fish evolution including the major groups of extinct fish species. Description of external anatomy and variations of fish body forms: Morphometric indices; Identification and description of major groups of living fish species; agnatha (myxinoidei and petromyzontoidei); Chondrichthyes and Osteichthyes; the use of skin; Colouration; Camouflage; Scale formation in fish identification; Use of external fish external features in fisheries taxonomy (Meristics and Morphometric features); Namibian marine and freshwater fish diversity.

#### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 40% of the Module and a summative assessment (end of semester examination) 60% (1x 3 hours theory paper). The pass mark for the module is 50%.

<b>F3512OB BIOSTATISTICS I</b>	
<b>Module Title:</b>	<b>BIOSTATISTICS I</b>
<b>Module Code</b>	F3512OB
<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	Lectures: 4 x 1h/week per semester. Practicals: 1 x 3 h alternate week per semester.
<b>Additional learning requirements</b>	Practical and group discussion sessions.
<b>NQF Credits</b>	13
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory

Semester Offered

2

### Module content

Introduction to biostatistics and its concepts: Definition of Biostatistics; Population and sample; Branches of statistics (descriptive and inferential); Variables and data. Data collection: Learning about the three methods for collecting biostatistics data; experimentation; survey and observation; introducing sampling and probability sampling techniques. Presentation of data: Purpose for presenting data; Tables and graphs including x-y plots and their meaning; Suitability of each presentation method; Interpretation of data linking with specified research objectives; introduction to MS Excel and using spreadsheets as well as data cleaning and data presentation will be done; students are required to tackle presentation of data using MS Excel. Random variables- Measures of central tendency and variability: Mode; mean; median and quartiles for both grouped and ungrouped data; Standard deviation; coefficient of variation; signal to white noise ratio, standard error; inter-quartile range and range of grouped and ungrouped data; Emphasis will be on the interpretation of the measures. Introduction to probability: Set theory, Probability theory including Bayesian law (conditional probability); Combinatory analysis (permutations and combinations); applications to biological data. Discrete probability distribution models: Binomial; Geometric and Poisson models. Continuous probability distribution models: Normal/Gaussian distribution and its percentage points; t-distribution. Point and interval estimation: Standard error and confidence intervals. Proportions and sample surveys: Constructing surveys; Sample size determination. A brief introduction to hypothesis testing: Ingredients to a test of hypothesis and basic stages in hypothesis testing; Examples using Z-test and normal distribution table

### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 50% of the Module grade (i.e., at least 8 assessed practicals including spreadsheet and/or statistical software use [60%], 1 practical-based test [20%] and 2 assignments, assessed as written, oral or poster [20%]) and a summative assessment (end of semester examination) 50% (1x 3 hours' theory paper). Pass mark for the module is 50%

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### F3511OC AQUATIC CHEMISTRY

<b>Module Title:</b>	<b>AQUATIC CHEMISTRY</b>
<b>Module Code</b>	F3511OC
<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	Lectures: 4 x 1hr/week per semester . Practicals: 1 x 3 hr alternate week per semester
<b>Additional learning requirements</b>	Practical and group discussion sessions.
<b>NQF Credits</b>	13
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

### Module Content

Introduction to water: definition of concepts, global water cycle, the water molecule, different states of water and energy transfers, Chemical structure of water: structure of water in biological systems, hydrogen bonding. Unique properties of water: description of properties of water i.e., High heat of vaporization, versatile solvent, surface tension, high specific heat, density. Physical and chemical parameters: Temperature, pH, salinity, alkalinity, hardness and acidity; Dissolved gases in water: solubility, Henry's Law, Nutrients and nutrient cycles: phosphorus, nitrogen, sulphur, iron and manganese; silicon and other micro-nutrient constituents, decomposition of organic matter; Aquatic pollution: Toxicity limits of various pollutants and impact on aquatic life, water body remediation strategies, wastewater treatment. Water Quality instruments: Instrumentation and methods of measurement of water quality parameters.

### Assessment Strategies

Student assessment for this module will consist of formative and summative tasks. The Final CA mark [60%] from formative assessments constitutes; two (2) CA tests (40%), Practicals (15%) and Assignments/Essays (20%), quizzes (5%) and a summative assessment (end of semester examination) [60%] (1x 3 hours theory paper). Pass mark for the module is 50%.

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### F3502OF FRESHWATER AND INTERTIDAL ECOLOGY

<b>Module Title:</b>	<b>FRESHWATER AND INTERTIDAL ECOLOGY</b>
<b>Module Code</b>	F3502OF
<b>NQF Level</b>	5
<b>Notional Hours</b>	70
<b>Contact Hours</b>	Lectures: 2 x 1h/week per semester . Practicals: 1 x 3 h alternate week per semester
<b>Additional learning requirements</b>	Practical sessions will involve sampling to introduce students to the different aquatic life forms
<b>NQF Credits</b>	7
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

### Module Content

Introduction to Freshwater and Intertidal Ecology. Abiotic parameters influencing productivity of aquatic systems. Diversity, structure and functioning of the various community structures: phytoplankton; zooplankton and benthos. Direct and indirect interactions between the biotic and abiotic components of the aquatic systems: Lakes and ponds rivers and other lotic water systems; estuary; ocean. Functional webs: influence of competition, Predation and symbiosis and commensalisms on community structure. Reproduction tactics: Growth: survival and fecundity of producers and consumers.

### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 40% of the Module grade (i.e., at least 8 assessed practicals (40%), 3 tests [40%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 60% (1x 2 hours theory paper). Pass mark for the module is 50%.

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**K.4 SECOND YEAR**

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**F3631OG GENETICS FOR AQUATIC RESOURCES**

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<b>Module Title:</b>	<b>GENETICS FOR AQUATIC RESOURCES</b>
<b>Module Code</b>	F3631OG
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact Hours</b>	Lectures: 4 x 1 h/week per semester. Practical: 1 x 3 h alternate week per semester
<b>Additional Learning Requirements</b>	Projects, Case studies, Group, and individual assignments
<b>NQF Credits</b>	15
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Mendelian principles: Lcope; Limitation; Modifications to Mendelian ratios; Multiple alleles; Epistasis. Practical: Exercises on Mendelian laws; Multiple alleles; Epistasis; Gene and genotype frequencies; Linkage and crossing over; Estimation of gene and genotype frequencies and other genetic parameters. Chromosome theory of inheritance: Genetic variation; Causes and measurement; Linkage and crossing over; Recombination; and Interference. Cytogenetics: Cytogenetics and Evolution; Karyotyping and banding; Genetic basis of sex determination. Chromosome manipulation: Ploidy induction; Sex reversal, Gynogenesis and androgenesis. Modern concept of gene: DNA as genetic material; Genetic code and protein synthesis, Transfer and regulation of genetic information. Introduction to recombinant DNA technology: Restriction enzymes; Vectors; genetic transformation; and genomics. Basic concepts of Population Genetics: Individual vs population; Gene and genotype Frequency and factors affecting them. Genetic basis of selection: Qualitative vs quantitative traits Pleiotropy; Penetrance; Application of selection for performance improvement; Concept of inbreeding and its management. Mutation: natural and induced mutagens; Fate of mutant allele in the population; Cross-breeding and genetic drift. DNA Genetic Markers and Their Application: Genetic Markers; Definition and Basic Types; DNA Markers and Methods of Molecular Genetics; Types of DNA Markers; Application of DNA Markers in Aquaculture and Fisheries. Bioinformatics: in fish genetics and breeding. Fish Genome: Zebra fish genome; Fish as genetic model.

**Student Assessment Strategies**

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 60% of the Module grade (i.e., at least 8 assessed laboratory practical work [40%], 3 x tests [20%], and 2 assignments, assessed as written [30%]) and seminar presentation [10%] and a summative assessment (end of semester examination) 40% (1x 3 hours theory paper). Pass mark for the module is 50%.

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**F3611SG GENERAL MICROBIOLOGY**

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<b>Module Title:</b>	<b>GENERAL MICROBIOLOGY</b>
<b>Module Code</b>	F3611SG
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact hours</b>	Four (4) hours contact lecture per week and 1 x 3 hours practical session every two week for one semester
<b>Additional learning requirements</b>	Field work
<b>NQF Credits</b>	15
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module content**

This course provides students with a general overview of microbiology. The first part covers a historical perspective of microbiology; how microorganisms were discovered; ancient experiments, theories and myths. The second chapter deals with their classifications; the chronology of methods used and the diversity of environments where microorganisms are found. The third chapter covers the morphology of prokaryotic microorganisms; their structures and chemical composition and subcellular organelles. The fourth chapter discusses the role of microorganisms in nature; in biogeochemical cycles (carbon and nitrogen cycles); and their application in industries will be discussed. The fifth chapter describes the morphology, biology and habitats of eukaryotic microorganisms; fungi, algae, protozoa and viruses will be studied. The sixth chapter is a synopsis of methods to control microbial growth will be given; differentiating and highlighting various physical and chemical control methods and their respective efficacies; with direct reference to the effect of antibiotics on microorganisms including their basic classification and mode of action. The seventh chapter is an overview of the important pathogens of plants and animals; common pathogens affecting livestock and crops in the tropics will be selected and discussed; fair coverage of various groups; bacteria, fungal and viral pathogens will be made; the characteristics of the causative agents; conducive conditions for their transmission and control measures will be given. The practical aspects of this module will cover, media preparation and sterilization, aseptic and pure culture techniques, microbial isolation and identification including microscopy, staining techniques, and biochemical tests. The antibiotic sensitivity assays will also be covered.

**Learning and Teaching Strategies/Activities**

Teaching and learning will be carried out through the following methods: lectures, practical sessions, consultations, written assignments, field work, and presentations.

**Student Assessment Strategies**

Assessment activities will comprise of formative assessments (50% of the final mark), comprising of at least three tests, forum discussions, practical reports and written assignments). One examination with minimum duration of 3-hours (50% of the final mark). A subminimum of 40% in the examination is required to pass, irrespective of the final mark.

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**F3631OY ICHTHYOLOGY II**

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<b>Module Title:</b>	<b>ICHTHYOLOGY II</b>
<b>Module Code</b>	F3631OY
<b>NQF Level</b>	6

<b>Notional Hours</b>	160
<b>Contact Hours</b>	Lectures: 4 x 1h/week per semester . Practicals: 1 x 3 h/week per semester
<b>Additional Learning Requirements</b>	Projects, practical sessions, exercussions, Group and individual assignments.
<b>NQF Credits</b>	16
<b>Prerequisite</b>	Ichthyology I (F3511OI)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

Introduction to fish biology and internal anatomy. Respiration: Structure and function of gills; Mechanism of gaseous exchange; Adaptation for air-breathing in lungfishes. Feeding and digestion: Structure and functions of alimentary canal; Food and feeding habits. Salt and water balance: Structure and functions of excretory organs; Osmoregulation; Salt and water balance in marine; Freshwater and elasmobranch fishes. Movement and body structure: Skeleton; Muscle and swimming mechanism; Static and dynamic lift; and Buoyancy mechanisms in fish. Reproduction: Structure and functions of gonads; Gamete formation and reproductive strategies; Fish endocrinology and hormonal control. Introduction to fish genetics.

#### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 40% of the Module grade and a summative assessment (end of semester examination) 60% (1x 3 hours theory paper). The pass mark for the module is 50%.

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### F3502OE NATURAL RESOURCE ECONOMICS

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<b>Module Title:</b>	<b>NATURAL RESOURCE ECONOMICS</b>
<b>Module Code</b>	F3502OE
<b>NQF Level</b>	5
<b>Notional Hours</b>	70
<b>Contact Hours</b>	Lectures: 2 x 1h/week per semester. Practicals: 1 x 3 h alternate week per semester
<b>Additional Learning Requirements</b>	Projects, exercussions, Group and individual assignments.
<b>NQF Credits</b>	7
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Introduction to natural resources economics: Definitions and economics concepts; scarcity; Opportunity cost and production possibility frontier; The role of economics in natural resources. Classification of natural resources: Types of natural resources; Renewable resources; Non-renewable resources; Natural and man-made capital. Property rights and natural resource use: Describe property rights; Characteristics of property rights; Property rights and resource use; The tragedy of the common concept; Sustainability of natural resources: Sustainability; Resource scarcity and population growth; Conservation and development; Brundtland report; Historical development of sustainable development; Operationalisation of the sustainable development concept; Indicators for sustainability analysis. Decision making and resource use: Positive and normative economics; Cost-benefit analysis. Natural resource and economic efficiency: Static and dynamic efficiency; Compounding and discounting. Externalities/market failures in resource use and production: Public goods; Forms and types of externalities; Causes of externalities; Dealing with externality issues; Public goods. Guiding principles in resources use: Precautionary principle; Polluter pay principles; Calculus of negligence principle; Subsidiary principle; User pay principle; The application of principles in the use of natural resources. Economic valuation of natural resources products and services: Eco-centric vs. anthropocentric approach; Why value natural resources; Procedures of economic valuation of natural resources; Total Economic values associated with natural resources. Valuation techniques and surrogate markets: Direct and indirect techniques; The contribution of natural resources to the national economy: The role of natural resources in the economy.

#### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 50% of the Module grade consisting of a combination of tests, quizzes, assignments and practical reports (at least 5 gradable items). Summative assessment (end of semester examination) 50% (1x 2 hours' theory paper). Formative assessments will be moderated internally while summative assessment will be moderated externally. Pass mark for the module is 50%.

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### F3632OC CONSERVATION BIOLOGY

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<b>Module Title:</b>	<b>CONSERVATION BIOLOGY</b>
<b>Module Code</b>	F3632OC
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact Hours</b>	Lectures: 4 x 1h/week per semester . Practicals: 1 x 3 h / week per semester
<b>Additional Learning Requirements</b>	Projects, Case studies, Group and individual assignments.
<b>NQF Credits</b>	16
<b>Prerequisite</b>	Freshwater and Intertidal Ecology (F3522OF)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Foundations of Conservation Biology: Introduction to module; State of our planet. Rise of Conservation Biology: Ethics and conservation; Biodiversity concepts and measurement; Estimating biodiversity; Global patterns and drivers of diversity Island biogeography. Importance of Biodiversity: The values of biodiversity; Biodiversity and ecosystem functioning; Biodiversity and ecosystem services. Ecological economics Hedonic pricing: Environmental economics and sustainable development. Threats to Biodiversity: Extinction; IUCN Red List; Habitat loss Meta-population dynamics; Habitat fragmentation and degradation. Overexploitation: Sustainable harvest models; Invasive alien species; Climate change. Approaches to Conservation: Conservation of genetic diversity; Effective pop size. Conservation of species populations: Population viability analysis; Conservation of communities and ecosystems. Managing landscapes and networks: Designing terrestrial and marine reserves; Ex situ conservation; Restoration and resurrection. The future of conservation: Agenda for the future.

### Student Assessment

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 40% of the Module grade (i.e., at least 8 assessed practicals (40%), 2 tests [40%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 60% (1x 3 hours theory paper). Pass mark for the module is 50%.

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#### F3632OQ

#### AQUACULTURE

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<b>Module Title:</b>	<b>AQUACULTURE</b>
<b>Module Code</b>	F3632OQ
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact Hours</b>	Lectures: 4 x 1h/week per semester. Practicals: 1 x 3 h/ week per semester
<b>Additional Learning Requirements</b>	Projects, Case studies, Group and individual assignments, Study site visit
<b>NQF Credits</b>	16
<b>Prerequisite</b>	Ichthyology I (F3511OI)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

### Module Content

Introduction to Aquaculture: History of aquaculture development; Global aquaculture production statistics and future trends; Aquaculture development in Namibia. Types of aquaculture systems: Extensive; Semi-intensive; Intensive; and Super-intensive systems; open, semi-open and closed systems; Pond designs. Aquaculture feasibility studies: Site and species selection for aquaculture; Impact of aquaculture systems on the environment; regulations governing aquaculture practices. Environmental factors affecting aquaculture productivity: Water quality; Soil types; Aquatic macrophytes. Aquaculture practices and management: Stocking; Broodstock management and larval rearing of important aquaculture species. Feed and feeding in aquaculture: Introduction to aquaculture nutrition and feed formulations; Aquatic animal nutrition; Feed manufacturing methods and practices. Aquaculture Business Planning: Feasibility study; Development of aquaculture business; Marketing and financial plan. Aquaculture animal diseases: Identification; Treatment, Control and prevention.

### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 40% of the Module grade (i.e., at least 8 assessed laboratory practical work (40%), 3 tests [40%] and 2 assignments, assessed as written [10%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 60% (1x 3 hours theory paper). Pass mark for the module is 50%.

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## K.5 THIRD YEAR

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#### F3752OO

#### BIOLOGICAL OCEANOGRAPHY

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<b>Module Title:</b>	<b>BIOLOGICAL OCEANOGRAPHY</b>
<b>Module Code</b>	F3752OO
<b>NQF Level</b>	7
<b>Notional Hours</b>	170
<b>Contact Hours</b>	Lectures: 4 x 1 h/week per semester; Practical: 1 x 3 h alternate week per semester
<b>Additional Learning Requirements</b>	Projects, Practical sessions, Group and individual assignments, Study site visit
<b>NQF Credits</b>	17
<b>Prerequisite</b>	Physical Oceanography (F3621OR)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

### Module Content

Introduction to Biological Oceanography: Definitions and concepts; History of biological oceanography. Light in the Ocean: Major source of energy; Transmission and absorption; Light dependent biological processes. Nutrients in the Ocean: Essential nutrients; Sources of nutrients; Importance and availability, Conservative and non-conservative constituents of seawater. Dynamics: Phytoplankton growth and models; Sverdrup Paradigm; Bacteria and Algae: Classification systems; Sampling methods; Morphology and life cycle; Economic value. Zooplankton: Definitions; Classification; Morphology; Identification and Ecological and Economic importance. Marine Ecology: Ocean habitats; Classification of organisms; Basic ecology; Selected adaptive strategies. Biological Productivity in Oceans: Food webs and trophic dynamics; General marine productivity; Biological productivity of upwelling systems. Special Biotopes: estuaries and fjords. Oceanographic instrumentation: Types and uses; application; interpretation of data; report writing.

### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 40% of the Module grade (i.e., practical, 2 tests and 2 assignments, and seminar presentation) and a summative assessment (end of semester examination) 60% (1x 3 hours theory paper). Pass mark for the module is 50%.

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#### F3751OM

#### FISHERIES MANAGEMENT

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<b>Module Title:</b>	<b>FISHERIES MANAGEMENT</b>
<b>Module Code</b>	F3751OM
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>Contact Hours</b>	Lectures: 4 x 1 h/week per semester
<b>Additional learning requirements</b>	Site visits, Case studies, Group and individual assignments
<b>NQF Credits</b>	16
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

### Module Content

Introduction to Fisheries Management: Definitions and concepts; Goals and objectives of Fisheries management; Principles of fisheries management; Fisheries management process. A short history of fishing and fishery management: The earliest evidence of fishing and seafood; Emergence of commercial fishing in antiquity; The marine fishing revolution of the Middle Ages; Fishery globalization in the nineteenth century and the first indications of decline; Beginnings of fisheries research in the late nineteenth century; In the twentieth century; Fishing intensified and there was an increased awareness of the need to manage fisheries. Introduction to theories of organisation: Management organisation and its function; Fisheries management Institutions; Legal framework in Namibia (Legal framework & international convention). State of world fisheries: Trends in world fisheries; State of capture and aquaculture fisheries; State of fisheries in Namibia; international developments strengthening fisheries; fisheries in crisis. Management and decision making: Fisheries planning; fisheries management plans; Sustainable fisheries management; Co-management; Issues in fisheries management; Politics in fisheries. Fisheries regulations: Input; Output and technical regulations. Enforcement of fisheries regulations: Monitoring; Control and Surveillances; Other participatory methods. Management costs: Types of fisheries services. Fishery sector: Subsistence artisanal vs. industrial and commercial fisheries. Livelihood approaches to fisheries and lesson from SADC: Fisheries and poverty; Gender roles in fishery; Diseases; Pandemics and fisheries communities.

### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 100% of the Module grade (Minimum of 2 tests, a marked assignment and seminar presentation). All assessments will be internally moderated. Pass mark for the module is 50%.

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<b>F3751OE</b>	<b>FISHERIES AND AQUACULTURE EXTENSION</b>
<b>Module Title:</b>	<b>FISHERIES AND AQUACULTURE EXTENSION</b>
<b>Module Code</b>	F3751OE
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>Contact Hours</b>	Lectures: 4 x 1 h/week per semester
<b>Additional Learning Requirement</b>	Site visits, Case studies, Group and individual assignments
<b>NQF Credits</b>	16
<b>Prerequisite</b>	Aquaculture (F3632OQ)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

### Module Content

Extension concepts: Definition and importance of program extension; Principles and theories. Extension methods; Modern and Traditional Extension; Fisheries and aquaculture extension as adult learning; Philosophy and principles of program development in extension; Comparing aquacultural extension approaches (FSRE); Science and Indigenous knowledge systems and participatory appraisal techniques; Social change and innovation; Attributes of Innovations and their rate of adoptions; Elements in diffusion of Innovations; Motivational theories; Community participation and involvement in extension, PRA methodologies and techniques; Improving the organisation and management of extension; Establishing and strengthening fishermen and fish farmer's organisations.

### Student Assessment Strategies

Student assessment for this module will only consist of formative tasks, which will make up 100% of the module grade. Assessment includes at least eight (8) practicals which contribute 40%), 3 tests (40%) and 2 assignments, assessed as written (10%) and seminar presentation (10%). The pass mark for the module is 50%.

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<b>W3750OT</b>	<b>FIELD ATTACHMENT</b>
<b>Module Title:</b>	<b>FIELD ATTACHMENT</b>
<b>Module Code</b>	W3750OT
<b>NQF Level</b>	7
<b>Notional Hours</b>	240
<b>Contact hours</b>	Minimum 22 weeks and maximum 25 weeks
<b>Additional Learning Requirement</b>	Site visits, Case studies, Report writing
<b>NQF Credits</b>	24
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	Core and 1

### Module Content

Students will be attached to selected institutions for hands-on experience in assigned areas of subject specialization. The students will apply the principles and techniques theoretically learnt to real-life problem-solving situations. A project-based learning programme will also be developed for each student on attachment.

### Student Assessment Strategies

A combination of 40 % Field report and 40 % report presentation will make up the 80 % of this module grade. 20 % of the subject grade is subject to satisfactory attendance and good conduct during attachment.

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<b>F3630OB</b>	<b>BUSINESS AND ENTREPRENEURSHIP</b>
<b>Module Title:</b>	<b>BUSINESS AND ENTREPRENEURSHIP</b>
<b>Module Code</b>	F3630OB
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact Hours</b>	Lectures: 2 x 1hr/week per semester
<b>Additional learning requirements</b>	Case studies (development of a business plan in the sphere of Fisheries and Ocean Sciences)
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None

**Compulsory/Elective  
Semester Offered**

Compulsory  
Core Semester

#### Module Content

Introduction to Business and Innovation: Definitions and concepts; Goals and objectives of a business; Research and innovation. Creativity: The creative process; Steps in the creative process; Traits of creative people; Barriers to creativity. Innovation: Innovation dilemma; Types of innovation; innovation process; Benefits of innovation; Source of innovation; Major innovation myths; The role of technology to innovation. Entrepreneurs: Entrepreneur theory; Types of entrepreneurs; entrepreneurship process; Common characteristics of entrepreneurs. Local and international framework supporting business development: In Namibia; Namibia Chamber of Commerce and Industry; Ministry of Industrialization; Trade and SME Development; Ministry of Sport; Youth and National Service; Development Bank of Namibia; National policies and others. International: SACU. Case studies: Analysis of different business entities; Assess the strengths; Weaknesses; Threats and opportunities of such businesses; New business ventures. Business feasibility factors: Management; Marketing; Production and services; Financial; Laws (labour, etc.); regulation; Standards; Business codes; Political and economies; Challenges facing businesses and societies; Steps to problem-solving. Business plan: Outlines and description; The process for developing a business plan; Criteria of a good business plan. Investors: Types of investors; What factors do investors consider when deciding whether to support a business or an idea; presenting a business plan to investors. Develop a business innovation project: identify a product/service to be developed; Writing a business plan; present the business plan.

#### Student Assessment Strategies

Student assessment for this module will only consist of formative assessments which will make up 100% of the module grade (Minimum of 2 tests: 20%, a marked assignment (business plan which will be assessed throughout its development stages: 60%) and seminar presentation: 20%). All assessments will be internally moderated. The pass mark for the module is 50%.

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#### F3752OP

#### DYNAMICS OF AQUATIC POPULATIONS

<b>Module Title:</b>	<b>DYNAMICS OF AQUATIC POPULATIONS</b>
<b>Module Code</b>	F3752OP
<b>NQF Level</b>	7
<b>Notional Hours</b>	180
<b>Contact Hours</b>	Lectures: 4 x 1 h/week per semester; Practical: 1 x 3 h per week per semester
<b>Additional learning requirements</b>	Group discussions, Practical sessions, Group and Individual assignments
<b>NQF Credits</b>	18
<b>Prerequisite</b>	Biostatistics II (F3631OB)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module content

Concepts in Fisheries Science: Fisheries development; Fisheries of the world; Examples of exploited populations in Namibia; Why study fish population dynamics? Why manage fisheries? Fishery-dependent data: CPUE and fishing effort, Catchability; Standardizing CPUE Fishery-independent data: Concept of population and unit stock; Basic sampling designs; Methods of abundance estimation; Visual census methods; Mark-recapture methods; Acoustic methods; Swept-area surveys; Fish distribution in space and time (distribution and migration). Harvesting renewable resources: Population dynamics and harvesting renewable resources basic equation; Life history of a fish population Recruitment: Factors affecting recruitment; Stock-recruitment relationships and density dependence. Growth and size relationships: Factors affecting growth; Body size relationships; Von Bertalanffy growth model; Length-weight relationship. Mortality: Natural mortality; Factors affecting natural mortality; Fishing Mortality; Impact of fishing mortality on populations and communities (including bycatch). Life-history strategies: r- and K-strategists; Fishing strategies in relation to LH strategies. Biological data: Calculations of catch composition; Otolith studies; age and growth; Length measurements and length-frequency distribution; Population age structure and cohorts; sex and gonad stage; maturity; maturity ogives and phenology. Decision tools and reference points: The decision-making process; The stock assessment process; Reference points; and Ecosystem indicators.

#### Student Assessment

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 50% of the Module grade (i.e., at least 8 assessed practicals including spreadsheet and least squares regression modelling – testing specific learning outcomes - as well as paper-reading and discussion exercises and essays arguing pros and cons of certain scenarios [60%], 1 practical-based test [20%] and 2 assignments, assessed as written, oral or poster [20%]) and a summative assessment (end of semester examination) 50% (1x 3 hours' theory paper). Pass mark for the module is 50%.

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#### F3632OS

#### SEAFOOD PROCESSING AND QUALITY CONTROL

<b>Module Title:</b>	<b>SEAFOOD PROCESSING AND QUALITY CONTROL</b>
<b>Module Code</b>	F3632OS
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>Contact Hours</b>	Lectures: 4 x 1hour/week per semester; Practical: 1 x 3 hr alternate week per semester
<b>Additional Learning Requirements</b>	Group and individual assignments, Laboratory practices
<b>NQF Credits</b>	16
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Fish composition: Morphological structure of fish; Fish muscle structure and chemical composition; Relate fish structure and handling to the quality; structure; and composition of edible portions of crustaceans and bivalve mollusks; relate fish composition to human nutrition. Fish capture technologies and classifications: Common fishing method; Their target species; Impacts on the aquatic system and seafood quality. Preliminary fishing operations: Purpose of preliminary operations in fisheries; Types of operations and technology/equipment used thereof (grading, washing, de-heading, gutting, evisceration, scaling, skinning, filleting); Effect of these operation on product quality. Fish chilling and freezing technologies: Relate the need for fish chilling and freezing; Process of fish chilling and freezing including related equipment used; Effect of freezing on fish quality; Individual quick-freezing methods (IQF) and IQF fish products; Fish glazing. Sea foods processing plants hygiene: Cross contamination in sea foods plants; hygienic requirements, water (UV treatment, chlorination), hygienic

production and use of ice; selection of equipment and utensils; personnel hygiene; Organized cleaning schedules with required cleaning steps and verification. Quality evaluation of sea foods: factors affecting microbiological quality of sea foods; Major degradative processes occurring during storage of fish and fish products; Use of standardized sensory evaluation schemes/indicators for evaluating fish freshness/quality; Use of chemical/biochemical; and microbiological parameters in evaluating fish freshness/quality; Marine toxins and seafood-borne illness (finfish and shellfish poisoning). Fish packaging: Type of packaging and seafood product quality; Modified Atmospheric Packaging (MAP); Product traceability; Seafood frauds (mislabeling, seafood substitution, short-weighting). Fish processing: Production line planning. Main principles and processing/preservation techniques: Drying; Salting; Smoking; Canning, Surimi technology; Concentrated fish proteins; Caviar processing; Battered and breaded fish products; Extruded fish products; Processing of fish meal and fish oils; Use of fish by-products, modern techniques used in the processing of mollusks and crustaceans.

#### Student Assessment

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 60% of the Module grade (i.e., at least 8 assessed practicals (40%), 3 x tests [20%], 2 assignments assessed as written [30%]) and seminar presentation [10%]) and a summative assessment (end of semester examination) 40% (1x 3 hours theory paper). Pass mark for the module is 50%.

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### F3512OT BIOCHEMISTRY

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<b>Module Title:</b>	<b>BIOCHEMISTRY</b>
<b>Module Code</b>	F3512OT
<b>NQF Level</b>	5
<b>Notional Hours</b>	130
<b>Contact Hours</b>	Lectures: 4 x 1hour/week per semester; Practical: 1 x 3 hr alternate week per semester
<b>Additional Learning Requirements</b>	Group and individual assignments, Laboratory practices
<b>NQF Credits</b>	13
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Structural Biochemistry: Structure and function of macromolecules (carbohydrates, proteins and lipids); Vitamins; Coenzymes and Cofactors. Enzymology: (Enzymes as organic catalysts; Enzyme nomenclature; Factors affecting activities of enzymes; Enzyme kinetics The Michaelis-Menten equation; The Lineweaver-Burk plot; Enzyme inhibition; Allosterism. Bioenergetics and Thermodynamics: Free Energy; Laws of Energy; Activation Energy; Transition States; Endergonic and exergonic reactions. Metabolism: Catabolism and Anabolism; Carbohydrate catabolism (Glycolysis, Alcohol and lactic acid Metabolism; Tricarboxylic acid cycle or the TCA cycle; Electron transport chain and oxidative phosphorylation); Regulation of carbohydrate metabolism; Gluconeogenesis; Synthesis of the disaccharides (lactose and sucrose); Lipid metabolism ( $\beta$ -oxidation, malonyl CoA); Integration of carbohydrate and fat metabolism; Amino acids and protein metabolism; Urea cycle; The Cori cycle; Pentose phosphate pathway. Spectrophotometry: Fundamental laws of spectrophotometry and absorbance.

#### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 40% of the Module grade (i.e., at least 4 assessed practicals [40%], 2 tests [50%] and 2 assignments/quizzes [10%]) and a summative assessment (end of semester examination) 60% (1x 3 hours' theory paper). Pass mark for the module is 50%.

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### F3751OC OCEAN AND COASTAL GOVERNANCE

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<b>Module Title:</b>	<b>OCEAN AND COASTAL GOVERNANCE</b>
<b>Module Code</b>	F3751OC
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>Contact Hours</b>	Lectures: 4 hours/ week
<b>Additional Learning Requirements</b>	None
<b>NQF Credits</b>	16
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content

National and International legal frameworks: United Nations Law of Sea (UNCLOS), Benguela Current Convention (BCC), the Environmental Management Act (2007) and other international legislations and conventions supporting Ocean and coastal governance. Marine Pollution: Marine pollution definition: types and environmental impacts; Oil pollution and impact of oil spill; Heavy metals: dangers and hazards Wastes: solid garbage and liquid sewage; Pollution risks from ships: International Convention for the Prevention of Pollution from Ships (MARPOL). Marine Protected Area (MPA): the issues, challenges, and opportunities, including a focus on the design, implementation, and evaluation of marine protected areas. Blue economy: understanding the concept towards achieving the sustainable use and conservation of Ocean. Coastal zone management: Principles, approaches, processes and issues related to integrated coastal and Ocean management. Marine Spatial Planning (MSP): This topic introduces the concept of MSP and how it can be used to attain blue growth. Environmental impact assessment (EIA) and strategic environmental assessment (SEA): This topic introduces the concept of SEA and EIA as a planning and governance tool.

#### Student Assessment Strategies

Student assessment for this module will consist of formative tasks, and the final mark will be made of 100% Continuous Assessment (CA). The CA will be made up of Assignments (20%), tests (40%), and case studies (40 %). The pass mark for the module is 50%.

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### F3622ON FIELD ATTACHMENT PREPARATION

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<b>Module Title:</b>	<b>FIELD ATTACHMENT PREPARATION</b>
<b>Module Code</b>	F3622ON
<b>NQF Level</b>	6

<b>Notional Hours</b>	80
<b>Contact Hours</b>	Lectures: 2 hrs./ week per semester
<b>Additional Learning Requirements</b>	None
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Guides on how to get specific job and skill experience during field attachment. Employability-enhancing activities: Guide students on how to gain experience; expand your network of company or industry contacts. Professional behavior and/or knowledge: prepare students on expectations for workplace behaviors and specific common job norms. Guide on effectiveness of field-based learning. Demonstration and discussion of ethical awareness, the ability to do ethical reflection, and the ability to apply ethical principles in decision-making. Capacities and skills for ethical and moral decisions making. Students should develop, demonstrate and act out their ethical abilities.

#### Student Assessment Strategies

Student assessment for this module will consist of formative tasks, and the final mark will be made of 100% Continuous Assessment (CA). The CA will be made up seminars (20 %) and field-based learning plan (80 %).

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### F3742OT FISHING TECHNOLOGY

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<b>Module Title:</b>	<b>FISHING TECHNOLOGY</b>
<b>Module Code</b>	F3742OT
<b>NQF Level</b>	7
<b>Notional Hours</b>	90
<b>Contact Hours</b>	Lectures: 2 x 1hour/week per semester; Practical: 1 x 3 hr alternate week per semester
<b>Additional learning requirements</b>	Site visit: Company that manufactures fishing equipment's (net)
<b>NQF Credits</b>	9
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content

Fishing gear and techniques: Definitions and concepts, historical overview of fishing technology, classification of fishing gear, development of fishing gear and methods, Factors that influence fishing gear and methods of selection. Design and gear technology: The design process, fishing gear designs, marine and freshwater fishing gear and technologies. Fish aggregating- and selective devices: Importance of fish selectivity, selectivity of fishing gears, selectivity influencing factors. Impact of fishing gear on the environment: Bycatch, discards, and over-fishing, ecological impacts on aquatic ecosystems/communities, benthic habitats, effects of fishing gear/methods on the quality of aquatic resources (during harvesting). Adaptation of appropriate technology: Fish finding equipment's and operation, sustainable gear/methods for eco-friendly fishing, gear regulations and international standards. Fishing gear research and development: The future of fishing gear technology, challenges in fishing gear technology and sustainability, current research in fishing gear technology and innovation.

#### Student Assessment Strategies

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 50% of the Module grade (Minimum of 2 tests, 2 marked assignments and 1 field report). Summative assessment (end of semester examination) 50% (1x 2 hours' theory paper). Formative assessments will be moderated internally while summative assessments will be moderated externally. The pass mark for the module is 50%.

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### F3631OB BIOSTATISTICS II

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<b>Module Title:</b>	<b>BIOSTATISTICS II</b>
<b>Module Code</b>	F3631OB
<b>NQF Level</b>	6
<b>Notional Hours</b>	150
<b>Contact Hours</b>	Lectures: 4 x 1 h/week per semester; Practical: 1 x 3 h alternate week per semester.
<b>Additional learning requirements</b>	Practical and group discussion sessions.
<b>NQF Credits</b>	15
<b>Prerequisite</b>	Biostatistics I (F3512OB)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module content

Inferential biostatistics for one or two populations: Revision of basic stages in hypothesis testing; T-tests and Z-tests for both paired and independent samples. Regression and correlation: Correlation methods; Pearson's correlation coefficient; coefficient of determination and non-determination and scatter-gram; Simple linear and regression using the Least Squares Technique. Introduction to experimentation and multiple population inferences: Principles of experimentation; CRD; RCBD; Factorial design ANOVA; Latin square design: Replicated and non-replicated; Statistical analysis; Split Plot design; Mathematical model for each design; ANOVA assumptions, Test for the violation of assumptions; Correcting violation and interpretation; Post hoc methods using SPSS: e.g. Mean Significant difference. Chi-square test of association and Goodness of fit: The chi-square distribution; Goodness of fit; n x n contingency tables. Social Survey methods: Definition of survey, Planning and designing surveys; how to carry surveys; sampling size issues; Yaro Yamane formula for sample size determination Craig, 2016; Sampling methods (Probability and non-probability methods); Questionnaire design; wording the questions; Response format scale reliability and validity and checks; Preparation of code book; coding open ended question; Cronbach's Alpha test.

#### Student Assessment

Student assessment for this Module will consist of formative and summative tasks. Formative assessments will make up 50% of the Module grade (i.e., at least 8 assessed handins including spreadsheet and/or statistical software use [60%], 1 test [20%] and 2



<b>Module Code</b>	F3610ZR
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	4 lecture periods per week and one 3hour practical per week for core semester
<b>Additional learning requirements</b>	None
<b>NQF Credits</b>	8
<b>(Co-requisites)</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Elective
<b>Semester Offered</b>	Core semester

**Module Content**  
Learn how to navigate RStudio: how to load/save a file; load a package; access help. Examine the base R objects: vectors; matrices, arrays, lists, factors and tables; their respective characteristics, naming conventions and structures. Understand sub-setting, filtering and creation of these objects. Examine the implementation of control structures (loops and functions) in R. Investigate how R can be used for mathematical and statistical calculations. Data Cleaning and Manipulation in R: Learn how to manipulate and clean data in R; importing and exporting data from other statistical packages and data bases; aggregating data; reshaping data Visualisation (Packages): Learn how basic plots are generated in R – histograms; X-Y plots, bar charts; pie charts, scatter plot. Understand the ggplot2 package for advanced plotting. Statistical Testing: Understand how R can be used for hypothesis testing. Investigate how R can be used in statistical modelling techniques (SLR)

**Student Assessment Strategies**

Continuous Assessment: 100 % (minimum of 2 tests (30%), 1 project assignment (presented in oral and written form, 40%), 3 marked practicals, 30%). The pass mark for the module is 50%

## L. B.SC. FISHERIES AND AQUATIC SCIENCES (HONS) [17BSFA] PROGRAMME IS PHASED OUT & NO INTAKE FOR 2023

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by School of Science. English Communication and Study Skills, English for Academic Purposes, Contemporary Social Issues and Computer Literacy are University Core Modules taken by all First Year University of Namibia students.

### L.1 PROGRAMME SCHEDULE

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
UCLC 3509	Computer Literacy	5	8	C	
ULCE 3419	English Communication and Study Skills	4	16	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
SBLG 3511	Introduction to Biology	5	16	C	
SPHY 3501	Physics for Life Sciences I	5	8	C	
SMAT 3511	Basic Mathematics	5	16	C	
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 1 Semester 2</b>					
ULEA 3519	English for Academic Purposes	5	16	C	
SCHM 3532	Chemistry for Life Sciences	5	16	C	
SBLG 3512	Diversity of Life	5	16	C	
SMAT3512	Pre-calculus	5	16	C	
<b>Total credits Semester 2</b>					<b>64</b>
<b>Total CREDITS YEAR 1</b>					<b>136</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 2 Semester 1</b>					
AAEC 3681	Principles of Microeconomics	6	12	C	None
AAEC 3691	Rural Sociology	6	12	C	None
AASC 3681	Genetics	6	12	C	None
AFST 3681	General Microbiology	6	12	C	None
ACRS 3681	Biostatistics	6	12	C	None
AFAS 3691	Aquatic Ecology	6	12	C	None
<b>Total Credits Semester 1</b>					<b>72</b>
<b>Year 2 Semester 2</b>					
AAEC 3682	Production Economics	6	12	C	None
AFAS 3682	Introduction to Aquaculture	6	12	C	None
AFAS 3601	Ichthyology I	6	8	C	None
AASC 3612	Biochemistry	6	16	C	SCHM 3532 (Chemistry for Life Sciences)
AFAS 3692	Aquatic Chemistry	6	12	C	None
AFAN 3682	Natural Resource Economics	6	12	C	None
<b>Total credits Semester 2</b>					<b>72</b>
<b>Total CREDITS YEAR 2</b>					<b>144</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 3 Semester 1</b>					
AACA 3701	Field Attachment I	7	8	C	None
AFAP 3781	Physical Oceanography	7	12	C	None

AFAS 3781	Aquaculture and Fisheries products	7	12	C	None
AFAS 3781	Ichthyology II	7	12	C	AFAS 3682: Introduction to Aquaculture and AFAS 3602: Ichthyology I
AFAS 3791	Fisheries Management I	7	12	C	None
AAEC 3781	Farm Planning and Management	7	12	C	None
<b>Total Credits Semester 1</b>					<b>68</b>
<b>Year 3 Semester 2</b>					
ACSC 3792	Research Methods	7	12	C	ACRS3681 (Biostatistics)
AFAS 3782	Basic Aquaculture Engineering	7	12	C	AFAS 3682: Intro to Aquaculture, AFAS3692: Aquatic Chemistry, AFAS3691: Aquatic Ecology and AFAS 3602: Ichthyology I
AFAS 3792	Fisheries Management II	7	12	C	None
AFAS 3712	Integrated Coastal Zone Management	7	16	C	AFAS 3691: Aquatic Ecology
AFAA 3782	Aquaculture Nutrition and Feed Manufacturing	7	12	C	None
<b>Total credits Semester 2</b>					<b>64</b>
<b>Total CREDITS YEAR 3</b>					<b>132</b>

Course Code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 4 Semester 1</b>					
AACA 3801	Field Attachment II	8	8	C	AACA 3708 (Field Attachment I)
AFAS 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AFAS 3812	Fish Population Dynamics	8	16	C	ACSC 3792: Research Methods
AFAS 3832	Aquaculture Management	8	16	C	AFAS: 3682: Introduction to Aquaculture, AFAS 3782 : Basic Aquaculture Engineering and AFAA 3782: Aquaculture Nutrition and Feed Manufacturing
AFAS 3831	Fish Pathology	8	16	C	AFST 3681 General Microbiology and AFAS 3682: Introduction to Aquaculture
AFAS 3891	Fisheries Economics	8	12	C	AFAN 3682: Natural Resource Economics
<b>Total Credits Semester 1</b>					<b>84</b>
<b>Year 4 Semester 2</b>					
AFAS 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AFAS 3811	Biological Oceanography	8	16	C	AFAS 3781 Physical Oceanography, and FAS 3692 Aquatic Chemistry
AENE 3882	Environmental Impact Assessment	8	12	C	AFAS 3712: Integrated Coastal Zone Management
<b>Total credits Semester 2</b>					<b>44</b>
<b>Total CREDITS YEAR 4</b>					<b>128</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>540</b>

## L.2 MODULE DESCRIPTORS

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**L3 FIRST YEAR**

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**CLC3509 COMPUTER LITERACY**

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<b>Module title:</b>	COMPUTER LITERACY
<b>Code:</b>	CLC3509
<b>NQF level:</b>	5
<b>Contact hours:</b>	1 lecture theory and 1 lecture practical per week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 100%: 2 Practical Tests 50%, 2 Theory Tests 50%
<b>Prerequisites:</b>	University Entry

**Module Content:**

The module covers the following topics. Introduction to Computers: hardware and software, types and categories of computers, usage of Computer devices and peripherals. Working with the windows operating system: File Management, working with multiple programs, using the recycle bin. Using a word processor: formatting a text and documents, spelling check, grammar and thesaurus tools, inserting tables, auto-shapes, clip arts, charts, and mail merge. Spreadsheet: worksheets and workbooks, ranges, formulas and functions, creating graphs, charts, and printing the workbook. Databases: creating tables, relationships, queries, forms and reports. Presentation software: slide layout and master, animations, auto-content wizard and templates. Communication tools: introduction to the Internet, web browsers, search engines, downloading and uploading files, creating and sending messages, email etiquette, internet security, and digital signatures.

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**LCE3419 ENGLISH COMMUNICATION & STUDY SKILLS**

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<b>Module title:</b>	ENGLISH COMMUNICATION AND STUDY SKILLS
<b>Code:</b>	LCE3419
<b>NQF Level:</b>	4
<b>Contact hours:</b>	4 hours per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment (60%): two tests (reading and writing), two reading assignments, one oral presentation, Examination (40%): one three hour examination paper
<b>Pre-requisites:</b>	None

**Module Content:**

This module is aimed at assisting students in the development of their reading, writing and speaking and listening skills, in order to cope with studying in a new academic environment and in a language which may not be their first language. The module also focuses on study skills that students need throughout their academic careers and beyond. The module serves as an introduction to university level academics, where styles of teaching and learning differ from those at secondary schools in that more responsibility is placed on the student. The module therefore, focuses on the skills that students need throughout their academic careers and beyond.

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**CSI 3580 CONTEMPORARY SOCIAL ISSUES**

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<b>Module title:</b>	CONTEMPORARY SOCIAL ISSUES
<b>Code</b>	CSI 3580
<b>NQF Level</b>	5
<b>Contact hours</b>	Equivalent to 1 hour per week for two semesters (Online)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None (University Core Module)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 & 2 (Year Module)

**Module Descriptor (Rationale of the module):**

The module, Contemporary Social Issues (CSI3580), is designed to encourage behavioural change among UNAM students and inculcate the primacy of moral reasoning in their social relations and their academic lives. In providing students with critical and analytical thinking the module enables students to grow and develop into well rounded citizens, capable of solving contemporary social challenges experienced in their communities and societies. The teaching of the module takes three dimensions: the intellectual, the professional and the personal dimensions. The intellectual dimension is fostered through engaging students with subject knowledge, independent learning and module assessment. The professional dimension, on the other hand, is fostered through exposing students to real life situations of case studies and practical exercises that draws attention to social issues that attract ongoing political, public and media attention and/or debate. Finally, the professional dimension is fostered through group work, online discussions and class participation

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**SBLG 3511: INTRODUCTION TO BIOLOGY**

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<b>Module title</b>	INTRODUCTION TO BIOLOGY
<b>Code</b>	SBLG3511
<b>NQF Level</b>	4
<b>Contact hours</b>	4 lectures/ week for 14 weeks and one 3-hour practical session per week.
<b>NQF Credits</b>	16
<b>Module Assessment:</b>	Continuous assessment (40%): Theory (not less than 3 tests and 2 assignments), 40%. Practicals (not less than 10 marked assignment), 60%. Examination (60%): 3 hour examination paper.
<b>Prerequisite</b>	NSCC (Biology C or better)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

It will consider organization of life, chemical basis of life, carbohydrates, proteins, nucleic acids, lipids and fats, water, cell structure and function, prokaryotic and eukaryotic cells, ultra-structure of plant and animal cells, cytoskeleton, membrane structure and function, cell communication, mitosis, meiosis, cell reproduction, cell cycle, and cell death. The following topics will be covered: Introduction to systems of classification, taxonomy and binomial nomenclature, including the five kingdoms and the three domain system. Definitions and categories/groups within the five kingdoms, evolution by natural selection (microevolution vs macroevolution), phylogeny and evolutionary

relationships in five kingdoms. The course content will also include genes, chromosomes, genomes, Mendelian genetics, extensions to Mendelian genetics, chromosome theory of inheritance, linkage and cross-over, recombination, sex determination. The course content will also cover an introduction to Ecology: Definitions, history, scales in ecology, application of ecology. Conditions and Resources: Environmental conditions, animals and their resources, plants and their resources.

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### SPHY 3501: PHYSICS FOR LIFE SCIENCES I

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<b>Module title:</b>	PHYSICS FOR LIFE SCIENCES I
<b>Code:</b>	SPHY3501
<b>NQF level:</b>	4
<b>NPSC:</b>	N/A
<b>Contact hours:</b>	28 Lectures and 14 Practical Sessions/Tutorials
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.
<b>Pre-requisites:</b>	None

#### Module Content:

This module is to introduce Life science students to physics concepts and applications that will be useful to them in their undergraduate studies and carrier. The course will cover the following topics:  
Units and significant figures; Motion in one dimension, average velocity, acceleration, freely falling bodies; Vectors and scalars, addition and subtraction of vectors in one and two dimensions, multiplication of vectors, component method of vector addition; Projectiles; Force and weight, Newton's laws and applications, free-body diagrams, friction, motion on inclined planes; Uniform circular motion, period and frequency of motion, centripetal force, banking of curves; Newton's law of Universal gravitation, gravity near the Earth's surface, satellites; Kepler's laws; Work done by a constant force, kinetic energy, work-energy theorem, potential energy, conservation of Mechanical energy, power; Momentum, impulse, conservation of energy and momentum in collisions, elastic and inelastic collisions in one dimension.

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### SMAT 3511: BASIC MATHEMATICS

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<b>Module Title:</b>	BASIC MATHEMATICS
<b>Code:</b>	SMAT 3511
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

#### Module Content:

Sets: notations and diagrams to represent sets, subset, empty set, equality of sets, intersection, union, complement.  
Algebraic expressions: simplification, expansion, polynomials, remainder and factor theorem, partial fractions.  
Trigonometry: trigonometric functions, basic trigonometric identities. The absolute value, linear equations, linear inequalities, quadratic equations, the quadratic formula, quadratic inequalities. Functions: domain, codomain, image, preimage, even function, odd function. Sequences: the general term, the geometric sequence, the arithmetic sequence. The Binomial Theorem.

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### LEA3519 ENGLISH FOR ACADEMIC PURPOSES

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<b>Module title:</b>	ENGLISH FOR ACADEMIC PURPOSES
<b>Code:</b>	LEA3519
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 periods per week for 14 weeks
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral Presentation; Examination (40%) : One three hour examination paper
<b>Prerequisites:</b>	None

#### Module Content:

This module develops a student's understanding, and competencies regarding academic conventions such as academic reading, writing, listening and oral presentation skills for academic purposes. Students are required to produce a referenced and researched essay written in formal academic style within the context of their university studies. Students are also required to do oral presentations based on their essays. The reading component of the course deals with academic level texts. This involves students in a detailed critical analysis of such texts. The main aim is therefore, to develop academic literacy in English.

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### SCHM 3532: CHEMISTRY FOR LIFE SCIENCES

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<b>Module Title:</b>	CHEMISTRY FOR LIFE SCIENCES
<b>Code:</b>	SCHM3532
<b>NQF Level:</b>	5
<b>Contact Hours:</b>	56 hours of lectures, 42 hours of practical sessions.
<b>Credits:</b>	16
<b>Module Assessment:</b>	CA: 50% (minimum 3 tests 80%, laboratory component 20%, tutorial assignments 10%). Final Exam: 50%; (1 x 3 hour exam paper)
<b>Pre-requisites:</b>	None

#### Module Content:

Classification of Matter: Mixtures and Pure substances; Physical States of Matter; Physical and Chemical Properties. Extensive and Intensive properties.  
Measurements: Units, Significant figures; Precision and Accuracy, Factor Label Method. Atomic structure and the Periodic table; Electron configuration; Physical and Chemical properties as predicted from groups. Ionic compounds and Molecular compounds: Writing chemical formulae and naming of ionic and molecular compounds. Average Atomic Mass. The Mole Concept; Percent Composition, Empirical formula and Molecular formula. Stoichiometry: limiting reagent, percent yield. Solutions: electrolytes and non-electrolytes, aqueous

solutions, ionic equations; concentrations: percent concentration; molarity, molality; dilution of solutions; structure and solubility. Types of bonds; Lewis structures; Resonance structures; Molecular geometry: the VSEPR model, Polarity of molecules. Acid-base equilibrium: properties of acids and bases; relations of acids and bases, self ionisation of water; strengths of acids and bases; the pH scale; hydrolysis of salts; buffers; acid-base titration. Introduction to organic chemistry: organic compounds; structural formulae and conformations; functional groups; Classes of hydrocarbons: alkanes, cycloalkanes: alkanes; alkenes and alkynes; oxidation and reduction; addition reactions; stereo-isomerism. Alcohols, phenols, thiols, ethers: organic compounds of oxygen; common alcohols and phenols. Carboxylic acids and esters, amines and amides: Introduction to carbohydrates, lipids and porphyrins.

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### SBLG3512: DIVERSITY OF LIFE

<b>Module title:</b>	DIVERSITY OF LIFE
<b>Code:</b>	SBLG 3512
<b>Course Equivalent:</b>	NSSC (/HIGH GRADE) Biology
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lecture periods / week for 14 weeks and one three hour practical session per week
<b>Credits:</b>	16
<b>Module assessment:</b>	Continuous assessment: Theory (not less than 3 tests and 2 Assignments) 40% Practicals (not less than 10 marked assignments) 50% Examination: 60% (1 x 2 hour examination paper)
<b>Prerequisites:</b>	NSSC (Biology C or better)

#### Module Content:

This module is designed to give students a detailed understanding of the diversity of life. It gives students the broader appreciation of biodiversity in the different ecological habitats. The course shall describe diagnostic characteristics of principle taxonomic categories for each phylum. Coverage of each Phylum shall follow a phylogenetic (evolutionary) approach as well as introduce broad ecological and physiological principles. Various aspects of reproduction and development shall be highlighted. This module prepares students to understand subsequent courses such as Introduction to Ecology and Microbiology, Population Ecology, Comparative physiology, Biogeography, Plant and Animal Form and Function

Topics covered will include viral, bacterial, fungal, algal, animal and plant diversity. It then considers the characteristics and life cycles of the following important algae, animal and plant groups: Chlorophyta, Phaeophyta, Rhodophyta, Chrysophyta, Euglenophyta, Pyrrophyta, Cryptophyta, Protostomate phyla: Nemertea, Mollusca, Anellida, Arthropoda, Nematoda, Rotifera, Lophophorates, Onychophora. Deuterostomate phyla: Echinodermata, Hemichordata and Chordata (Subphyla: Urochordata, Cephalochordata and Vertebrata: Class Myxiniiformes, Petromyzontiformes, Placoderms, Chondrichthyes, Actinopterygii, Actinistia, Dipnoi, Amphibia, Reptilia, Aves, Mammalia ) bryophytes, seedless vascular plants, gymnosperms, and the angiosperms. Concepts such as Homology and analogy; body symmetry (radial, bilateral), cephalisation, body cavities: diploblastic, triploblastic (acoelomate and coelomate [deuterostomes and protostomes]) will be covered.

Examples from Namibia shall be used where possible and applicable. The course content shall be supplemented with appropriate weekly practical sessions in the laboratory and in the field.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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### SMAT 3512: PRE-CALCULUS

<b>Module Title:</b>	PRE-CALCULUS
<b>Code:</b>	SMAT 3512
<b>NQF level:</b>	5
<b>Contact hours:</b>	4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

#### Module Content:

Functions: one-to-one and onto functions, horizontal line test, composition of functions, inverse of a function.

Introduction to exponential and logarithmic functions. Limit of a function: definition, left and right limits, infinite limits, limits at infinity, continuity in terms of limits. Differentiation: rate of change, derivative of a function, rules of differentiation, increasing and decreasing functions and graph sketching. Integration: antiderivatives, the definite integral, area under a graph. Trigonometry: further trigonometric identities, area of a sector and segment of a circle, derivatives and integrals of trigonometric functions.

(Although the above information has been compiled as accurately as possible, the Faculty of Agriculture and Natural Resources cannot be held responsible for any errors and/or omissions which may occur in the above module descriptors of modules offered by other Departments.)

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## L.4 SECOND YEAR

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### AAEC 3681: PRINCIPLES OF MICROECONOMICS

<b>Module title:</b>	PRINCIPLES OF MICROECONOMICS
<b>Code:</b>	AAEC 3681
<b>NQF level:</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs)
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>NQF Credits:</b>	12
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered:</b>	1

#### Module Content:

The course includes issues such as: introduction to the concept of scarcity, consumer theory, choices under uncertainty, theory of production, cost and output, the theory of the firm under perfect competition, supply and demand analysis, market structures (competitive markets, monopolistic, monopoly and oligopoly), general equilibrium analysis and efficiency, externalities, and public goods.

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### AAEC 3691: RURAL SOCIOLOGY

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<b>Module Title:</b>	RURAL SOCIOLOGY
<b>Code</b>	AAEC 3691
<b>NQF level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs)
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hour paper)
<b>NQF Credits</b>	12
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

This module investigates the basic sociological concepts and their application to agricultural progress and rural development planning; the significance of rural sociology to agricultural extension and rural development; differences between rural and urban population; culture and culture change, social interaction and social structures; groups and organization, deviance, social class and stratification; Social institutions families; religions; rural/urban migration and environment; social change in global perspective.

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### AAEC 3682: PRODUCTION ECONOMICS

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<b>Module Title:</b>	PRODUCTION ECONOMICS
<b>Code</b>	AAEC 3682
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs)
<b>Assessment Strategies</b>	Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	Co-requisite: AAEC 3681: Principles of Microeconomics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

The course includes issues such as: production functions, cost of production, optimum resource allocation, profit maximization, isoquants, product-product relationships, economies of size and scale, technical change, and decision making under risk and uncertainty.

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### AFST 3681: GENERAL MICROBIOLOGY

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<b>Module Title:</b>	GENERAL MICROBIOLOGY
<b>Course Code</b>	AFST 3681
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment 40% (minimum 2 tests, 2 assignments and 4 practicals). Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

This course provides a student with a general overview of microbiology including their environment, classifications, their morphology, structures and chemical composition. The biology of bacteria, fungi, algae, protozoa and viruses. Effect of antibiotics on microorganisms, important pathogens of plants and animals. The role of microorganisms in general industries, food industries and in the soils. Concept of microbiology with special reference to microscopy, staining procedure, sterilization, aseptic, pure culture techniques and media preparation.

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### AASC 3681: GENETICS

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<b>Module Title:</b>	GENETICS
<b>Code</b>	AASC 3681
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (2 assignments, 2 tests and at least 5 marked practicals). Examination: 60% (1 x2 hr paper).
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

This module covers Extension of Mendelian analysis and ratio – incomplete dominance, co-dominance, multiple alleles, gene interactions, pleiotropy, epistasis, lethal genes; Chromosome (Physical structure, Packaging, Karyotype and Variations); The Cell Cycle; Mitosis and its genetic significance; Meiosis and its genetic significance; Sex determination; Sex linkage and general examples of sex-linked inheritance; The molecular structure of DNA – the double helix model; DNA replication in prokaryotes and eukaryotes; Gene expression (Transcription and Translation); Regulation of gene expression – The Lac operon; Mutations (types, causes, detection and significance). The module also introduces students to basic molecular biology concepts. It examines molecular organization of the genomes (prokaryotes and eukaryotes) and molecular structure of genes; it introduces DNA based technology such as Polymerase Chain Reaction (PCR), DNA extraction, electrophoresis, sequencing, genetic engineering and animal cloning.

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**AASC 3612: BIOCHEMISTRY**

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<b>Module Title:</b>	BIOCHEMISTRY
<b>Code</b>	AASC 3612
<b>NQF Level</b>	6
<b>Contact hours:</b>	Lectures: 4x 1hr/wk for 14 weeks (56hrs); Practical's: 1 x 3hr/wk for 14 weeks (42hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum 2 assignments, 2 tests and at least 5 marked practicals). Examination: 60% (1 x3 hr paper)
<b>NQF Credits</b>	16
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Under this course the students will learn about: Physical biochemistry: Acids, bases, buffers, pH, ionic strength, molarity; water (structure and ionization). Structural biochemistry: Structure and function of macromolecules (carbohydrates, proteins and lipids), Vitamins, Coenzymes and Cofactors. Enzymology: Enzymes as organic catalysts; Enzyme nomenclature; Factors affecting activities of enzymes; Enzyme kinetics - The Michaelis-Menten equation; The Lineweaver-Burk plot; Enzyme inhibition; Allosterism. Bioenergetics and thermodynamics: Free Energy, Laws of Energy, Activation Energy, Transition States, Endergonic and exergonic reactions. Metabolism: Catabolism and Anabolism; Carbohydrate catabolism (Glycolysis, Alcohol and lactic acid. Metabolism, Tricarboxylic acid cycle or the TCA cycle; Electron transport chain and oxidative phosphorylation); Regulation of carbohydrate metabolism; Gluconeogenesis; Synthesis of the disaccharides (lactose and sucrose); Synthesis of polysaccharides (starch and glycogen); Lipid metabolism ( $\beta$ -oxidation, malonyl CoA); Integration of carbohydrate and fat metabolism; Amino acids and protein metabolism; Urea cycle; The Cori cycle; Pentose phosphate pathway; Glyoxylate cycle in oily seeds. Spectrophotometry: Fundamental laws of spectrophotometry and absorbance.

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**AFAS 3691: AQUATIC ECOLOGY**

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<b>Module Title:</b>	AQUATIC ECOLOGY
<b>Code</b>	AFAS 3691
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum 2 assignments, 2 tests and at least 5x marked practicals). Examination: 60% (1 x2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Abiotic parameters influencing productivity of aquatic systems. Diversity, structure and functioning of the various community structures: phytoplankton, zooplankton and benthos; direct and indirect interactions between the biotic and abiotic components of the aquatic systems. Functional webs. Influence of competition. Predation and symbiosis and commensalisms on community structure. Reproduction tactics, growth, survival and fecundity of producers and consumers.

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**AFAS 3682: INTRODUCTION TO AQUACULTURE**

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<b>Module Title:</b>	INTRODUCTION TO AQUACULTURE
<b>Code</b>	AFAS 3682
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, 1 marked assignment and 3 practicals); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module content**

History of aquaculture. Types of aquaculture systems and global aquaculture production statistics. Culturable aquaculture species. Site selection for aquaculture practices. Impact of aquaculture systems on the environment and regulations governing aquaculture practices. Environmental factors affecting aquaculture productivity: water quality, soil types, aquatic macrophytes. Pond designs and stocking. Introduction to aquaculture nutrition and feed formulations. Aquaculture diseases and management. Broodstock management and larval rearing. Aquaculture development in Namibia.

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**AFAS 3601: ICHTHYOLOGY I**

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<b>Module Title:</b>	ICHTHYOLOGY I
<b>Code</b>	AFAS 3601
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 2 x 1hr/wk for 14 weeks (28hrs); Practical's: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests and 3 marked assignments); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Introduction to fish biosystematics, phylogeny and classification. Fish evolution; major groups of extinct fish species. External anatomy and variations of fish body forms; morphometric indices, identification and description of major groups of living fish species; agnatha

(myxinoidei and petromyzontoidei), chondrichthyes and osteichthyes. Fish skin, colouration and camouflage. Fish scale formation and identification. Use of scale and Otolith in fish aging. Fish migration. Namibia marine and freshwater fish diversity.

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### AFAS 3692: AQUATIC CHEMISTRY

<b>Module Title:</b>	AQUATIC CHEMISTRY
<b>Course Code</b>	AFAS 3692
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Introduction to water chemical structure. Chemical composition of water bodies. Chemical and physical parameters: pH, salinity, alkalinity and carbon dioxide; total alkalinity and hardness; acidity; dissolved gasses and interaction with atmosphere; decomposition of organic matter; Nutrients and nutrient cycles: phosphorus, nitrogen, sulphur, iron and manganese; silicon and other micro-nutrient constituents. Physical – chemical interactions in oceanic and estuarine environment; Marine system pollution scenario. Irradiance/UVR and heat flux. Instrumentation and methods of measurement of water quality parameters.

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### ACRSC 3681: BIOSTATISTICS

<b>Module Title:</b>	BIOSTATISTICS
<b>Code</b>	ACRSC 3681
<b>NQF Level</b>	6
<b>Contact hours</b>	3 lecture hours / week for 14 weeks; 3 tutorial / practical hours alternate weeks for 14
<b>Assessment Strategies</b>	Continuous assessment (40%): at least three assessments; Examination (60%): 1 x 2 hr paper
<b>NQF Credits</b>	12
<b>Prerequisite</b>	SMAT 3511 Basic Mathematics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Definition of statistics, descriptive and inferential statistics. Qualitative and quantitative data, primary versus secondary data. Sampling and sample size determinations, and replications. Presentation of data: tables, charts, graphs. Measures of central tendency: mean, mode, median. Measures of dispersion: standard deviation, coefficient of variation, standard error. Probability, Bayes' theorem, combinations and permutations, Binomial, Poisson, and Normal distributions, T-test and F- distribution mean comparisons, Analysis of variance, analysis assumptions. Single and multiple factor experiments, correlation and linear regression, transformations. Research process: research problem formulation, research objectives, hypothesis formulation. Basic experimental designs: completely randomized, randomized complete block, Latin square, Split plot.

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### AFAN 3682: NATURAL RESOURCE ECONOMICS

<b>Module Title:</b>	NATURAL RESOURCE ECONOMICS
<b>Code</b>	AFAN 3682
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests and 3 marked assignments); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content**

Natural resource economics: Renewable and non-renewable resources; natural- and man-made capital: Conservation and development. Sustainability: Resource scarcity and population growth; ecocentric vs. anthropocentric approach; Resource use; the precautionary use of user-pay principle; Economic growth and sustainable development. Brundtland report. Market failures: public goods, externalities. Valuing natural resources: surrogate market techniques, travel time, contingency valuation methods, non-use values; opportunity costs.

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## L.5 THIRD YEAR

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### AFAP 3781: PHYSICAL OCEANOGRAPHY

<b>Module Title:</b>	PHYSICAL OCEANOGRAPHY
<b>Code</b>	AFAP 3781
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, 1 assignment and 3 practicals); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Physical properties of sea water; What drives oceans? Global temperature and salinity distribution. Coastal processes: accumulation, fresh water runoff, sediment transport. Tides and tidal mechanisms. Eddy diffusion and turbulence. Waves and Tsunamis. Coriolis and Ekman transport. Statics (sea at rest) and Dynamics (wind driven and geostrophical currents, vertical water movement, rings and meanders). The Benguela Current system. Environmental conditions and the Fisheries. Physical and oceanographic instrumentation.

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### AFAS 3781: AQUACULTURE AND FISHERIES PRODUCTS

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<b>Module Title:</b>	AQUACULTURE AND FISHERIES PRODUCTS
<b>Code</b>	AFAS 3781
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 practicals); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	AFAS 3682: Introduction to Aquaculture
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module content

Aquaculture and Fisheries Products; Fish from farm/sea to the table; storage and slaughter techniques; Harvesting techniques; Processing technologies and preservation methods i.e. smoking, freezing, canning and drying; Transport and logistics; Packaging ; Nutritional composition; Product Development and value addition; Product Quality and Marketing; Food safety and health ; Quality evaluation; Quality Management Systems.

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### AFAF 3781: ICHTHYOLOGY II

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<b>Module Title:</b>	ICHTHYOLOGY II
<b>Code</b>	AFAF 3781
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	AFAS 3682: Introduction to Aquaculture
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

Introduction to fish biology and internal anatomy. Respiration: structure and function of gills, mechanism of gaseous exchange, adaptation for air breathing in lungfishes. Digestive: structure and functions of alimentary canal, food and feeding habits. Excretion: structure and functions of excretory organs, osmoregulation and thermoregulation. Skeleton, muscle and swimming mechanism. Reproduction: structure and functions of gonads, gamete formation and reproductive strategies. Fish endocrinology and hormonal control. Introduction to fish genetics.

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### ACA 3701: FIELD ATTACHMENT I

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<b>Module Title:</b>	FIELD ATTACHMENT I
<b>Code</b>	ACA 3701
<b>NQF Level</b>	7
<b>Contact hours</b>	Six weeks of Field Attachment
<b>Assessment Strategies</b>	40 % report presentation at a seminar; 60 % Field report. Subject to satisfactory attendance and good conduct during attachment
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

#### Module Content:

At the end of the Second year, students will be attached to selected institutions for hands-on-experience in selected area of subject specialization. Academic staff will pay field visits to students to discuss with them and their supervising officers on site the knowledge obtained and areas of exposure needing improvement.

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### AAEC 3781: FARM PLANNING AND MANAGEMENT

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<b>Module Title:</b>	FARM PLANNING AND MANAGEMENT
<b>Code</b>	AAEC 3781
<b>NQF Level</b>	7
<b>NQF Credits</b>	12
<b>Contact Hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)
<b>Prerequisite</b>	AAEC 3682: Production Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

The course includes issues such as: management of farm records; machinery; land; labor; and capital, farm business planning, enterprise budgeting, agricultural risk management strategies. Students will be exposed to business planning using spreadsheets.

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**AFAS 3791: FISHERIES MANAGEMENT I**

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<b>Module Title:</b>	FISHERIES MANAGEMENT I
<b>Code</b>	AFAS 3791
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Introduction to theories of organization, history of fisheries management, management and decision making, fisheries management authorities (state owned, participatory/community based or co-management); fisheries management plans (design and implementation), fisheries regulations (input, output and technical regulations) enforcement of fisheries legislation (monitoring, control and surveillances; other participatory methods); management costs; characteristics of subsistence artisanal vs. industrial and commercial fisheries; livelihood approaches to fisheries, lesson learned from other countries including (SADC)

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**AFAS 3792: FISHERIES MANAGEMENT II**

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<b>Module Title:</b>	FISHERIES MANAGEMENT II
<b>Code</b>	AFAS 3792
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Fisheries development and sustainability, fisheries and Marine Protected Areas (MPA), combating illegal, unreported and unregulated fishing (IUU), sustainable fisheries management approaches: ecosystem approach to fisheries, robust management, adaptive management, precautionary approach to fisheries; fish and seafood marketing and trade; regional fisheries management, law of the sea.

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**AFAS 3712: INTEGRATED COASTAL ZONE MANAGEMENT**

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<b>Module Title:</b>	INTEGRATED COASTAL ZONE MANAGEMENT
<b>Code</b>	AFAS 3712
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 4x 1hr/wk for 14 weeks (56hrs); Practical's: 1 x 3hr for 14 weeks (42hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).
<b>NQF Credits</b>	16
<b>Prerequisite</b>	AFAS 3691: Aquatic Ecology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

Potential impacts by climate change and direct human interference on coastal systems. Impact assessment: scooping of habitats, focusing and validation of communities and species, identification and evaluation of impacts. Monitoring. ICZM strategies: coordinated retreat, adaptation (sustainability), protection. Ecological and sociological implications. Internal functioning of companies; company decision making and the influence of externally set conditions with emphasis on Namibian based companies.

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**AFAS 3782: BASIC AQUACULTURE ENGINEERING**

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<b>Module Title:</b>	BASIC AQUACULTURE ENGINEERING
<b>Code</b>	AFAS 3782
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).
<b>NQF Credits</b>	12
<b>Prerequisite</b>	AFAS 3682: Introduction to Aquaculture, AFAS 3692: Aquatic Chemistry, AFAS 3691: Aquatic Ecology, AFAS 3602: Ichthyology I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content**

Principles of site selection. Water transport: pipes and pipe parts, types of pumps. Water quality and water treatment. Heating and Cooling. Aeration and oxygenation. Aquaculture recirculating systems. Pond, cage tanks and raceway systems, their construction principles and layout. Fish transportation and size grading systems. Instrumentation and automation in aquaculture.

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**ACSC 3792: RESEARCH METHODS**

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<b>Module Title:</b>	RESEARCH METHODS
<b>Code</b>	ACSC 3792
<b>NQF Level</b>	7

<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (1 x 2 hr paper)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	ACSC 3692: Biostatistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Students will be exposed to more advanced statistical concepts and research methods above those covered in Biostatistics. Comparison between parametric and non-parametric statistics. Non-parametric statistics: goodness of fit tests; tests of association, Chi Square tests; paired comparisons, Wilcoxon's tests; rank correlation; Multivariate methods: multiple regression, discriminant analysis, canonical analysis, multidimensional scaling, principal component analysis. Review of experimental designs with emphasis to livestock, crop and game animal experimentation. Review of procedures for implementing research projects and presentation of research results with emphasis to practical field situations and case studies. Introduction to Statistical Computer packages

**AFAA 3782: AQUACULTURE NUTRITION AND FEED MANUFACTURING**

<b>Module Title:</b>	AQUACULTURE NUTRITION AND FEED MANUFACTURING
<b>Code</b>	AFAA 3782:
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Assessment Strategies</b>	Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Module Content:**

Advantages/disadvantages of natural versus artificial diets; Basic components of artificial diets; Macro- and Micro Nutrients; proteins, carbohydrates, lipid/fats, energy and mineral/vitamins, amino acids, fatty acids, carotenoids; Use of biotechnology in feed enhancement; Nutritional requirements of fish at different life stages and different species. Nutrient digestion and pathways; Sources of feed stuffs/nutrients and binders; Feed formulation models; Least Cost production; Feed manufacturing techniques; Feed stability in water; Assessment of feed performance and fish growth performance.

**L.6 FOURTH YEAR**

**AFAS 3810: RESEARCH PROJECT**

<b>Module Title:</b>	RESEARCH PROJECT
<b>Code</b>	AFAS 3810
<b>NQF Level</b>	8
<b>Contact hours</b>	Consultation: 1 x 1hr/wk for 28 weeks (28 hrs)
<b>NQF Credits</b>	32
<b>Prerequisite</b>	ACSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Module Content:**

Students carry out independent study of a current topic in natural resources and agriculture. The course include participation in meetings organized by the coordinator, work with a faculty advisor to develop a research project, formulate hypotheses, design and carry out preliminary experiments and collect data and test the hypotheses. Students will carry out independent library research, begin experimental work, prepare a written report and make a presentation to other students the proposal and final report. The student will submit a final report written following Guidelines for Scientific Writing.

**Assessment Strategies**

Continuous assessment (100%) consisting of research proposal write up and presentation of proposal in a seminar, presentation of empirical findings in a second seminar, and grading of the final report.

**AACA 3801: FIELD ATTACHMENT II**

<b>Module Title:</b>	FIELD ATTACHMENT II
<b>Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>Contact hours</b>	Six weeks of Field Attachment
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Module Content:**

This module is designed to further expose students to the realities of the fishing industry operations in Namibia and beyond. They are expected to observe and participate in different facets of production, processing, marketing, extension and assist with management functions e.g. supervision of general work force and problem solving. Academic staff will pay field visits to students to discuss with them and their supervising officers on site the knowledge obtained and areas of exposure needing improvement.

**Assessment Strategies**

An attachment report and an oral presentation constitute the total assessment mark: 40% (Field Attachment Seminar Presentations). 60% (Field attachment Reports)

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### AFAS 3891: FISHERIES ECONOMICS

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<b>Module Title:</b>	FISHERIES ECONOMICS
<b>Code</b>	AFAS 3891
<b>NQF Level</b>	8
<b>Contact hours:</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr/wk alternate for 14 weeks (21hrs)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	AFAN 3682: Natural Resource Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

Role of economics in fisheries management. Production technology and efficiency. Catch and cost structure. Producer's surplus and resource rent. Profitability and efficiency parameters. Marketing functions and consumption. Maximum sustainable yield (MSY) versus maximum economic yield (MEY) Welfare economics.

#### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).

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### FAS 3831: FISH PATHOLOGY

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<b>Module Title:</b>	FISH PATHOLOGY
<b>Code</b>	FAS 3831
<b>NQF Level</b>	8
<b>Contact hours</b>	Lectures: 4 x 1hr/wk for 14 weeks (56rs); Practical's: 1 x 3hr/wk for 14 weeks (42hrs)
<b>NQF Credits</b>	16
<b>Prerequisite</b>	SFST 3681: General Microbiology, AFAS 3682: Introduction to Aquaculture
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

General basic pathology and fish immune/defense system. General and basic parasitology, parasite specificity and parasite development cycle. Infectious diseases: viral, bacterial and fungal diseases. Invasive diseases: protozoan infection, mixosporidian infection, crustacean parasites, plathyhelminthes infection of fish. Non- infectious diseases. Diseases of unknown etiology. Basic histopathology. Fish disease diagnosis, treatment and prophylaxis.. Biosecurity and animal welfare.

#### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 10 marked practicals); Examination: 60% (1 x 3 hr paper).

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### AENE 3882: ENVIRONMENTAL IMPACT ASSESSMENT

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<b>Module Title:</b>	ENVIRONMENTAL IMPACT ASSESSMENT
<b>Code</b>	AENE 3882
<b>NQF Level</b>	8
<b>Contact hours:</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs); Practical's: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	AFAS 3712: Integrated Coastal Zone Management
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### Module Content:

Definitions: impact assessment, Environmental studies, Environmental Impacts of Human Activities on Natural Resources; impact on atmosphere, impact on water bodies, impact on wildlife, impact on forests; Environmental considerations in Physical planning. Impact identification, monitoring and mitigation; methods of identifying impacts, methods of monitoring environmental impacts, types of mitigation actions. Formal Environmental Impact Assessment: Origins and significance of formalized approach; historical context and rationale; major issues in formal EIA process; procedure of formal EIA process, common methodologies and examples o their application, Choosing an appropriate methodology. Policy and Framework in Namibia: monitoring and quality control, role of Departmental Affairs; EIA in Namibia.

#### Assessment strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).

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### FAS 3811: BIOLOGICAL OCEANOGRAPHY

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<b>Module Title:</b>	BIOLOGICAL OCEANOGRAPHY
<b>Code</b>	FAS 3811
<b>NQF Level</b>	8
<b>Contact hours:</b>	Lectures: 4x 1hr/wk for 14 weeks (56hrs); Practical's: 1 x 3hr/wk for 14 weeks (42hrs)
<b>NQF Credits</b>	16
<b>Prerequisite</b>	AFAP 3781: Physical Oceanography, AFAS 3692: Aquatic Chemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

#### Module Content:

Abiotic factors: Properties of sea water and sediment – sea water reactions. Dissolved nutrients, nutrient cycling and chemical – biological interactions. Biotic factors: Inhabitants of the pelagic biota (bacteria, algae, zooplankton, fish). Primary production, -regulation and regional aspects. Energy transfer and food chain processes. Pelagic – benthic interactions. Microbiology of oceans. Types of biotopes: polar,

temperate and tropical systems. Marine system carrying capacity. Sampling gear and methods of species biomass assessment. Marine remote sensing. Oceanographic instrumentation and methods of measurement.

#### **Assessment Strategies**

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 10 marked practicals); Examination: 60% (1 x 3 hr paper).

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#### **AFAS 3812: FISH POPULATION DYNAMICS**

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<b>Module Title:</b>	FISH POPULATION DYNAMICS
<b>Code</b>	AFAS 3812
<b>NQF Level</b>	8
<b>Contact hours:</b>	Lectures: 4x 1hr/wk for 14 weeks (56hrs); Practical's: 1 x 3hr/wk for 14 weeks (42hrs)
<b>NQF Credits</b>	16
<b>Prerequisite</b>	ACSC 3692: Biostatistics, ACSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### **Module Content:**

An overview of fishing technology, design and choice of vessel and gear technology, fish aggregating- and selective devices, Impact of fishing gear on environment. Concepts in Fisheries science, estimation of age and growth parameters, estimation of mortality, gear selectivity, sampling, exponential decay model, stock recruitment relationship, non-age and age structured models, reference points, and projection model.

#### **Assessment Strategies**

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 10 marked practicals); Examination: 60% (1 x 3 hr paper).

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#### **AFAS 3832: AQUACULTURE MANAGEMENT**

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<b>Module Title:</b>	AQUACULTURE MANAGEMENT
<b>Code</b>	AFAS 3832
<b>NQF Level</b>	8
<b>Contact hours:</b>	Lectures: 4x 1hr/wk for 14 weeks (56hrs); Practical's: 1 x 3hr/wk for 14 weeks (42hrs)
<b>NQF Credits</b>	16
<b>Prerequisite</b>	AFAS 3682: Introduction to Aquaculture, AFAS 3792: Basic Aquaculture Engineering, AFAS 3781: Aquaculture Nutrition and Feed Manufacturing
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

#### **Module Content:**

Broodstock, hatchery, water quality management. Live feed production. Selection breeding. Broodstock conditioning. Hygiene requirements on the farm. Bio-security. General Human Resources. Financial projections of aquaculture enterprises.

#### **Assessment Strategies**

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 10 marked practicals); Examination: 60% (1 x 3 hr paper).

## M. M. SC. RANGELAND RESOURCES AND MANAGEMENT [17MSRR]

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### M.1 ADMISSION REQUIREMENTS

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I.1.1 The University of Namibia general regulations regarding admission of students to Master's Degree programmes shall apply.

I.1.2 Notwithstanding the above, students wishing to enrol for this programme must be in possession of a good undergraduate Bachelor of Science degree in Agriculture, Biology, Life Sciences, or related field from a recognized and accredited institution of higher learning.

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### M.2 ASSESSMENT

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The following were adopted to ensure high standards and competitive degree quality:

I.2.1 A 3-hour theory examination at the end of each course;

I.2.2 A pass mark of 60% for all courses, including the thesis;

I.2.3 A weighting of 50:50 for continuous assessment (CA) and the final examination;

I.2.4 At least 3 different continuous assessments for each course for core courses and 5 for generic courses;

I.2.5 Only students with an attendance record of 80% of all course activities (excluding continuous assessment activities) and a minimum continuous assessment grade of 40% can write the final examination;

I.2.6 A supplementary examination may be conducted in cases where a student has obtained a fail mark of 45 – 49% (hereinafter referred to as marginal fail) in the Regular Examinations. A student who fails to get the required passing marks after the supplementary examination will have to repeat the failed course in the subsequent year.

I.2.7 A student can remain registered for a maximum of 4 years.

I.2.8 Student will only be awarded M.Sc. degree in Rangeland Resources Management upon completion of all required courses with a pass mark of 60% or higher, including the thesis component.

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### M.3 DEGREE STRUCTURE

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The following will be the structure of the degree.

I.3.1 The degree name will be MSc. Rangeland Resources Management and will be housed and taught in the Department of Animal Science at the University of Namibia.

I.3.2 It will be a two-year fulltime program with a 50:50 weighting of course work to research. The program is based at Neudamm Campus. Classes/Lecturing will take place during daytime.

I.3.3 Coursework will be covered over two semesters in the first year while research and thesis work will be done in the second year.

I.3.4 There will be a maximum of 15 students per intake (minimum 5 students) and new intakes will be done once in two years.

I.3.5 The degree course work will comprise of: 8 compulsory core courses, 2 (out of 7) elective core courses and 2 compulsory generic courses. Graduation requires the completion of minimum 240 credits in line with NQA guidelines.

I.3.6 Core courses, both compulsory and elective will be equally weighted at 12 credits each, equivalent to 40 hours, while generic courses will each be weighted at 16 credits, equivalent to 64 hours.

I.3.7 Each core course will run over a 4-week block, while the generic courses will run over 28 weeks, across the two semesters.

I.3.8 Six core courses will be taught each semester with a week's break between the core teaching blocks.

I.3.9 Core course examinations will be written immediately after the course, during the inter-block break.

I.3.10 To counter the anticipated time-tabling problem regarding the 7 elective courses, there will be restricted possible course combinations and sequencing in the student's degree plan.

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### M.4 TEACHING MODE

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This will include; lectures, field work, discussion seminars, case studies, group projects etc.

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### M.5 THESIS COMPONENT

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Only students who have successfully passed all coursework shall be allowed to undertake research in Rangeland and Resources Management. Each student is required to propose a topic and write a proposal for research before the end of the first year. The official registration for the thesis will depend upon acceptance of her/ his proposal by Faculty Postgraduate Studies Committee.

Two (2) supervisors are recommended per student and the main supervisor must be from UNAM and must be a PhD holder. All thesis must be externally examined.

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### M.6 PROGRAMME SCHEDULE

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**FIRST YEAR SEMESTER 1**

Courses	Code	Periods	NQF Level	Pre-requisite	Credits	Compulsory/ Elective
Academic writing for Postgraduate Students	UAE 5819	04/56	8	None	16	Compulsory
Research/Exp Design and Analysis	ASC 5900	2/0.3	9	None	8	Compulsory
Geographic Info systems & Remote Sensing	ASC 5920	1.1/1.2	9	None	8	Compulsory
Into Integrated Resource Management	ASC 5981	7/w+pr3/w	9	None	12	Compulsory
Rangeland Ecosystem Structure & Function	ASC 5991	7/w+pr3/w	9	None	12	Compulsory
Soil Dynamics	ASD 5981	7/w+pr3/w	9	None	12	Elective
Water Dynamics	ASW 5981	7/w+pr3/w	9	None	12	Elective
Environmental Physiology	ASE 5981	7/w+pr3/w	9	None	12	Elective
Land Use Planning	ASL 5981	7/w+pr3/w	9	None	12	Elective
Fodder Flow	ASF 5981	7/w+pr3/w	9	None	12	Elective
Rangeland Management	ASR 5981	7/w+pr3/w	9	None	12	Compulsory
<b>Total Credits Semester 1</b>						<b>128</b>

**FIRST YEAR SEMESTER 2**

Courses	Code	Periods	NQF Level	Pre-requisite	Credits	Compulsory/ Elective
Research/ Exp Design & Analysis	ASC 5900	2+pr03	9	None	8	Compulsory
Geographic Info Systems & Remote Sensing	ASC 5920	1.1 + pr1.2	9	None	8	Compulsory
Rangeland Degradation and Its Mitigation	ASC 5992	7/w+pr3/w	9	None	12	Compulsory
Nutrition of Foraging Animals	ASN 5982	7/w+pr3/w	9	None	12	Compulsory
Sustainable Livelihoods	ASS 5982	7/w+pr3/w	9	None	12	Compulsory
Range Biodiversity and Conservation	ASR 5982	7/w+pr3/w	9	None	12	Compulsory
Wildlife Ecology & Management	ASC 5982	7/w+pr3/w	9	None	12	Elective
Natural Resource Economics	ASE 5982	7/w+pr3/w	9	None	12	Elective
Natural Resource Policies	ASP 5982	7/w+pr3/w	9	None	12	Elective
<b>Total Credits Semester 2</b>						<b>100</b>
<b>TOTAL CREDITS YEAR 1</b>						<b>228</b>

**SECOND YEAR**

Courses	Code	Periods	NQF Level	Pre-requisite	Credits	Compulsory/ Elective
Research Project/Thesis	ASC 5910		9	None	128	Compulsory
<b>TOTAL CREDITS YEAR 2</b>						<b>128</b>

**TOTAL PROGRAMME CREDITS****356****M.7 MODULE DESCRIPTORS****M.8 FIRST YEAR****AASC 5900: RESEARCH / EXPERIMENTAL DESIGN AND ANALYSIS**

<b>Module Title:</b>	RESEARCH / EXPERIMENTAL DESIGN AND ANALYSIS
<b>Code</b>	AASC 5900
<b>NQA Level</b>	9
<b>Practicals/week:</b>	28 weeks (64 Contact Hours) compulsory
<b>Credits</b>	6
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 5 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

A: Social research methods: Research paradigms and associated methodologies; positivism, phenomenology and critical theory: A critical difference between quantitative and qualitative research in terms of the nature of their empirical data should be discussed, purpose and nature of research, a basic overview of research design and methodology. Survey research; define and explain the purpose and describe the types, survey research cycle, discuss the advantages and challenges of the research strategy and methodology and the role of indicators, describe data gathering techniques, instruments analysis and presentation. Participatory rural appraisal (PRA); define, and explain the purpose and describe the types of PRA, PRA cycle, research strategy and methodology, the advantages and value, challenges and shortfalls of the method. The research proposal: define the research proposal, its purpose and the steps involved in writing it. Clearly and fully describe the layout and contents of the research proposal. Describe how research proposals should be evaluated, and the importance of that step. Scientific communication Describe what should be contained in a research report. Explain the importance of an oral presentation, and how it should be prepared and done

B:Research/Experimental Design and Analysis Review of basic analytical techniques: review basic concepts of graphical and numerical data summary i.e. how to summarize data in form of tables and graphs, how to calculate measures of central tendency and measures of dispersion, merits and demerits of each of the measures of central tendency and measures of dispersion, the ideas of probability and confidence intervals in relation to statements made about results of experiments and surveys; the importance of the normal, F-distribution and t-distribution in statistics; the sampling distribution of the mean and hypothesis testing and introduce the concepts of sampling error and standard error and calculation of confidence intervals. Standard Experimental Designs; Completely randomized design; show how to design a simple experiment using the principles of replication, randomization and local control; analysis of variance (ANOVA), results of one-way ANOVA, compare treatment means, and how to present the results. Discuss the advantages and disadvantages of the design. Randomized block design, principle of blocking including advantages and disadvantages; latin square designs and its usefulness; factorial experiments. Comparison of treatment means: describe the most important procedures for mean comparisons and when they should be used. e.g. LSD, DMRT, Orthogonal contrasts. Explain the difference between comparison-wise and experiment-wise error rates, discuss the advantages and disadvantages of the most popular multiple comparison tests. Regression and correlation: the concept of dependent and independent variables, the uses and abuses of the simple and multiple regression; calculate and interpret correlation coefficient and coefficient of determination; the concept of least squares point estimates and least squares regression line and how to test hypothesis about a regression line; polynomial regression (polynomial fitting), types of curves e.g. exponential growth curves, logistic curves. Non Parametric Statistics: Introduce alternative tests to the parametric tests used in previous units, advantages and disadvantages of non-parametric tests. Multivariate statistics: introduction to the nature of multivariate data and the range of interdependence techniques available for exploring and analyzing multivariate data sets, the concept of classification and explain analyses using the different cluster analysis techniques; the concept of gradient analysis using ordination techniques, indirect gradient analysis (e.g. Principal Components Analysis, Detrended Correspondence Analysis) and direct gradient analysis (e.g. Canonical Correspondence Analysis) with practical examples. Other ordination approaches can also be covered, multivariate Statistical Analysis software packages (e.g. CANOCO for Windows, TWINSpan for Windows, PC-ORD for Windows, NMDS, DECORANA) and demonstrates how they are used.

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### **AASC 5920: GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING**

<b>Module Title:</b>	GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING
<b>Code</b>	AASC5920
<b>NQA Level</b>	9
<b>Contact Hours:</b>	28 weeks (64 Contact Hours) compulsory
<b>Credits</b>	16
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 5 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

#### **Module Content.**

Basic introduction to the course GIS/RS in Rangeland Resources Management: The fundamentals of GIS and the components of a GIS. The nature of geographic data, and geo- referencing. Generalization, abstraction and metadata. Data models and data collection. Modeling the real world in a GIS environment. Review the main methods of GIS data capture and transfer; introduce essential practical management issues. Remote Sensing. Geographic query and analysis; turning data into information; basic introduction to spatial analysis; measurement, including algorithms to determine length, areas, shapes, slopes, and other properties of objects important for rangeland resources management. The concept of environment, natural resources, demography and land use. Major environmental concerns including pollution, soil degradation and crop and livestock production, effects of agrochemicals, desertification and methods of control, natural and man-made hazards, human population growth, industrialization, urbanization, energy sources, waste management and recycling. Ecosystems management and modeling of habitat change.

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### **AASC 5981: INTRODUCTION TO INTEGRATED RESOURCES MANAGEMENT**

<b>Module Title:</b>	INTRODUCTION TO INTERGRATED RESOURCES MANAGEMENT
<b>Code</b>	AASC5981
<b>NQA Level</b>	9
<b>Contact Hours:</b>	40 (4 weeks) compulsory
<b>Credits</b>	16
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

#### **Module Content:**

Ecosystem approach: principles to ecosystem management; ecosystem structure, functions and integrity; ecosystems connectivity; scales in ecosystem management, e.g. basin management; application of Convention on Biology Diversity and Ecosystem Approach Toolkit. Dealing with complexity and dynamism; Socio-ecological system components, behavior and interactions; scales in socio – ecology system. Institutions of Natural Resource Management: institutional arrangements in governing natural resources; decision making process, trade-offs and competing interests; conflict resolution mechanisms, challenges and best practices; policy responses in the southern African region regarding Natural Resource Management (NRM), property rights, legal frameworks, regulations regarding amongst others: pricing and subsidies, markets, Community Based Natural Resources Management (CBNRM). Adaptive management and action research: shifting paradigm from seeking solutions to generating learning opportunities to continuously improve ecosystem management; integration of formal scientific knowledge and local knowledge in an adaptive management framework; approaches to engage interest groups as partners in action research; formulation of action research; measuring natural resource performance. Knowledge management: partnerships in multi-stakeholder issues; data management (spatially reference data), including local knowledge; information sharing approaches aiming to achieve shared understanding of system properties and change; organization/institutional learning. Systems analysis tools: models as management tools; application of modeling to natural resource management; data bases, GIS; decision and negotiation support tools.

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### **AASC 5991: RANGELAND ECOSYSTEM STRUCTURE AND FUNCTION**

<b>Module Title:</b>	RANGELAND ECOSYSTEM STRUCTURE AND FUNCTION
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<b>Code</b>	AASC5991
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

This course aims at describing the general structure and processes that are characteristic of Southern African rangelands. Southern African rangelands are a basic resource for the survival of the majority of Southern African rural population. Proper and sustainable management of these rangelands require defining these rangelands in Southern Africa and the processes that drive them. Types and distributions of major rangeland types will be described to illustrate the diversity of structures, including floristically and including the faunal species associated with the rangelands.

Rangeland ecosystem structure consists of the soil, plants, animals and invertebrates. Foraging activities of rangeland herbivores play an important role on the integral functioning of rangelands. These effects will be discussed to lay the foundation on principles and practices associated with the rangelands. Changes occurring on rangelands, the causes and models used to describe these changes as well as implications of understanding and describing rangeland dynamics on rangeland management.

Defining Southern African rangelands; understand the significance of the different scale and levels of organization in rangeland description; understand the major Southern African biomes and their determinants; understand the role of grazing and grazing management on rangeland ecosystem integrity as well as understanding of rangeland vegetation dynamics models.

**AASD 5981: SOIL DYNAMICS**

<b>Module Title</b>	SOIL DYNAMICS
<b>Code</b>	AASD5981
<b>NQA Level</b>	9
<b>Standards Competencies</b>	N/A
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Soil chemical processes: discuss the dynamics of nutrient cycling in the context of the impacts of rangeland management practices on the rates and directions of the various processes involved, describe surface functional groups, sorption processes and exchange reactions in soils, quantity-intensity relationships in soils, discuss redox chemistry and soil acidity and alkalinity and their relevance in soil management. Comparative analyses of the various chemical processes across different soil types and climatic gradients, implication of rangeland management practices on soil chemical properties and soil and processes. Soil organic matter (SOM): biophysiochemical processes in soils (e.g. decomposition, properties of SOM,) and their importance in rangeland management. Impacts of various management practices on the nitrogen cycle. Comparative analyses of the various processes involved across different soil types and climatic gradients. Implications of rangeland management practices on soil biophysiochemical properties and soil processes. Soil water, the holding capacity, measurements, and flow in the soil. Inferences should be made on issues related to soil erosion, irrigation, drainage and floods as the result of improper management strategies. Water movement in soil (Darcy's law of water flow), soil morphology; and soil conservation.

**AASW 5981: WATER DYNAMICS**

<b>Module Title</b>	WATER DYNAMICS
<b>Code</b>	AASW 5981
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Water cycle: components of the water cycle and the fluxes of the planet's water, implications on the management of plants, animals and the land as a whole. Climate, drought, flood, water quantity and quality (both surface and ground water). Water quality standards used in the southern African region should be explained, especially the one used by the South African River Health Program such as SASS5 (or similar). The need to continuously monitor water quality in rangeland ecosystems must be explained – how and why it is done. Watershed management, watershed water balance, watershed water capture, storage and release. Water harvesting and utilization especially given that much of southern Africa is semi-arid to arid. Water pollution, sources and types. Policies and legislation addressing water pollution must be discussed with particular reference to rangeland management. Ways of preventing and mitigating water pollution.

**AASE 5981: ENVIRONMENTAL PHYSIOLOGY**

<b>Module Title</b>	ENVIRONMENTAL PHYSIOLOGY
<b>Code</b>	AASE 5981

<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Introduction to physiology of foraging animals: cell structure and function (The significance of knowledge of cell structure and its functions in understanding physiological process). Osmo-regulation and excretion, circulating body fluids and functions. Respiratory system. Climatic Physiology and temperature regulation: regulation of body temperatures. Adjustment to ambient temperature variation; cold, response to heat. Morphological and anatomical features relevant to temperature regulation. Body conformation, limits of temperature regulation in hot and cold. Water and animal physiology: distribution of body water; water balance; Photoperiodism: seasonal physiological change; allometry of food intake (energy requirements, body size); genetic adaptation; reproductive and digestive physiology: importance in terms of production assessment.

**AASL 5981: LAND USE PLANNING**

<b>Module Title</b>	LAND USE PLANNING
<b>Code</b>	AASL 5981
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Land use planning; familiarize students with concepts of existing land use planning guidelines e.g. for land evaluation, agro-ecological zoning and discuss their application in the Namibia context; environmental sustainability, criteria, current land use cover and land cover change detection; land use planning procedure, participatory methods for local and regional land use planning; techniques of resource survey and mapping, food agriculture organization (FAO) framework and guidelines for land evaluation; land capability classification; agro-ecological zoning methodology; importance of GIS and remote sensing in land use planning and image processing; decision support tools in local-level land use planning. Land tenure: Land tenure regimes governing land use in southern Africa; opportunities and challenges underlying tenure systems; land rights and tenure arrangements.

**AASF5981: FODDER FLOW**

<b>Module Title</b>	FODDER FLOW
<b>Code</b>	AASF5981
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Fodder production from rangelands: Discuss the importance of natural grasslands as major sources of nutrients for range animals including wild life; the nutritional limitations of utilizing natural grasslands and appropriate mechanisms for improving their nutritional quality applicable to range communities especially pastoralists; overview of the different pasture management practices to improve productivity of native pasture lands, livestock productivity, animal husbandry practices and disease control; the importance and methods of reseeding and over sowing; methods of establishing cultivated pastures and conditions, choice of plant species and management of cultivated pastures.

Management of sown and improved tropical legume pastures: Explain the concept of incorporating forage legumes into natural grasslands and their role in providing quality fodder to range animals while preserving the natural resource base; the factors which affect and favor legumes in grass/legume pastures, overview of fertilizer use to improve pasture productivity and factors limiting their use in tropical rangelands especially in Africa; explain the principles and importance of pasture biomass assessment and its application in pasture management, soil surface protection and erosion; Utilization and conservation of forage: Explain the importance of fodder utilization and conservation, the different methods of forage conservation e.g. standing hay or differed feed, hay, silage and haulage.

Fodder flow planning: strategies for drought feeding: Explain the nutrition aspects of drought feeding and the strategies to be adopted for different agro-ecological zones; discuss the different strategies for feeding range animals in periods of severe feed shortages (drought feeding); the strategy for drought feeding based on molasses and other supplementary feed stuffs.

**AASR 5981: RANGELAND MANAGEMENT**

<b>Module Title</b>	RANGELAND MANAGEMENT
<b>Code:</b>	AASR 5981
<b>NQF Level:</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) Compulsory
<b>Credits:</b>	12
<b>Module Assessment:</b>	CA 50%: at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations) Examination 50%: One 3 hrs written examination paper

**Prerequisites:** None

**Module Content:**

Students will be exposed to topics such as Eco-physiology of southern Africa, rangeland herbivorous interaction, rangeland management, carrying capacity, current land issues, range monitoring and evaluation, sustainable use of rangeland and drought mitigation strategies, problems of bush/weed encroachment on rangeland pastures and methods of control; grazing management and methods for optimum utilization of range pastures, the importance of fire in the management of range forages and as a tool for control of weeds. review the different methods of pasture assessment emphasizing tropical rangeland pastures, e.g. pasture yield, pasture composition, estimating number, frequency and vegetation cover, basal area of a pasture, pasture structure, trees and shrubs. Students will also be exposed to practical activities at the farm at Neudamm and elsewhere within the country.

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### **AASC 5982: WILDLIFE ECOLOGY AND MANAGEMENT**

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<b>Module Title</b>	WILDLIFE ECOLOGY AND MANAGEMENT
<b>Code</b>	AASC 5982
<b>NQA Level</b>	9
<b>Contact Hours:</b>	40 contact hours (4 weeks) elective
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Population dynamics: define wildlife and wildlife management and its importance; the factors which influence fluctuations of animal populations in the wild; the patterns of growth of animal populations and the differential equations which describe the various patterns (logistic, geometric and exponential); explain the need for reliable information on population size and reproductive rates; the inherent qualities/properties of wildlife populations: rate of increase, age structure, lifespan, sex ratio, fecundity/natality and mortality; interspecific dynamics, intraspecific dynamics, territoriality and home range, dispersal patterns and migrations; the mechanisms of population regulation, including density-dependent and density-independent factors (and how these can be extrinsic or intrinsic). Wildlife nutrition and water requirements: Wildlife feeding and nutrition; influence of variations in gut anatomies (including feeding classes), body sizes and physiology on nutritional requirements. Counting wild animals: Emphasize the importance of collecting data on animal counts in wildlife management, pros and cons of the various methods applied in animal censuses; discuss home range, territories and social organization: the use of some statistical models to characterize home ranges of animals such as minimum convex polygon model, density estimation models (bivariate, normal, harmonic mean, and kernel), the importance of radio telemetry as a tool in many modern studies of animal behaviour, ecology, management and conservation; home range utilization (intensity of use) by wild animals and the concept of the 'centre of activity'; define a 'territory' and compare and contrast a home range and territorial behaviour. Define a 'social animal' and social organization in wild animal populations; social behaviour.

Wildlife utilization and conservation systems in southern Africa: Define wildlife utilization/harvesting and explain the purposes including the concept of maximum sustained yield (MSY) and optimum sustained production (OSP), culling controversies, conservation and the causes of wildlife extinctions considered in the issues such as: types of protected area systems and their functions, ecosystem-based vs species-based approaches, influence of size of protected area, minimum viable population concept and population viability analysis, importance and effects of corridors, culling in parks and reserves and its controversies, conservation outside parks and reserves, and community-based wildlife management initiatives in southern Africa, international conservation issues including IUCN Red Data Books, the role of CITES, etc.

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### **AASC 5992: RANGELAND DEGRADATION AND ITS MITIGATION**

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<b>Module Title</b>	RANGELAND DEGRADATION AND ITS MITIGATION
<b>Code</b>	AASC 5992
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Define rangeland degradation; causes of rangeland degradation; indicators of rangeland degradation; state of rangeland degradation in Sub-Saharan Africa; mitigating rangeland degradation; rangeland restoration and rehabilitation and reference ecosystem; the ecological trajectory; challenges and opportunities.

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### **AASN 5982: NUTRITION OF FORAGING ANIMALS**

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<b>Module Title</b>	NUTRITION OF FORAGING ANIMALS
<b>Code</b>	AASN 5982
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Nutritional diversity of rangeland forage. Define the term rangeland in its broad sense and give an overview of the feeding and nutrition of animal; discuss the species and diversity of range forages and their nutritive value. Discuss biotic factors including plants anatomy,

differences in plant parts, plant age, stage of growth; and biotic factors including season of growth, range site conditions, stocking rate, livestock and wildlife species. Animal foraging behavior and diet selection: Diet selection and foraging behavior; wildlife feeding nutrition; factors affecting food availability, quantity and quality. Review the classification of range forage base, on their functional attributes and the types of foods eaten including bulk/ roughages grazers, concentrate selectors and intermediate feeders. Factors which influence diet selection of foraging animals. Determination of the amounts and quality of nutrients derived from grazing animal's diets. Foraging behavior of range animals including foraging tactics of range animals. Establish forage quality effects on foraging behavior of animals; Present and discuss the inherent factors which affect diet selection by foraging animals.

Range land animal nutritional requirements: The concept of animal nutritional requirements to support metabolic activities for normal health and vigor, growth rate, reproduction and or normal lactation levels; the roles and requirements of the most important nutrients essential for the metabolic activities of foraging animals. Discuss the three protein fractions when considering the protein requirements , soil and plant factors which affect mineral content of pastures; the important major minerals required for grazing stock production , role of anti – nutritional factors and their effects on nutritive value of forages.

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### AASS 5982: SUSTAINABLE LIVELIHOODS

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<b>Module Title</b>	SUSTAINABLE LIVELIHOODS
<b>Code</b>	AASS 5982
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

#### Module Content:

Land, agriculture, poverty and rural livelihoods in Africa – an introduction on food security, poverty and sustainable development; Rangeland Resource Management (RRM): Services and Markets; Describe issues that revolve around effective rangeland resources management e.g. service provision, research, communication and interaction between service providers and clients, refinements. Cross-cutting RRM including issues such as decentralization, governance and institution building, impacts of HIV/AIDS on RRM, engendering rangeland resource management. Land and agrarian reform; discuss technical information and background on the history of land and agrarian reform and introduce models currently implemented in Namibia, South Africa and Mozambique, supplemented by other relevant examples from the region. Sustainable Livelihoods Framework. Hands on application of the livelihoods framework.

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### AASR 5982: RANGE BIODIVERSITY AND CONSERVATION

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<b>Module Title</b>	RANGE BIODIVERSITY AND CONSERVATION
<b>Code</b>	AASR 5982
<b>NQA Level</b>	9
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

#### Module Content:

Inventory, assessment and monitoring of rangeland biodiversity with particular emphasis on rangeland; review and discuss inventory assessment and monitoring approaches; discuss the importance of red data lists, their advantages and disadvantages. Valuation of rangeland biodiversity; categories of biodiversity, economic evaluation of and applicability of various methods and approaches to rangeland resources. Bio-systematic considerations for conservation of rangeland biodiversity; ecological and taxonomic views of biodiversity and how they are linked. Conservation strategies and current issues. Conservation genetics: principles and procedures underlying various modern techniques of measuring genetic diversity; interpretation and use in conservation genetics. Local and international conventions on biodiversity (convention on biological diversity, United Nations Convention to Combat Desertification (UNCCD), Convention on International Trade on Endangered Species of Fauna and Flora (CITES).

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### AASE 5982: NATURAL RESOURCE ECONOMICS

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<b>Module Title</b>	NATURAL RESOURCE ECONOMICS
<b>Code</b>	AASE5982
<b>NQA Level</b>	9
<b>Lecturers /week:</b>	4 weeks (40 Contact Hours) elective
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

#### Module Content:

Introduction to natural resources economics, environmental economics and agricultural economics: economic value of rangeland natural resources, use and non-use values, economic valuation of range resources including biodiversity, species and habitats, ecosystem function, conservation, water, soils, incentives and appropriation of value-local and global. RM and NRM relevant applications: cases from southern Africa; natural resources accounts: Botswana, Namibia, raising local natural resource benefits and lowering local opportunity costs: CBNRM, assessing the economic impact of desertification: Namibia, differential land use, land taxation in Namibia, poverty rights and common-pool resources: examples and lessons learnt in southern Africa and elsewhere. Introduction to some analytical tools, cost

effectiveness analysis, benefits and costs, supply and demand, economic efficiency and markets. National budgets, international financing, aid: strategy overviews; financing RRM: public and private investments, budgeting, Government budgets, aid, cooperation and trade. Current RRM relevant economic debates: top hits; food security, land reform, alternative land uses: weighing the economic-social and environmental benefits and value, water pricing, valuation of protected areas, access and benefit sharing: how to unlock the potential of natural resources, international trade and subsidies: how does the global economy affect RRM in southern Africa and international aid: What is needed and what is useful.

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### AASP 5982: NATURAL RESOURCE POLICIES

<b>Module Title</b>	NATURAL RESOURCE POLICIES
<b>Code</b>	AASP5982
<b>NQA Level</b>	9
<b>Lecturers /week:</b>	4 weeks (40 contact hours) elective
<b>Credits</b>	12
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.
<b>CA:</b>	50%
<b>Exam:</b>	50%
<b>Prerequisites</b>	None

**Module Content:**

Policy formulation, analysis and implementation. The price linkage: fiscal expenditures; support for agriculture; improving the incomes of the rural poor. Gender and rural development: the key issues for discussion here are the deeply rooted traditional codes of condition, division of labor and unfair inheritance laws. Principal aspects of a legal framework; Policy analysis and implementation; agricultural policies and their impact on other natural resources in the economy; competitiveness of developing countries' exports in the world market; the existence of mega tariffs of 200- 300 % on agricultural commodities in developed countries; trade liberalization and the reallocation of resources towards a country's comparative advantage

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### UAE 5819: ACADEMIC WRITING FOR POSTGRADUATE STUDENTS

<b>Module Title</b>	ACADEMIC WRITING FOR POST GRADUATE STUDENTS
<b>Code:</b>	UAE5819
<b>NQF Level:</b>	9
<b>Contact hours:</b>	4 lecture periods per week and 1 practical session per week for 14 weeks
<b>Credits:</b>	16
<b>Module Assessment:</b>	CA: (1 x 3 hour exam paper)
<b>Prerequisites:</b>	Must be a postgraduate student.

**Module Content:**

This module is a post-graduate course designed to empower students with skills and knowledge to access and critique academic sources and to synthesize information from these sources to assist them in the substantiation and development of their own claims when writing an academic paper in their respective fields of specialization. Additionally, this course will empower students with the capacity to undertake the challenges of academic writing by exposing them to the different rhetorical and stylistic elements typical of academic texts. Finally, students will be introduced to the American Psychological Association (APA) writing style and will be equipped with the necessary skills to format an academic paper in APA style.

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## M.9 SECOND YEAR

### THESIS COMPONENT

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### AASC 6910: RESEARCH PROJECT / THESIS

<b>Module Title</b>	RESEARCH PROJECT/THESIS
<b>Code</b>	AASC 6210
<b>NQA Level</b>	9
<b>Contact Hours:</b>	Second Year; Compulsory
<b>Credits</b>	128

**Modules Assessment:**

**Thesis component**

Only students who have successfully passed all coursework shall be allowed to undertake research in Range Resource Management. Each student is required to propose a topic and write a proposal for research before the end of the first year. The official registration for the thesis will depend upon acceptance of her/ his proposal by Postgraduate Students Committee.

Two (2) supervisors are recommended per student and the main supervisor must be from UNAM and must be a PhD holder. All thesis must be externally examined.

**Prerequisites** A pass in all coursework modules

**Module Content:**

A student, who has successfully completed the coursework phase, shall undertake research in an approved topic in rangeland management. A student must submit a research proposal in the second semester of the first academic year. A student can only officially register for the second year after acceptance of his/her research proposal by the Postgraduate Studies Committee.

The student under the guidance of the two academic advisors will collect and analyze data, write a thesis and make a presentation of the research findings before staff and students of the Faculty. The two academic advisors will assist the candidate to ensure integrity, correctness and completeness of the research. After the thesis has been examined by the two supervisors, it will be sent for further

examination by an external assessor. The candidate will be required to defend the thesis before a panel of examiners according to the Rules and Regulations of the University of Namibi

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## **N.1 POSTGRADUATE TRAINING PROGRAMMES AT UNAM**

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**Students who are on full time employment should take studies on a part time basis.**

### **Postgraduate Diploma Programmes**

1. UNAM makes provision for Postgraduate Diploma programmes in selected fields as approved by Senate.
2. Postgraduate Diploma programmes offer specialised training, which is career-oriented.
3. Postgraduate Diploma programmes have a minimum of **one year** duration for **full-time** students, and **two years** for **part-time** students; are **taught** programmes (i.e. involve lectures, seminars, practicals, written tests and examinations, etc); and also include a small independent research component.

### **Master's Degree Programmes**

1. Postgraduate training programmes at Master's degree level are of two types:  
Master's degree by research culminating in a thesis.  
Taught Master's degree involving at least one academic year of coursework followed by a mini thesis.

Students admitted to Master's degree programmes enrol on either a full time or part time basis. Master's degree programmes have minimum of two years duration for full-time students and three years for part-time students; and **a maximum of three years for full time students and maximum of five years for part-time students**, unless otherwise stipulated by programme specific regulations.

### **Doctoral Programmes**

1. Doctoral programmes at UNAM are normally undertaken by research and the writing of a dissertation unless otherwise approved by Senate. The duration of a doctoral programme is a minimum of three for full-time studies and four years for part-time students; and **a maximum of four years for full time students and maximum of six years for part-time students**.
2. Doctoral study opportunities at UNAM are offered where the departments have the necessary qualifications for admission, where the relevant Department has the necessary research facilities and infrastructure, and where sufficiently qualified and experienced academics are available and ready to provide effective supervision.

### **Approval of Postgraduate Programmes**

All programmes should be considered by the UNAM Postgraduate Studies Committee to ensure that they adhere to the UNAM Postgraduate regulations and standards of quality, before these programmes are recommended by the Academic Planning Committee (APC) to Senate for approval.

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## **N.2 REGULATIONS AND GUIDELINES GOVERNING POSTGRADUATE APPLICATIONS**

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### **Eligibility for Admission/ Procedures to Apply for Postgraduate Studies**

UNAM welcomes students with a range of qualifications from all over the world. Applicants must fulfil the minimum admission requirements for entry as well as English Language requirement (if relevant) as indicated. Competition for places in some programmes is extremely high, and the minimum requirement given may not be sufficient to be admitted. **Due to this, applicants may be requested to undergo further screening processes.**

### **Postgraduate Diploma**

1. Prospective students must be in possession of a relevant Bachelor's degree from UNAM or any other recognised institution.
2. Students who do not comply with (1) above may also be considered according to the University approved Recognition of Prior Learning (RPL) Policy.

### **Master's Degree**

1. Prospective students must be in possession of a NQF (Namibian National Qualifications Framework) Level 8 Bachelor (honours) degree qualification or equivalent, with an overall grade average of 60% (and above) from UNAM or any other recognised institution, in the chosen field of study.
2. In addition, prospective students must satisfy Faculty specific requirements as indicated in the admission requirements of the relevant programme (e.g. minimum two years teaching experience and a screening test for M.Ed. admission).

### **Doctor of Philosophy Degree and other Doctoral Programmes**

1. Prospective candidates must be in possession of a NQF level 9 Master's degree or equivalent from UNAM or any other recognised institution, in the chosen field of study.
2. Students who enrolled for a Master's degree by thesis only may be considered for upgrading into the Doctoral Programme if, during the second year of registration they demonstrate sufficient original contribution(s) to knowledge as motivated by the supervisors through the Faculty Postgraduate Studies Committee and approved by the UNAM PGSC.

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### **N.3 APPLICATION PROCEDURES FOR POSTGRADUATE STUDIES**

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#### **Application forms**

Applications for postgraduate studies should be made on a University **postgraduate application form** which is available on request from the Office of the Registrar, Student Records Section, and can also be downloaded from the UNAM Webpage: <http://www.unam.edu.na>

Before completing the application form, applicants must familiarise themselves with all aspects pertaining to postgraduate studies as set out in this prospectus. Applicants must also acquaint themselves with the different modes of the programmes offered (e.g. taught programmes or by thesis/dissertation only, full time or part time). Applicants must ensure that all relevant documentation is submitted with the application form, together with a **non-refundable application fee**. Receipt of the application will be acknowledged by mail.

**Prospective students with qualifications obtained from an institution outside Namibia (or non-accredited institutions in Namibia) must submit a Namibia Qualifications Authority (NQA) evaluation for such qualification together with their application forms compulsory. Please Note: this process takes at least 30 days and proof of submission to NQA will NOT be accepted.**

**All Master's by Thesis and Doctorate by Dissertation must submit a research topic concept note (maximum two pages) together with the application form. No consideration will be given to applications without the concept note.**

#### **Incomplete applications will not be considered.**

The closing date for taught Master's and taught Doctoral applications is end of **July** of each year or as advertised (**No late applications will be accepted**).

Application for Master's and Doctoral programmes by thesis/dissertation only, will be accepted throughout the year.

#### **Processing of applications**

The completed application forms will be processed and forwarded by the Student Records Section to the Centre for Postgraduate Studies which will in turn forward the applications to the relevant Faculty/School/Department Admission Committees.

#### **Admission of students**

The Department/School recommends admission through the Faculty to the Centre for Postgraduate Studies taking into account the applicant's fulfilment of the minimum admission requirements, availability of supervisors and space. A provisional admission letter indicating further conditions to be met as applicable will be issued to prospective student.

#### **Master's by Thesis and Doctoral programmes by Dissertation**

The relevant Faculty PGSC will recommend Supervisor(s) according to the applicant's area of study to the UNAM PGSC for approval.

Upon approval of the supervisor(s) by the UNAM Postgraduate Studies Committee and verification of other conditions, an admission letter is issued by the Centre.

It is the responsibility of the student to ensure that the supervision agreement (Annex 1) is signed with the supervisor. After verification of this agreement by the Faculty PGS Officer the student may register during the next registration period (first week of the month).

#### **Master's and Doctoral Programmes by coursework**

Upon recommendation by the relevant Department/School, the FPGSC will recommend a supervisor(s) according to the applicant's area of study to the UNAM PGSC for approval, at least six months before the start of the research component.

#### **Study Permit Requirements**

According to the Immigration Control Act of 19 August 1993, all International students (SADC and Non-SADC) must be in possession of a valid approved Study Permit and Visa before entering Namibia for the purpose of studying. All prospective (first and senior) students are required to apply for a Study Permit and Visa on the prescribed forms obtainable from the University of Namibia or at the Namibian Embassy in any country or the nearest Namibian Embassy or Ministry of Home Affairs and Immigration (Namibia) website.

Only persons with permanent Namibian Residence, Refugees or Asylum Seekers and Diplomatic representatives are exempted from applying for a Study Permit and Visa. The mentioned categories are exempted on condition that they provide the relevant documentation (i.e. Permanent Residence Permit, approved and endorsed Refugee/ Political Asylum Seekers status, a Courtesy Visa which confirms diplomatic status) to the University of Namibia.

Study Permits, Work Permits and Tourist Visas are not interchangeable. Kindly note that candidates in possession of a work permit will need to apply for a study permit if offered provisional admission to the University of Namibia.

The University of Namibia and the Ministry of Home Affairs and Immigration (Namibia) have a temporary arrangement that students may apply for their Study Permits during the duration of the scheduled registration period.

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### **N.4 REGULATIONS AND GUIDELINES GOVERNING REGISTRATION OF ADMITTED STUDENTS**

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#### **REGISTRATION FOR MASTER'S/DOCTORAL BY THESIS/DISSERTATION ONLY**

##### **N.4.1.1 Registration of admitted students**

1. All postgraduate students are expected to adhere to the deadline dates for registration as stipulated in the Faculty, Postgraduate and General Regulations Prospectuses.
2. All Postgraduate Students shall be required to register for the **compulsory module on “Academic Writing for Postgraduate Students”**.
3. Students who apply for Masters/Doctoral may be required to enrol in selected modules, which will help to bridge any gaps in their earlier training or expose them to new developments in their study disciplines, as may be recommended by relevant FPGSC and approved by the UNAM PGSC. Students must pass these modules before they qualify for graduation.
4. All Postgraduate Students shall be required to register **every year** for the duration of the specific programme, unless approval has been granted for a break in studies.
5. Students who fail to register for any particular academic year will have to apply for re-admission to the programme and provide valid reasons why he/she could not register for the particular academic year.
6. A registered student may be allowed to transfer to the University of Namibia (from another institution) subject to written approval of the supervisor(s) and the relevant Postgraduate Studies governing bodies from both Universities involved. Registration is subject to the availability of suitable supervisors and all relevant processes and regulations of the University of Namibia.
1. A registered student may be allowed to transfer from the University of Namibia subject to written approval of the supervisor(s) and the relevant Postgraduate Studies governing bodies from both Universities involved.
2. No student shall be admitted as a candidate for more than one qualification at the same time without the special permission of Senate. Likewise, no student registered at the University of Namibia shall be permitted to enroll as a student at another university at the same time.
3. Senate may, after consultation with Faculties, restrict the number of candidates who may be permitted to register for a particular course of study, in which case Faculties may, from amongst the candidates qualified to register for such a course of study, select those who will be permitted to register.

## **REGISTRATION FOR MASTER’S/DOCTORAL PROGRAMMES BY COURSEWORK**

### **Registration of admitted students**

1. All postgraduate students are expected to adhere to the deadline dates for registration/addition of modules as stipulated in the Faculty, Postgraduate and General Regulations Prospectuses.
2. Students who are registered in programmes involving coursework and a thesis/dissertation will be required to enrol for **core** and **elective** (optional) modules, as prescribed in the relevant Faculty Prospectus and in the Centre for Postgraduate Studies Prospectus under the relevant Faculty.
3. Before registering for the research component, students must sign an agreement with the approved supervisor (Annexure 1) **not later than six (6) months** before the scheduled start of the research project, as reflected in the curriculum.

### **Approval of Research Proposal**

Within three (3) months of signing the agreement with the approved supervisor the research proposal accompanied by all supporting documents (e.g. informed consent form, interview guide etc) must be presented to the Faculty PGSC. The Faculty PGSC makes one of three recommendations:

Within six (6) months of registration for a Master’s and within nine (9) months of registration for a Doctoral programme, the research proposal accompanied by all supporting documents (informed consent form, interview guide etc) must be presented to the Faculty PGSC. The Faculty PGSC makes one of three recommendations:

1. Approves the research proposal and recommends it, as well as the Ethical Clearance Certificate obtained from the CRP, to the UNAM PGSC for noting and issuing of the Research Permission Letter by the Director: Postgraduate Studies;
2. Rejects the research proposal and recommends de-registration of the student to the UNAM PGSC.
3. Grants an extension period of three (3) months for re-submission after which the Faculty PGSC makes one of the following recommendations:
  - 3.1 Approves the research proposal and recommends it, as well as the Ethical Clearance Certificate obtained from the CRP, to the UNAM PGSC for noting and issuing of the Research Permission Letter by the Director: Postgraduate Studies;
  - 3.2 Rejects the research proposal and recommends de-registration of the student to the UNAM PGSC;
  - 3.3 Recommends registration at a lower level for a PhD candidate (Master’s by Thesis only).

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## **N.5 COLLABORATIVE POSTGRADUATE TRAINING**

1. Through collaborative arrangements, students may undertake part of their training with other institutions of higher learning that the University is collaborating with.
2. Registration of students on collaborative programmes will be guided by the particular Memorandum of Understanding.
3. The implementation of collaborative programmes should adhere to terms and conditions stipulated in the Memorandum of Understanding.

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## **N.6 CANCELLATION AND EXEMPTION OF MODULES**

1. All postgraduate students are expected to acquaint themselves with the deadline dates for cancellation and exemption of modules as stipulated in the Faculty, Postgraduate and General Rules and Regulations Prospectuses.
2. No module cancellations or cancellation of studies will be effected without the completion of the required cancellation form signed by the student and Faculty Officer: Postgraduate Studies.
3. Students have to submit a complete exemption application form before the stipulated due dates to the Centre for Postgraduate Studies after recommendation by the relevant lecturer and Head of Department.

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## **N.7 APPLICATION FOR BREAK IN STUDIES**

1. Students who are unable to register for a specific year are expected to apply before **31 October** for break in studies for the subsequent academic year, to the UNAM Postgraduate Studies Committee through the Faculty Postgraduate Studies Committee for a maximum period of one academic year. Reasonable justifications for the leave of absence should be provided.
2. When a student is on approved break in studies, the year of non-registration will not count as part of the duration of the study. However, students must re-apply before the closing date of applications for admission to activate their registration for the subsequent academic year.
3. A student who takes a break studies for a period of one (1) years will be required to:
4. Apply for re-admission to the University and Faculty/program.
5. Satisfy all requirements for admission, and
6. Start the programme from the first year.

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## **N.8 APPLICATION FOR LEAVE OF ABSENCE**

In order to be admitted to examinations, students are required to attend at least 80% of the lectures and to complete the required elements that make up the continuous assessment mark. Students who are unable to attend classes/tests for any reason, must complete the necessary application form (obtainable from the Office of the Registrar), and supply the necessary documentation. The application must be seen by all lecturers concerned, who will provide their comments and signatures. Final approval rests with the Registrar's Office. It will be the responsibility of the student to make up for missed events/complete the relevant requirements (including tests).

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### **ABSENCE DUE TO MATERNITY**

Students who request absence from classes/tests for the purpose of delivery, must apply beforehand (application form obtainable from the Office of the Registrar), and provide a medical certificate, signed by a Medical Practitioner, indicating the expected date of delivery. Students will be expected to attend classes two weeks prior to and after the date of delivery. Should the date of delivery differ from the expected date students, on resumption of classes, will be expected to furnish a medical certificate stating the new date. A new, late application for absence from classes must be completed by the student in such cases.

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### **ABSENCE DUE TO FUNERALS**

Students who miss classes/tests due to funeral attendance must, prior to departure, apply for absence from classes (application form obtainable from the Office of the Registrar). On return, the student must supply satisfactory proof which confirms that the student attended the funeral. On receipt of the above mentioned, the application will be processed further. Students should note that absence from classes/tests should not exceed one week.

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### **ABSENCE DUE TO ILLNESS & OTHER REASONS**

1. Students who miss classes/tests due to illness, must produce a valid medical certificate, signed by a Medical Practitioner, stating the period of absence and nature of the illness. An application for absence from classes must be completed by all students before or not later than five days after the illness, depending on the circumstances (application form obtainable from the Office of the Registrar). Students who are in possession of surgery dates, etc. will be expected to apply for absence from classes prior to their leave of absence. Permission will only be granted for emergency cases. The Registrar's Office reserves the right to reject such applications if the illness does not warrant absence from classes/tests.
2. Students should note that reasons such as over-sleeping, car trouble, transport problems, misreading the examination timetable, etc. will not be considered as valid reasons for missing tests / classes / examinations.

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## **N.9 COURSEWORK EVALUATION AND GRADING**

1. Students who are registered for postgraduate programmes by coursework will be examined according to procedures approved by Senate.
2. In all Schools, the meaning attached to letter grades awarded by examiners is as follows:

<b>Grade</b>	<b>Interpretation</b>	<b>% Equivalence</b>
A	Distinction	80 and above
B	Very Good	70 – 79
C	Good	60 - 69
D	Satisfactory	50 - 59
E	Fail	49 and below

1. Before a student can proceed to the thesis/dissertation research phase (in the case of coursework programmes), s/he must first pass all coursework modules. Subject to faculty regulations, a student with one module outstanding may register for the research project, provided that the outstanding module is not Research Methodology or module that deals with research or data analysis.

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## **N.10 THESIS/DISSERTATION RESEARCH**

Students who successfully complete the coursework phase, or who are registered for postgraduate studies by thesis/dissertation alone, undertake research in an approved research topic, and write a thesis/dissertation. This shall be after a specified period set by the relevant Committees and approved by Senate.

**Thesis and Dissertation** research may include an artistic/aesthetic component, presented in the form of a composition, a theatre/musical performance, and/or an exhibition of original works, as a partial fulfilment of the requirements for a **Master's** or **Doctoral** degree, respectively.

As a standard practice, every thesis/dissertation shall be accompanied by a declaration stating that it has not been submitted for a similar degree in any other university (Annex 2).

The thesis must contain a concise and comprehensive **abstract** of between 200-300 words and 300-400 words for the dissertation, indicating the main findings and major conclusions of the research. The abstract should be Times New Roman, font size 12, and 1.5 line spaced.

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#### **N.11 REGULATIONS ON THE TEACHING AT POSTGRADUATE LEVEL**

1. To teach and supervise students at the master's and doctoral programme levels, a member of staff shall have a doctoral degree or equivalent in the discipline of the postgraduate programme being offered.
2. To teach and supervise students at the postgraduate diploma programme levels, a member of staff shall have a Master's or equivalent in the discipline of the postgraduate programme being offered.
3. Members of staff without PhD or equivalent qualifications but with specialised expertise can co-teach with members of staff holding doctoral degrees.

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#### **N.12 GUIDELINES ON THE RESEARCH SUPERVISION OF POSTGRADUATE STUDENTS**

##### **ASSIGNMENT OF SUPERVISORS**

1. Every postgraduate student shall be assigned a supervisor/supervisors (at least **one** (1) supervisor for Master's students and **two** (2) supervisors for Doctoral candidates) nominated by the relevant Department, recommended by the relevant Faculty Postgraduate Committee and approved by the UNAM Postgraduate Studies Committee on recommendation of the Faculty Postgraduate Studies Committee.
2. Where the student's research topic is multidisciplinary in nature, or where there is need for additional expert supervision in the same discipline, or where the student's postgraduate training programme involves sandwich arrangements, one or more additional supervisors may be appointed.
3. Postgraduate student supervisors will be appointed from suitably qualified members from UNAM Faculties/Centres; where there is a need to appoint an external supervisor there should be another supervisor from UNAM.
4. A supervisor for Master's and Doctoral students must have a doctoral degree and expertise in the field of study that he/she is expected to supervise. In addition, the supervisor must have relevant research and publication experience.
5. For purposes of mentorship, the co-supervision at all levels is strongly recommended. A supervisor without a doctoral degree will be considered to supervise Master's students (normally as a co-supervisor) subject to approval by the UNAM PGSC.

##### **GENERAL DUTIES AND RESPONSIBILITIES OF POSTGRADUATE SUPERVISORS**

1. The supervisor must have a thorough understanding of the University's Postgraduate Regulations and Guidelines, in order to effectively guide the student towards attaining the stipulated standards.
2. The supervisor has the responsibility of ensuring that their students make progress in their studies. Where there are problems affecting the student's research progress, these shall be communicated to the UNAM Postgraduate Studies Committee through the Head of the relevant Department and the Faculty Postgraduate Studies Committee.
3. Supervisors should understand that:
  - (a) The Master's thesis research programme is designed as a **training** course, whereby it is intended that the student will:
    - \* be exposed, acquire and apply fundamentals of research,
    - \* acquire certain new techniques and methods of research,
    - \* learn how to present the results of research in a scholarly manner, and
    - \* make some contribution to knowledge.
  - (b) Master's students require close and careful supervision because they usually lack previous research experience, especially during the early stages of their theses (when learning about research methodology, experimental design and research technique) and also when preparing the initial drafts of their theses.
    1. The supervisor of a Doctoral candidate should recognise that the candidates, in most cases, will have acquired some research experience when they were Master's degree students. What is expected of the Doctoral candidate is thus qualitatively and quantitatively more than outlined above for Master's degree students. Here the supervisor expects the candidate to:
      - \* make a **distinct and original contribution to knowledge**, of fact and/or theory;
      - \* produce a considerable amount of **original work**;
      - \* undertake a more critical and extensive review of the relevant literature than is the case for Master's students, and
      - \* exercise considerable initiative in conducting the research.
    1. After completion of a research proposal, the doctoral candidate should be able to work **independently** and be **guided** rather than be directed by his/her supervisor. It is, nevertheless, the supervisor's responsibility to guide the candidate in the right direction.
    2. During the initial phase, the supervisors have the responsibility of assisting their candidates in the design and formulation of appropriate postgraduate research projects.

3. Supervisors should be able to determine, through their previous research experience, potential impediments to the research problem and advise the students on what can be achieved meaningfully, within the time allocated for the study.
4. The supervisors have the responsibility of monitoring the student's research progress throughout the research period:
  - (a) Both the supervisor and the student must submit **compulsory** report on the progress of the student to the relevant Departmental HoD before the end of each semester (Annex 3A and 3B). The Faculty PGSC will study the reports and take the necessary steps to resolve problems (where necessary).
  - (b) Where the departmental HoD is the supervisor, the deputy dean of faculty should sign.
  - (c) A summary report of all progress reports received and recommendations from the Faculty PGSC on problems identified and actions taken must be tabled during the **July and November** UNAM PGSC meetings.
  - (d) In order to ensure that the thesis/dissertation research proposals benefit from inputs from other academics in the Departments, every Faculty offering postgraduate programmes shall, in consultation with the supervisors, arrange at least one **compulsory** research seminars, which will enable the candidates to refine and improve the research proposal, report on progress and learn from others.
1. The supervisor has the ultimate responsibility of assisting the student to give an appropriate title to the thesis/dissertation, and to guide him/her on the presentation of the research results in the form of a scholarly thesis/ dissertation, in accordance with the set guidelines.
2. The supervisor and student should have regular meetings to discuss progress on the research project.
3. Although the writing of the postgraduate thesis/dissertation is the responsibility of the student, it is the supervisor's role to ensure that the standards set by the University are adhered to. The supervisor should:
  - (a) be accessible to the student during the critical stage of thesis/dissertation writing;
  - (b) discuss the drafts of the thesis/ dissertation with the student throughout the process;
  - (c) read the student's thesis/ dissertation carefully and critically, indicating where improvements are needed, e.g., where there is paucity of information, and where the important findings could be published, , etc.;
  - (d) at the conclusion of the work, read the entire thesis/ dissertation, and advise whether or not it is in a form suitable for presentation to examiners;
  - (e) but should not be responsible for personally editing language usage in the thesis, or correcting typographical errors. He/she should however, point out language and typographical errors.
1. If the student has two or more supervisors, one of these should be appointed as main supervisor and the rest as co-supervisor(s).
2. Should a supervisor be away from the University for more than three consecutive months, an acting supervisor must be appointed. In the case of absence of main supervisor, the co-supervisor will act. Where a student has only one supervisor an acting supervisor must be appointed by UNAM PGSC on recommendation of the FPGSC.
3. Where continued supervision is a condition of sabbatical or extended research leave, the Head of Department must ensure that these conditions are adhered to.
4. Where a supervisor retires or resigns from the University, he/she shall cease from supervising any student(s) under his charge, unless there is an agreement in writing for the continued supervision of the student(s).
5. If, in the course of the student's research, a situation develops whereby:
  - (a) there is a breakdown in communication between the student and the supervisor;
  - (b) there are personal clashes and conflicts between the two;
  - (c) the student refuses to follow the supervisor's advice;
  - (d) a change will enhance the progress of the student the case should be reported in writing to the Head of the relevant Department by either the supervisor or the student. The Head of Department has the responsibility to hear both sides of the case (that is, from the supervisor and the student) with a written report and recommendation to the FPGSC for possible action. The FPGSC will study the report and take action or make a recommendation (where applicable) to the UPGSC.

Staff members from research institutions will be allowed to supervise ten (10) students; the main supervision will be counted as 1 and co-supervision as 0.5 students, respectively. To ensure adequate supervision, a single staff member shall not supervise more than five (5) postgraduate students at any given time. Staff members' supervision responsibilities should be taken into consideration by Heads of Departments when other teaching duties are assigned.

### **REMUNERATION OF SUPERVISORS**

All supervisors will be remunerated upon approval of the graduation of the student by AEC, according to the tariffs determined by the University from time to time (Annex 17). Progress reports of the student during the duration of the study, signed by the supervisor(s), should accompany the claim form (Annex 18).

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## **N.13 REGULATIONS AND GUIDELINES GOVERNING THE SUBMISSION OF THESES AND DISSERTATIONS FOR EXAMINATION**

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### **NOTICE OF INTENT TO SUBMIT THE THESIS/DISSERTATION FOR EXAMINATION**

1. At least **three (3) months** prior to the scheduled date for the submission of the **thesis** and **four (4) months** prior to the scheduled date for the submission of the **dissertation**, the respective postgraduate students shall, through their supervisors, Departments and Faculty PGSC, submit a written notice, to the UPGSC, declaring their intention to submit their

theses/dissertations (Annex 4A). This is in order to allow sufficient time to organise the appointment of examiners before the submission of the thesis/dissertation.

2. Students who submit a notice of intent within a shorter period than specified in paragraph 1 above should note that the examination might be delayed.
3. Students who fail to submit their theses or dissertations within the time period indicated in the notice of intent should note that the examination of their thesis/dissertation may be delayed as new examiners may need to be appointed.
4. The abridged curriculum vitae of internal and external examiners nominated by relevant Faculty PGSC and Annex 4B shall be submitted together with the notice as per Annex 4A for approval by the UNAM Postgraduate Studies Committee (see Annex 5 for the format of the abridged curriculum vitae).
5. Student shall submit **three** ring bound copies of the Master's thesis and **four** ring bound copies of the doctoral dissertation (including soft copy in word version) through the relevant HoD postgraduate studies to the Centre for Postgraduate Studies for examination by the **end of October of each year**. The submission of the bound copies should be accompanied by a signed form (Annex 6).
6. Students submitting the thesis or dissertation after the due date may not graduate and must re-register and **pay the required fees** for the subsequent academic.
7. Students with no re-admission statuses must appeal for re-admission for the subsequent academic year, irrespective of the fact that the thesis or dissertation might have been submitted for examination.

### APPOINTMENT OF EXAMINERS

1. Every Master's thesis submitted shall be examined by at least two examiners approved by the UNAM Postgraduate Studies Committee on recommendation by the Faculty Postgraduate Studies Committee. At least one of the examiners in each case must be external to the University of Namibia, except when the student is a staff member in which case **all** examiners must be external. **The supervisor(s) should not be one of the examiners.**
2. Upon receipt of the notice of intent from the student, the Head of the Department should complete and submit Annex 4B together with the abridged CV's of the potential examiners to the FPGSC for recommendation and approval by the UNAM PGSC. Heads of Departments must declare any potential conflict of interest in the nomination and appointment of examiners. **Examiners may NOT be selected from the pool of moderators already approved for modules in the specific taught programme.**
3. In the case of doctoral dissertations, at least three examiners shall be appointed, of whom two must be external to the University, except **when the student is a staff member in which case all examiners must be external. The supervisor(s) should not be one of the examiners.**
4. Internal and External Examiners will be appointed on the basis of their expertise, independent from appointment of external moderators already approved for modules in the specific programme.
5. The examiner should not have any direct involvement in the research project of the student and must declare any past or present (personal or professional) connections with the student. Before final appointment the examiner should declare any direct conflict of interest by signing Annex 7.
6. An examiner for Master's students and Doctoral candidates must have a doctoral degree and expertise in the field of study that he/she is expected to examine. In addition, the examiner must have relevant research and publication experience.
7. The Director: Centre for Postgraduate Studies shall issue a letter of appointment to the thesis or dissertation examiners (Annex 8).

**Examiners shall complete examination in the following periods: Mini thesis (Master's) = 6 weeks; Thesis (Master's) by research = 6 weeks; and Doctoral dissertation = 8 weeks.**

## **N.14 REGULATIONS AND GUIDELINES GOVERNING THE EXAMINATION OF THE SUBMITTED MASTER'S THESES AND DOCTORAL DISSERTATIONS**

### **EXAMINATION OF MASTER'S THESES AND DOCTORAL DISSERTATIONS**

1. Each examiner shall be required to examine the thesis or dissertation in detail and submit his/her comprehensive assessment under the following headings:
  - (a) **Appropriateness of the thesis title.** Comment on the appropriateness of the title as it relates to the content of the thesis or dissertation.
  - (b) **Introduction:** comment on the validity of the research problem, the extent to which the questions or objectives address the identified research problem and the justification for the study.
  - (c) **Completeness of the Literature Review.** Comment on the ability of the student to describe other researcher's contributions to similar problems. The literature review should lead the reader to a good understanding of what is already known about the research topic, what gaps of knowledge exist, what the study was intended to contribute, and what hypotheses guided the study. The examiners should comment on the candidate's familiarity with the literature.
  - (d) **Research Methods:** The examiners should also comment on the appropriateness of the research methods (and instruments, where relevant) employed in the study. Where applicable, comment on ethical considerations should be included.
  - (e) **Presentation of the Results:** The examiners should comment on the manner in which the findings of the study are presented. If tables of data are provided, are they reduced statistically? Are the statistical analyses appropriate? If illustrations are provided, are they of publishable quality? Is the description of the research results of adequate clarity and scholarship?
  - (f) **Discussions and Conclusions:** Are the conclusions clearly presented? Are they logical and supported by data? Has the candidate sufficiently indicated how his/her results compare with those of others, as cited in the literature? From the

thesis/dissertation, is his/her contribution to new knowledge clearly brought out? In the case of Doctoral dissertations, is there evidence of sufficient originality? If there are weaknesses in the thesis/ dissertation, what are the shortcomings?

(g) **Recommendations:** Are the recommendations formulated address what was not reported in the thesis? Will the recommendations lead to addition of new knowledge to the current study?

(h) **Language and Technicalities:** Is the language used clear and concise? Are there major typographical errors? Is a language editor needed? (Where applicable).

(i) **References:** Are all the references cited in the text recorded on the reference list (and vice versa)? Are recent references used? Are the references used appropriate to the study? Is there consistence in the style of referencing used?

**Summary:** The examiner should present a summary indicating whether s/he recommends the thesis or dissertation for a postgraduate degree award. Exam should allocate marks for the thesis by following guidelines in Annex 9, and complete the Summary Form (Annex 10 & 11).

1. All examination reports must be submitted to the Director: Centre PGS within a stipulated time from the date of receipt of the documents. If the assessments are not received within two months, new examiners may be appointed.

2. The Director: Centre for Postgraduate Studies will forward the reports to the relevant HoD PGS, who will be responsible for distributing the reports to the supervisor.

3. Once the relevant HoD PGS has received **all** the reports for a particular student he/she removes the names and affiliation of the examiner as well as the allocated marks and distributes the amended report to the supervisor.

4. The supervisor will share the reports with the student to make the indicated corrections. Where the reports contain conflicting recommendations, the supervisor will guide the student in addressing them.

5. The revised thesis or dissertation together with a comprehensive table of corrections must be submitted to the supervisor to verify that all corrections have been made before the thesis or dissertation is bound.

1. Upon evaluation of the thesis, the examiner will recommend one of the following:

(a) PASSES subject to MINOR corrections ( $\geq 50\%$ )

(b) PASSES subject to MAJOR corrections ( $\geq 50\%$ )

(c) RE-SUBMIT FOR RE-EXAMINATION (no mark allocated)

(d) FAIL ( $< 50\%$ )

**A thesis re-submitted for re-examination shall be re-examined by the same examiner and awarded a maximum mark of 50%.**

1. Upon evaluation of the dissertation, the examiner will recommend one of the following:

(a) PASSES subject to MINOR corrections

(b) PASSES subject to MAJOR corrections

(c) RE-SUBMIT FOR RE-EXAMINATION

(d) FAIL

**No marks should be allocated for the dissertation.** A dissertation re-submitted for re-examination shall be re-examined by the same examiner.

(a) Where a Master's thesis is recommended for re-submission, **it must be re-submitted within 6 months**, failure to do so the student will be deemed to have failed the thesis and will not be re- admitted.

(b) Where a Doctoral dissertation is recommended for re-submission, **it must be re-submitted within 12 months**, failure to do so the student will be deemed to have failed the dissertation and will not be re- admitted.

(c) Where a thesis or dissertation is submitted for re-examination, the examiner should indicate whether the student has satisfactory addressed the identified shortcomings in the first submission.

1. In cases where the examiners of the thesis disagree in their recommendations (fail versus pass), Faculty PGSC should recommend an independent external examiner to the UNAM PGSC for approval to serve as arbiter on the thesis.

2. Where two examiners fail a dissertation the student will be deemed to have failed the dissertation and will not be re- admitted.

3. Where one examiner fails a dissertation, School PGSC should recommend an independent external examiner to the UNAM PGSC for approval to serve as arbiter on the thesis or dissertation.

1. For both theses and dissertations the assessment of the arbiter will be FINAL.

2. A **copy of the first version** of the thesis or dissertation submitted for examination will be sent to the arbiter.

3. In cases where the difference in the pass marks allocated for a thesis, by the internal and external examiner, is **20% or more**, the Departmental Head must set up a departmental committee (excluding the supervisor and internal examiner) to study the case and recommend a mark for the thesis and provide a motivation on the decision to the UNAM PGSC, through the Faculty PGSC. Where the departmental Head is the supervisor or the examiner, the Dean shall appoint an independent person to study the case and recommend a mark for the thesis and provide a motivation for his/her decision to the UNAM Postgraduate Studies Committee.

4. **All examination reports**, including any reports that recommended a fail must be submitted by the faculty PGS HoD to the UNAM Postgraduate Studies Committee for recommendation to AEC.

5. A postgraduate student, who disagrees with the results of the examination as approved by AEC, may appeal to the HoD PGS within two weeks after the release of the results giving reasons and evidence to support the appeal.

#### **PUBLICATION FROM A THESIS OR DISSERTATION**

Students are encouraged to publish work from their thesis/dissertation in accredited journals. The following acknowledgements must be included in such publications:

***"This work forms part of a Master/PhD study undertaken at the University of Namibia".***

**Any publication from thesis/dissertation must show UNAM as the student's affiliation.**

A list of publications and conference presentations by the student, that was part of their study, should be listed in the thesis immediately after the abstract.

**VIVA VOCE EXAMINATION FOR STUDENTS REGISTERED BY THESIS OR DISSERTATION**

1. In addition to writing a thesis or dissertation, the postgraduate students who are registered for Master's by Thesis and all Doctoral students, shall appear for a *viva voce* examination, to defend the submitted work before a panel of specialists on the subject.
  2. The Centre for Postgraduate Studies is responsible for administering the *viva voce* examinations for doctoral students while the respective Faculties/departments are responsible for administering the *viva voce* examinations for master's students.
  3. The *viva voce* examination shall take place only after the UNAM PGSC is satisfied that the thesis or dissertation submitted by the student is considered by the examiners to be of an acceptable standard.
  4. The questions to be asked in the *viva voce* examination shall primarily be focused on the student's thesis or dissertation research area. **The public can attend and WILL BE PERMITTED to ask questions.**
  5. The *viva voce* panel shall consist of the examiners and supervisors of the thesis or dissertation.
  6. The Chairperson of the *viva voce* panel shall be a senior academic (at least at the rank of Associate Professor for Doctoral students and Senior lecturer for Master's students) and shall not be one of the supervisors or examiners. The *viva voce* panel (including the chairperson) shall be approved by **the Director of the CPGS** on recommendation of the relevant HoD PGS.
  7. The main supervisor must provide the relevant HoD PGS with an electronic copy of the corrected thesis or dissertation, who will distribute it, together with copies of the examiners' reports to the panel members at least two weeks before the date of the *viva voce* examination.
  8. All members of the *viva voce* panel must acquaint themselves with the postgraduate processes and procedures.
1. The functions of the *viva voce* panel shall be:
    - (a) to ascertain that:
      - \* the thesis/dissertation presented (the data, methodology, analysis and findings) is the original work of the student
      - \* the shortcomings identified during the examination process have been addressed.
      - \* the broader subject area in which the study is based is fully grasped by the student.
      - \* any weaknesses in the thesis/dissertation can be adequately clarified by the student,
    - (b) to make a definite recommendation to AEC through the UNAM PGSC, as to whether the student be deemed to have **passed** or **failed** the study (Annex 12).
  1. The *viva voce* panel shall, as far as possible, endeavour to reach a unanimous decision on the student's performance. Where the panellists are unable to reach a consensus as to whether the student passes or fails, a vote may be taken to arrive at a reasonable decision. A majority vote shall be required for passing the *viva voce* examination.
    - (a) At the end of the *viva voce*, the panel shall sign a *viva voce* Examination Results Form (Annex 12) making a specific recommendation to AEC through the UNAM PGSC on the student's performance.
    - (b) The Chairperson of the panel shall also submit to the UNAM PGSC a **comprehensive report** (Annex 13) signed off by the *viva voce* panellists. This should be done within one week of the examination. The report should include, an attendance register, challenges faced with the *viva voce* examination, a summary of the presentation, the discussion during the *viva voce* examination, any strong/weak points identified during the presentation and discussions, including any specific recommendations to the student.
2. The duration of the *viva voce* shall be **two hours for masters and three hours for PhD.**
  3. The Chairperson of the *viva voce* Panel should announce the recommended outcome of the examination to the audience; but the qualification can only be awarded after approval by AAGC.

**SUBMISSION OF FINAL BOUND THESES OR DISSERTATIONS**

After all the corrections as recommended by the examiners (including those from the *viva* where applicable) have been made to the satisfaction of the supervisor(s), **five** fully bound copies of the theses or dissertations shall be submitted to the Faculty PGSC for inspection before submission to the Centre for Postgraduate Studies. Where a student has been supervised by more than one supervisor, an additional copy for each additional supervisor must be provided. In addition, an electronic version of the thesis or dissertation compiled as a single document in **PDF** format shall be submitted. Please note that the final thesis or dissertation must be in the format as prescribed in B19.

**PRESENTING STUDENTS FOR GRADUATION**

The Faculty Officer: School will only submit the names of students for graduation approval by AAGC on recommendation of the UNAM PGSC when the following conditions have been met:

1. Updated academic record reflecting the eligibility of the student for graduation.
2. Completed checklist confirming, amongst others, that corrections have been effected after receipt of examiners reports and *viva voce* examinations, (including a table of corrections), where applicable.
3. All signed examination reports (including, where applicable, arbiter/failed examination report).
4. Five (5) bound copies and one (1) electronic copy (in PDF format) of the Thesis or Dissertation has been submitted as per Regulation B.16.4.

**REMUNERATION OF EXAMINERS**

All examiners will be remunerated upon receipt of the examination report compiled using the examination guidelines in B.16.1, according to the tariffs determined by the University from time to time.

## **AWARDING OF A QUALIFICATION AT A LOWER LEVEL**

1. A student who is de-registered for a taught Masters programme due to failure to successfully complete the research component, may be awarded a relevant and existing Postgraduate Diploma in the field provided that all the taught modules are passed and the research component is re-written and passed as a research project/paper. Award of this PGD is subject to approval by AEC on recommendation of the UNAM PGSC.
2. A student who was awarded a Postgraduate Diploma according to paragraph (1) above, will not be allowed to register for the same taught master programme at a later stage.
3. A student who fails a Masters by research, may be allowed to re-apply for re-registration on a completely different topic or a taught Masters programme.
4. A student who fails a PhD, may be allowed to re-write the dissertation in the format of a thesis incorporating all the recommended amendments and corrections of the examiners within a period of 12 months after the release of the results. The re-submitted thesis will be examined according to the regulations of Masters degrees.
5. A Student who was awarded a Master's degree according to paragraph (4) above, and wish to apply for a Doctoral programme at a later stage, will have to choose a different topic.

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## **N.15 POSTGRADUATE FEES**

All registered students shall pay the various categories of fees as approved by the University Council on recommendation of appropriate Committees of UNAM (Refer to Student Fees booklet and PG Studies Fees brochure).

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## **N.16 GUIDELINES ON THE WRITING OF POSTGRADUATE WORK**

### **GUIDELINES ON THE WRITING OF RESEARCH PROPOSALS**

#### **Outline of the proposal**

All research proposals must be prepared according to the following layout:

**Title** of the proposed study (refer to Annex 14 for the format of the title page)

The title of the mini thesis/thesis/dissertation research proposals should be clear and concise. From the title, one should be able to infer clearly the subject of the mini thesis/thesis/dissertation. This means that the title should be self-explanatory and limited to the scope of the study.

#### **1. INTRODUCTION**

- 1.1 **Background of the study**  
Give a general overview and background of the research problem.
- 1.2 **Statement of the problem**  
Students should concisely formulate their research problems by clearly indicating research issues they would like to investigate in their studies. This should include the purposes of their studies
- 1.3 **Either objectives of the study or research questions (NOT BOTH)**  
Based on the statement of the problem, students should state either objectives or research questions of their studies. They should do this unambiguously.
- 1.4 **Hypotheses of the study (where applicable)**  
Where applicable, particularly in the Natural Sciences, students should state unequivocal and testable hypotheses that are based on theory and on the statement of the problem. Each hypothesis should have a clear rationale.
- 1.5 **Significance of the study**  
Students should state the importance of their studies, the anticipated contribution of such studies to knowledge and to socio-economic progress.
- 1.6 **Limitation of the study**  
Students should indicate the logistical, resource and other limitations of their studies and indicate the possible impact of such limitations.
- 1.7 **Delimitation of the study**  
Students should indicate the specific scope of the study, providing the rationale for such delimitation.
2. **Literature Review and where applicable, the theoretical framework**

Students should prepare critical, synthesised and integrated literature reviews that should demonstrate the need and justification of their studies. The reviews should show gaps in knowledge, theoretical and methodological shortcomings, need for further research, unanswered questions, and disagreements in literature and theoretical frameworks that may need to be revised to resolve controversies. In addition, the reviews should demonstrate what has been done in research areas of interest and what remains to be investigated.

#### **3. Research Methods**

- 3.1 **Research Design**  
Students should provide clear statements on either quantitative or qualitative research designs they intend to use. It is not necessary to provide the definitions of the research designs. However, they should specify how they intend to use particular research designs in their studies. They should not merely provide the distinction between the two generic designs.
- 3.2 **Population (where applicable)**  
Students should, where applicable, specify the population to which they would like to confine their research/studies.
- 3.3 **Sample (where applicable)**  
Students should clearly explain how they intend to draw samples from the target populations. They should specify how they intend to appropriately use either quantitative or qualitative sampling techniques to draw research samples. Merely describing what these sampling techniques are is inadequate.
- 3.4 **Research Instruments (where applicable)**  
Research instruments and measures that would be used to collect data should be clearly provided under this section.
- 3.5 **Procedure**

The manner in which data would be collected should be explained here. How research instruments would be used to collect data should be specified in this section.

### 3.6 **Data analysis (where applicable)**

In this section, students should provide specific descriptive and/or statistical tests that they would employ to analyse their data, and rationale. Mere reference to particular quantitative data analysis statistical packages and electronic qualitative data analysis procedures would not be sufficient.

### 3.7 **Budget (where applicable)**

### 3.8 **Research Ethics**

Students should provide detailed information about ethical issues and *how* they will address potential ethical dilemmas when conducting their research.

#### 3.9.1.1 **References**

Students should use the referencing format approved by respective faculties/departments. Where there is no prescribed referencing format by faculty/department, the **American Psychological Association (APA)** becomes the default. There must be consistency between sources cited in the text of the proposal and sources of information indicated in reference lists. Unless critical in the area of research, primary and secondary sources of information cited shall not be more than 10 years old. Students should use refereed/verifiable sources of information.

**Research proposals submitted for consideration by the Faculty Postgraduate Studies Committee shall capture the above information in a clear and concise manner and not exceed the maximum page number stated below:**

- a) Master's by coursework (mini thesis) shall not exceed 6 pages
- b) Master's by research shall not exceed 8 pages.
- c) Doctoral Degree shall not exceed 10 pages.

In all cases the research proposal should be **Times New Roman, font size 12, double spaced** and on one side of the paper.

The School PGSC recommends the research proposal to UNAM PGSC for noting after evaluating the proposal using Annex 15, and issuing of the Research Permission Letter (Annex 16) by the Director: Postgraduate Studies;

### **De-registration of postgraduate students who fail to make progress**

Schools shall deregister postgraduate students who fail to make progress as stipulated under B.6.2.

## **REGULATIONS AND GUIDELINES FOR WRITING AND PRESENTATION OF POSTGRADUATE THESES AND DISSERTATIONS** **Broad Guidelines on Mini Thesis/Thesis/Dissertation Manuscript Preparation**

### **Typing/Word-processing**

The document must be typed and printed on good quality white A4 paper. The typescript must be clear, Times New Roman, font size 12, double spaced and on one side of the paper.

### **Pagination**

The preliminaries (i.e., parts preceding the Introduction) must be in lower case Roman numerals (i.e.: (i), (ii), (iii), (iv)...), beginning with the title page which should not be numbered. The pages in the main body of the document should be numbered in Arabic numerals (i.e.: "1", "2", "3", "4"...) consecutively throughout. The page numbers should be centred in the lower margin.

### **Margins**

The left margin must be 4.0 cm; the right hand margin must be 2.5 cm; the top margin must be 2.5 cm, and the bottom margin must be 2.5 cm.

### **Title page**

The title page must be organised according to (Annex 14)

### **Components of the preliminary pages (Each starting on a separate page)**

#### **Abstract**

Following the title page, the mini thesis/thesis/dissertation shall contain an abstract which concisely and comprehensively summarises the essential points and conclusions emanating from the research. The abstract should be between 200-300 words (not exceeding 1 page) in the case of Master's theses, and 300-400 words (not exceeding 2 pages) for Doctoral dissertations. Furthermore, it should include the purpose of the study, a brief overview of the methodology used, the main findings, major conclusions and recommendations. The abstract should not contain headings with 1.5 line spaced.

#### **List of Publication(s)/Conference(s) proceedings**

A list of publications and conference presentations by the student, that was part of their study, should be listed in this section. Any publication from thesis/dissertation must show UNAM as the student's affiliation.

#### **Table of Contents**

The Table of Contents shall be generated to include level three subheadings.

#### **List of Tables**

If there is a list of Tables, these should be consecutively numbered in Arabic numerals following the guidelines of the relevant department/faculty approved referencing style.

#### **List of Figures**

If there is a list of Figures, these should be consecutively numbered in Arabic numerals following the guidelines of the relevant department/faculty approved referencing style.

#### **List of Abbreviations and/or Acronyms**

Acronyms and non-standard abbreviations should be listed alphabetically in bold; the definitions should not be bolded.

### **Acknowledgements**

The document shall also contain an Acknowledgements section, in which the candidates express their appreciation and gratitude to all the people and institutions which rendered help in the course of the study.

### **Dedication**

If the candidate wishes to dedicate the document to any person, the dedication should be concisely written, and should appear in the preliminaries.

### **Declarations**

The document shall contain the various declarations as outlined in (Annex 2)

### **Body of the Thesis/Dissertation**

**a) Master Theses** should broadly follow the outline in the proposal (B18.1). In addition it should include results, discussions, conclusions and recommendations as detailed below.

Tables, text figures, diagrams and photographic illustrations should be numbered in separate sequence, and be referred to by number in the text. Each table and figure should have a concise but comprehensive caption. The illustrations should be of publishable quality (600 dpi or higher).

#### **Results:**

Data should be presented in a clear and concise and informative manner.

A variety of forms might be used to present data, however the same data **must not** be presented in more than one form (for example tables and figures)

Where applicable primary data should be attached as an appendix and not appear in this section

#### **Discussions:**

It should not merely be a description of the findings (tables and figures) in words

This section forms the core of the document and therefore need to be a critical analysis of the results and demonstrate insight and understanding of the findings.

Results and findings must be discussed in context and linked to literature and the stated research aims.

The discussion must address the objectives and/or questions of the study

#### **Conclusions:**

This should not be a repeat of the results and /or discussion

It should relate directly to the main objective(s) of the study.

It must indicate whether the problem was solved, what was learned through the research, what remains to be learned, weaknesses and shortcomings of study, strengths of study as well as possible applications of study (how it can be used).

#### **Recommendations**

Must emanate from the research findings and must be feasible

Gives opinion on what measures should be adopted to solve the problem based on the conclusions made.

May endorse the research findings as the solution to the problem or may propose an alternative route.

Identify information gaps or inconsistencies and suggest further studies to address these.

#### **References**

Should follow the department/faculty specific referencing style

#### **Appendices**

Should be numbered sequentially and can include the following:

Ethical clearance certificate

Research permission letter

Other relevant permissions (where applicable), e.g., collection permits, informed consent documents, etc.

Data collection Instruments such as questionnaires, interview protocols, pre and post-tests etc.

Any other relevant data such as supplementary information, raw data etc.

**b) Doctoral Dissertations** should follow a **stand-alone chapter** (journal publication) approach.

Tables, text figures, diagrams and photographic illustrations should be numbered in separate sequence, and be referred to by number in the text. Each table and figure should have a concise but comprehensive caption. The illustrations should be of publishable quality (600 dpi or higher).

#### **Introduction Chapter (Chapter 1)**

This chapter must introduce the study and provide a comprehensive overview of the research problem, and broadly follow the guidelines as indicated above.

#### **Literature Review (Chapter 2)**

1. This chapter must provide a comprehensive literature review and broadly follow the guidelines as indicated in (B.19).
2. This should demonstrate critical understanding and comprehension of the current state of knowledge in the area of research and lead to the motivation for the study.
3. The literature should focus on recent developments in the area of study.

### **Stand-alone chapters**

**Each Faculty and/or department has a choice to decide whether to use a stand-alone chapter or use the guidelines for Master thesis.**

Guidelines for stand-alone chapters are as follows:

Each of these chapters **introduces and represents an independent research aim/objective/question** and should follow the outline below:

Title, Abstract, Keywords, Introduction, Materials and Methods, Results and Discussion, Conclusion, and References (Should follow the approved department /school/ faculty specific referencing style).

### **Concluding chapter**

This chapter integrates all findings of the study and conclusions with feasible recommendations/reflections. Original contribution(s) to knowledge must be clearly pointed out.

### **Appendices**

Should be numbered sequentially and can include the following:

1. Ethical clearance certificate
2. Research permission letter
3. Other relevant permissions (where applicable), e.g., collection permits, informed consent documents, etc.
4. Data collection Instruments such as questionnaires, interview protocols, pre and post-tests etc.
5. Any other relevant data such as supplementary information, raw data etc.

### **Language**

The presentation of the thesis or dissertation shall be in English. The use of a language other than English requires approval of the UNAM PGSC. In such cases, the abstract must be in both English and the approved language.

### **Length of Theses/Dissertations**

The suggested guidelines are as follows (A4 double spacing):

- (a) **Master's theses for coursework programmes(Mini Theses):** The recommended length of Mini theses for coursework programmes is as follows:
  1. Mini Theses with less than 100 credits: a minimum of 15,000 words and a maximum of 22,000 words (not exceeding 90 pages).
  2. Mini Theses between 100–140 credits: a minimum of 18,000 words and a maximum of 30,000 words (**not exceeding 120 pages**).
  3. Mini Theses above 140 credits: a minimum of 30,000 words and a maximum of 37,000 words (not exceeding 150 pages).
- (b) **Master's theses (by research):**

The recommended length of a Master's thesis is a minimum of 30,000 words and a maximum of 45,000 words (**not exceeding 180 pages**).
- (c) **Doctoral dissertations:**

The recommended length of a Doctoral dissertation is a minimum of 46,000 words and a maximum of 75,000 words (**not exceeding 300 pages**).

### **Binding of Theses/Dissertations**

- (a) Candidates should ensure that when binding the theses/dissertations, the spine shall contain the name of the candidate, the degree for which it was submitted, and the year of degree award (**graduation year**).
- (b) The colour of the cover for Master's theses shall be **red** and that for Doctoral Dissertations shall be **black**.

**Note: The thesis/dissertation MUST be subjected to plagiarism software i.e. Urkund.**

# ANNEX 1

## SUPERVISION AGREEMENT BETWEEN GRADUATE STUDENT AND SUPERVISOR

This supervision agreement between

Name of student: .....

Student number: .....

Faculty: .....

Department: .....

and (on behalf of UNAM)

Name of supervisor: .....

Department: .....

And (if applicable)

Name of co-supervisor: .....

Department: .....

Regarding post-graduate research for the degree of: .....

Research topic: .....

.....  
.....

By signing this document, both student and supervisor(s) acknowledge their understanding and obligations of the general expectations and responsibilities regarding the supervision of the thesis/dissertation as contained in the UNAM Postgraduate Studies regulations prospectus.

..... Name of Student	..... Signature	..... Date
..... Name of Supervisor	..... Signature	..... Date
..... Name of co-supervisor (where applicable)	..... Signature	..... Date
..... Name of Department HoD	..... Signature	..... Date
..... Name of Faculty HoD: PGS	..... Signature	..... Date



**ANNEX 3A:**

**PROGRESS REPORT**

(To be completed by student for main and co-supervisors)

**SCHOOL POSTGRADUATE STUDIES COMMITTEE**

Semester....., 20.....

Student Name: .....

Student Number: .....

Postgraduate Programme Student is enrolled in: .....

Student Contact Details Tel and Email Address: .....

Mode of study: Full Time/Part Time: .....

Academic year of first registration: .....

Research Title: .....

Supervisor's Name: .....

**PROGRESS TO DATE:**

- a) On a scale of 1 to 5 (with 1 being poor and 5 excellent), indicate your progress according to your plan of study. If you rate 1-2, please provide details on a separate page.      1      2      3      4      5
- b) Please indicate the frequency of your face to face academic consultation this semester with your supervisor      0  
1-3      4-6      >6
- c) Please indicate the frequency of other forms of academic communication with your supervisor (never, less frequent, more frequent)      Telephone  
e-mail  
Social media
- d) Are there any other problems/issues that you would like to draw to the attention of the Faculty/School Postgraduate Studies Committee?

If yes, have you discussed these problems with your Supervisor or Head of Department?

Has the problem been resolved?

Do you require any further intervention to address these issue(s)? If yes, please provide details on a separate page.

YES      NO

YES      NO

YES      NO

YES      NO

Comments: (You may use a separate page for your comments)

.....  
Name of student

.....  
Signature

.....  
Date

.....  
Name of Departmental HOD

.....  
Signature

.....  
Date

**ANNEX 3B:**

**PROGRESS REPORT**

(To be completed by each supervisor, main and co-supervisors)

**SCHOOL POSTGRADUATE STUDIES COMMITTEE**

Semester.....20.....

Student Name: .....

Student Number: .....

Postgraduate Programme Student is enrolled in: .....

Student Contact Details Tel and Email Address: .....

Mode of study: Full Time/Part Time: .....

Academic year of first registration: .....

Research Title: .....

Supervisor's Name: .....

**PROGRESS TO DATE:**

a) On a scale of 1 to 5 (with 1 being poor and 5 excellent), indicate student progress according to plan of study. If you rate 1-2, please provide details on a separate page.      1      2      3      4      5

b) Please indicate the frequency of your face to face academic consultation this semester with your student      0  
1-3      4-6      >6

c) Please indicate the frequency of other forms of academic communication with your student (never, less frequent, more frequent)

Telephone

e-mail

Social media

d) Are there any other problems/issues that you would like to draw to the attention of the Faculty/School Postgraduate Studies Committee?

If yes, have you discussed these problems with the student or Head of Department?

Has the problem been resolved?

Do you require any further intervention to address these issue(s)? If yes, please provide details on a separate page.

YES      NO

YES      NO

YES      NO

YES      NO

Comments: (You may use a separate page for your comments)

.....

Name of Supervisor

.....

Name of Department HoD

.....

Signature

.....

Signature

.....

Date

.....

Date



**ANNEX 4B:**

**REQUEST FOR APPOINTMENT OF EXAMINERS**

**CENTRE FOR RESEARCH SERVICES**

**Student Number:**

**Surname and Initials:**

**Department**

**School**

**Faculty**

**Degree (Masters/PhD)**

**Title of thesis/dissertation:**

- Main Supervisor                      Affiliation:**
- Co-Supervisor                      Affiliation:**
- Co-Supervisor                      Affiliation:**
- Co-Supervisor                      Affiliation:**
- External Examiner                  Affiliation:**
- External Examiner                  Affiliation:**
- External Examiner                  Affiliation:**
- Internal Examiner                  Affiliation:**

I hereby declare that there is no conflict of interest in the nomination of the abovementioned examiners.

.....  
**Name of Independent Chair/HoD                      Signature                      Date**

**Recommended by SHDB on.....                      Resolution no.....**

.....  
**Name of Faculty PG Coordinator                      Signature                      Date**

## ANNEX 5:

### RECOMMENDED FORMAT OF SUMMARIZE CURRICULUM VITAE

#### CENTRE FOR RESEARCH SERVICES

The Abridged CV should be not more than three-pages long

Title:                    Initials:

Surname:

Name/s:

Academic or equivalent institution to which affiliated:   Past:   Present:

Present Academic Rank    Professor

Work and employment experiences   Past:   Present:

Physical Contact Details (Courier Delivery Address):

Telephone numbers           Office:   Cell:

Email address/

Academic Qualifications and Year Obtained/Institution   Qualification/s & Year/s Obtained

Area/s of Expertise/Specialisation   Primary   Secondary

Record of publications in the last 10 years

ARTICLES IN PEERED REVIEWED JOURNALS/PROCEEDINGS (top 10 recent)

Title & Authors: Journal/Proceedings Name

NATIONAL AND INTERNATIONAL CONFERENCES (top 10 recent)

Title & Authors & Conference

CONTRIBUTION IN BOOKS, CHAPTERS IN BOOKS ECT.(top 10 recent)

Title & Authors , Book & ISBN

List of key research projects undertaken or coordinated for the last 10 years, starting with the most recent:

Record of postgraduate student supervision for the last 10 years, starting with the most recent:

Title or Student Role Main/Co Supervisor

Examiner of post graduate studies

Title/Student & M/PhD

Other Academic related experiences/achievements





# ANNEX 7

CENTRE FOR POSTGRADUATE STUDIES

## WILLINGNESS TO SERVE AS AN EXAMINER AND DECLARATION OF POSSIBLE CONFLICT OF INTEREST

I, ..... am willing to serve as examiner for student ..... and hereby declare the following possible areas of conflict of interest regarding the examination of the thesis/dissertation titled: .....  
.....  
.....

### POSSIBLE AREA OF CONFLICT      DETAILS

Family (e.g. cousin, in-law)

Other Personal relationship (e.g. friend)

Professional (e.g. colleague, research collaborator, co-author)

Others

None

.....  
Name of Examiner

.....  
Signature

.....  
Date

## ANNEX 8

### EXAMINER APPOINTMENT LETTER

Date

Examiner Physical Address

Telephone

E-mail

Dear Prof/Dr XXX

Examination of Thesis/Dissertation: Mr./Ms. XXX

I am pleased to inform you that you have been appointed as an examiner for the above-mentioned student. The manuscript is enclosed herewith. Attached, also find the guidelines for the compilation of the report and the relevant forms to be filled in.

Please return the comprehensive report and completed forms in electronic format within 8 weeks from the date of receipt of the manuscript to the Director, Centre for Postgraduate Studies ([directorpgs@unam.na](mailto:directorpgs@unam.na)). If there is a need to return the hardcopy of the manuscript, kindly do so via DHL to the return address provided. However, note that no reports or forms should accompany the manuscript.

Please acknowledge receipt of the manuscript. Should you be unable to complete the examination by the indicated time frame, given your other commitments, kindly inform me accordingly.

Best regards

Name

Director, Centre for Postgraduate Studies,

Tel: +264 61 206 3275

E-mail: [directorpgs@unam.na](mailto:directorpgs@unam.na)

Cc. Faculty of xxxxxx HOD: Postgraduate Studies (e-mail)

## ANNEX 9

### MARK ALLOCATION OF MASTER'S THESIS

Name of Student: .....

Student Number: .....

Thesis title: .....

.....

Assessment Criteria	Allocated mark	Maximum mark
Title: (appropriateness, clear and informative)		2
Abstract: (concise, outlines aim of study, methodology, findings and conclusions)		4
Introduction: background/orientation of study (sufficient and relevant)		3
Introduction: problem statement (clear and logical progression from literature to aims of the study)		3
Introduction: objectives/hypothesis/research questions (well formulated and relevant to the problem statement)		3
Literature review: (relevant, recent, critical, comprehensive and logically/theoretical integrated)		10
Research methods: (clear, detailed, informative, appropriate and supported by literature)		10
Results: Data collected (adequate and relevant)		7
Results: Data analysis (appropriate, relevant to aims and objectives/hypotheses/research questions)		10
Results: Data presented (technical aspects, appropriate, concise, informative and clear)		7
Discussions: Critical, comprehensive, logically integrated, linked to literature, acknowledgment and discussion of limitations, significance and implications of the findings		25
Conclusion and recommendations: clear, concise and supported by data, findings must relate/respond to the objectives/hypotheses/research questions. Recommendations must be linked to the findings		5
Contribution to knowledge: originality and relevance to subject area		3
References: Appropriate format, consistency between in-text citation and reference list		5
Language and technicalities: clear and legible language use and format		3
<b>TOTAL</b>		<b>100</b>

.....

Name of Examiner

.....

Signature

.....

Date

# ANNEX 10

## SUMMARY OF EXAMINATION RESULTS (MASTER THESIS)

Name of student: .....

Thesis title: .....

.....

.....

Faculty:.....

### EXAMINERS RECOMMENDATIONS (X)

1. Thesis PASSES subject to MINOR corrections

Mark allocated: ..... (> 50%)

2. Thesis PASSES subject to MAJOR corrections as indicated in the report

Mark allocated: ..... (> 50%)

3. Thesis MUST BE RE-SUBMITTED FOR RE-EXAMINATION after one or more of the following (specify):

(No mark to be allocated)

3.1 Additional literature review

3.2 Additional data collection

3.3 Additional data analysis

3.4 Thesis re-write

3.5 Other (specify in Main Report)

4. Thesis FAILED (reasons specified in Main Report).

Mark allocated: ..... (< 50%)

.....

.....

.....

Name of Examiner

Signature

Date

### Interpretation of the grading scale:

% Equivalence	Interpretation
80 and above	Distinction
70 – 79	Very Good
60 – 69	Good
50 – 59	Satisfactory
49 and below	Fail

# ANNEX 11

## SUMMARY OF EXAMINATION RESULTS (PhD/DOCTORAL DISSERTATION)

Name of student: .....

Dissertation Title: .....

.....

.....

Faculty:.....

### EXAMINERS RECOMMENDATIONS (X)

1. Dissertation PASSES subject to MINOR corrections
2. Dissertation PASSES subject to MAJOR corrections as indicated in the report
3. Dissertation MUST BE RE-SUBMITTED FOR RE-EXAMINATION after one or more of the following (specify):
  - 3.1 Additional literature review
  - 3.2 Additional data collection
  - 3.3 Additional data analysis
  - 3.4 Dissertation re-write
  - 3.5 Other (specify in Main Report)
4. Dissertation FAILED (reasons specified in Main Report).

.....

Name of Examiner

.....

Signature

.....

Date

## ANNEX 12

### VIVA VOCE EXAMINATION RESULTS FORM (NO MARK SHOULD BE ALLOCATED – ONLY PASS/FAIL)

(To be attached to the detailed report by the Viva Voce Chairperson)

Name of Student: .....

Degree registered for: .....

Thesis/Dissertation Title: .....

.....

.....

Date: .....

No. EXAMINERS' RECOMMENDATION (X)

1. PASS

1.1 Student PASSES and no additional adjustments are required.

1.2 Student PASSES SUBJECT TO minor corrections and revisions

2. FAIL

2.1 Student FAILS, but should be given another chance of defending the thesis/dissertation after rectifying the identified weaknesses

2.2 Student FAILS OUTRIGHT

Name\* Designation Affiliation Signature

Chairperson

External Examiner

External Examiner

External/Internal Examiner

Main supervisor

Co-supervisor

Co-supervisor

Other

• The VIVA VOCE Panel Chairperson should prepare a more detailed report according to instructions contained in B.16.3 under Viva voce Examinations.

• In case of disagreement, each panellist shall show against his/her signature which recommendation (e.g., 1.1, 1.2, 2.1 or 2.2) s/he prefers.

# ANNEX 13

## TEMPLATE FOR VIVA VOCE CHAIRPERSON REPORT

Name of Student: .....

Degree registered for: .....

Thesis/Dissertation Title: .....

.....

Date of Viva Voce examination : .....

1. Panel members in attendance
2. Challenges faced with the examination (e.g. logistical arrangements)
3. Summary of the presentation by the student
4. Summary of the discussions during the examination
5. Strong and/or weak points identified during the presentation and discussions
6. Specific recommendations to the student where applicable

We hereby declare that this report is a true reflection of the Viva Voce examination:

Name*	Designation	Affiliation	Signature
	Chairperson		
	External Examiner		
	External Examiner		
	External/Internal Examiner		
	Main supervisor		
	Co-supervisor		
	Co-supervisor		
	Other		

External panelists who are unable to sign off the report must acknowledge approval of the report via e-mail

# ANNEX 14

(Research Proposal/Summary/Mini Thesis/Thesis/Dissertation title page)

**EVALUATION OF SELECTED NAMIBIAN MEDICINAL PLANTS FOR ANTI-HIV PROPERTIES**

**A RESEARCH PROPOSAL/ A MINI THESIS/THESIS/DISSERTATION SUBMITTED IN PARTIAL FULFILMENT/FULFILMENT**

**OF THE REQUIREMENTS FOR THE DEGREE OF**

**MASTER OF SCIENCE (SPECIFIC DEGREE NAME IN FULL)/DOCTOR OF PHILOSOPHY IN SCIENCE (BIOLOGICAL SCIENCES)**

**OF**

**THE UNIVERSITY OF NAMIBIA**

**BY**

.....

**(NAME OF STUDENT)**

.....

**(STUDENT NUMBER)**

.....

**MONTH AND YEAR OF GRADUATION**

**MAIN SUPERVISOR: Name (Affiliation).....**

**CO-SUPERVISOR(S): Name (Affiliation).....**

**NB: INDICATE IN FULFILMENT WHEN THERE IS NO COURSEWORK AND IN PARTIAL FULFILMENT WHEN THERE IS COURSEWORK**

# ANNEX 15

## CENTRE FOR POSTGRADUATE STUDIES

### CHECKLIST FOR APPROVAL OF RESEARCH PROPOSALS (TO BE COMPLETED BY THE SUPERVISOR)

Faculty: ..... Department: .....

Postgraduate Programme Student is enrolled in: .....

Name of Student: ..... Student number: .....

Title of Study to be conducted: .....

Instructions: Tick (✓) YES or NO in the space provided to indicate whether particular actions and tasks were undertaken. In addition, indicate the dates when the actions or tasks were undertaken.

	NATURE OF ACTION TAKEN	RESPONSE CHOICES	DATE WHEN ACTION WAS TAKEN
1	The student is registered at UNAM for the current academic year	YES NO	
2	The research proposal has been prepared under the guidance of a supervisor or supervisors.		
	YES		
	NO		
3	The student successfully completed the seminar at department and/or faculty level.	YES NO	
4	The research proposal has been considered and recommended at departmental level.		
	YES		
	NO		
5	The research proposal has been considered by the Faculty Postgraduate Studies Committee the following resolution was taken:		
	RESOLUTION NUMBER: .....	Approved	
	Rejected		
	Extended		
6	Where extension was granted and the proposal re submitted, the research proposal has been considered by the School Higher Degrees Board the following resolution was taken:		
	RESOLUTION NUMBER: .....	Approved	
	Rejected		
7	The research proposal has been submitted to the UNAM PGSC for noting.	YES NO	
	.....	.....	.....
	Name of the Main Supervisor	Signature of the Main Supervisor	Date:
	.....	.....	.....
	Name of the Co-Supervisor	Signature of the Co- Supervisor	Date:
	.....	.....	.....
	Name and Signature of the Faculty PGSC Chairperson: .....		
	Date:.....		

## ANNEX 16

### RESEARCH PERMISSION LETTER

**Student Name**

**Student number**

**Programme**

**Approved research title**

### TO WHOM IT MAY CONCERN

I hereby confirm that the above-mentioned student is registered at the University of Namibia for the programme indicated. The proposed study met all the requirements as stipulated in the University guidelines and has been approved by the relevant committees.

The proposal adheres to ethical principles as per attached Ethical Clearance Certificate. Permission is hereby granted to carry out the research as described in the approved proposal.

**Best Regards**

-----  
**Name**

-----  
**Date**

**Director: Centre for Postgraduate Studies**

**Tel: +264 61 2063275**

**E-mail:**

## APPENDIX 1: MODULE EQUIVALENCE (Diploma and Degree Programmes)

**Modules Equivalence Table: Diploma in Agriculture versus Diploma in Livestock Production**

Old modules	NQF Level	Credits	New modules	NQF Level	Credits
Mathematics and Basic Statistics	4	16	Elementary agricultural mathematics and statistics, Introduction to Statistics	4 5	12 14
Biology	4	16	Principles of Biology	4	14
Farm Duties I	4	8	None	-	-
Basic Economics	4	12	Basic Economics	4	12
Physical Science	4	12	None	-	-
Animal Anatomy, Physiology and Reproduction	4	8	Animal Anatomy and Physiology	5	16
Financial Management	5	8	Farm Management	6	16
Communication and Information systems	5	8	None	-	-
Introduction to Rural Sociology	5	8	None	-	-
Soil Science	5	12	Soil Science	5	14
Applied Animal Health	5	16	Farm Animal Health	6	18
Farm Duties II	5	8	Farm Duties	6	8
Introduction to Research	5	12	None	-	-
Workshop Technology, Surveying and Farm Structures	5	8	Farm Mechanization	4	7
Vegetable and Fruit Production	5	16	Olericulture Technology	4	14
Crop Production	5	12	Principles of Crop Production	4	14
Applied Animal Breeding	5	8	Applied Animal Breeding	5	16
Special Study	6	8	None	-	-
Field Attachment	6	8	Field Attachment	6	16
Principles of Agricultural Extension	6	8	Agricultural Extension and Group Dynamics	6	14
Agricultural Marketing and Policy	6	8	Agricultural Marketing and Policy	6	9
Intensive Animal Production	6	12	Intensive Animal Production	6	18
Water Management and Soil Conservation	6	8	None	-	-
Range Management	6	12	Range Management	6	18
Special Study	6	8	None	-	-
Project Management	6	8	None	-	-
Entrepreneurship	6	8	None	-	-
Animal Nutrition and Feeding	6	8	None	-	-
Game Ranching	6	8	None	-	-
Extensive Animal Production	6	8	Extensive Animal Production	6	18
Farm Power & Machinery	6	12	Farm Mechanization	4	7
None	-	-	Livestock Production Systems	5	14

**Modules Equivalence Table: Diploma in Agriculture versus Diploma in Sustainable Crop Production and Technology.**

Module	Old Programme	NQF Level	Credits	Module Code	New Programme Equivalent Modules	NQF Level	NQF Credit
AAEC 2411	Mathematics and Basic Statistics	4	16	F2531CA	Elementary	4	12
AASC 2431	Biology	4	16	F2401CB	Introduction to Botany	4	7
AAEA 2400	Farm Duties 1	4	8		None		
AAEC 2482	Basic Economics	5	12		None		
AASC 2432	Physical Science	5	16		None		
AASC 2422	Animal Anatomy, Physiology and Reproduction	5	8		None	5	8
AAEC 2541	Communication and Information systems	5	8	F2641EC	Agricultural Extension and Group Dynamics	6	14
AAEC 2501	Financial Management	5	8		None		
AAEC 2521	Introduction to Rural Sociology	5	8	F2412ED	Community Development and Rural Sociology	4	12
ACSC 2581	Soil Science	5	12	F2552CN	Soil Science	5	14
AASC 2551	Applied Animal Health	5	16		None		
AAEA 2500	Farm Duties II	5	8		None		
ACSC 2582	Introduction to Research	5	12		None		
ACSC 2522	Workshop technology, surveying and farm structures	5	8	F2432TG	Workshop Technology and Farm Structures	4	14
ACSC 2532	Vegetable and Fruit Production	5	16	F2431CO	Olericulture Technology	4	14
ACSC 2583	Crop Production	5	12	F2421CI	Integrated Crop Farming	4	14
AAEC 2502	Applied Animal Breeding	5	8		None		
AAEA 2600	Special Study	6	8		None		
AAEA 2601	Field Attachment	6	8	W2600CM	Field Attachment	6	24
AAEC 2641	Principles of Agricultural Extension	6	8	F2641EC	Agricultural Extension and Group Dynamics	6	14
AAEC 2661	Agricultural Marketing and Policy	6	8		None		
AASC 2681	Intensive Animal Production	6	12		None		
ACSC 2601	Water Management and Soil Conservation	6	8	F2602TS	Soil and Water Conservation Technology	6	8
AASC 2691	Range Management	6	12		None		
AAEC 2602	Project Management	6	8	U3420PJ	Project Management Skills	5	2
AEC 2622	Entrepreneurship	6	8	F2531EB	Entrepreneurship and Business Development	5	12
AASC 2622	Animal nutrition and Feeding	6	8		None		
AASC 2602	Game Farming	6	8		None		
AASC 2642	Extensive Animal Production	6	8		None		

ACSC 2622	Farm Power and Machinery	6	12	F2612TF	Farm Power and Machinery	6	16
ACSC 2622	Crop Protection	6	8	F2601CH	Crop Protection	6	16

Modules from older curricula with no equivalents will be offered again until either phased out or for a maximum of 2 consecutive times only. The Department reserves the right to offer these in whatever mode logistics allow (blended or online)

### Modules Equivalence Table: Bachelor of Food Science and Technology

The following table presents the summary of the modules in the old programme and new programme.

Old programme		Level	NQF credit	Equivalent Modules		Level	NQF credit
SBLG 3511	Introduction to Biology	5	16		No equivalent –to be offered again	5	16
SPHY 3501	Physics for Life Sciences 1	5	8	P3511PG	General Physics I	5	14
SMAT 3511	Basic Mathematics	5	16		No equivalent –to be offered again	5	16
SCHM 3532	Chemistry for Life Sciences	5	16		No equivalent –to be offered again	5	16
SPHY 3532	Physics for Life Sciences II	5	16	S3512PG	General Physics II	5	14
SBLG 3512	Diversity of Life	5	16	S3512ED	Diversity of Life	5	16
SMAT 3512	Pre-calculus	5	16		No equivalent –to be offered again	5	16
AAEC 3681	Principles of Microeconomics	6	12	F3611AE	Principles of Economics	6	14
AAEC 3691	Rural Sociology	6	12	F3631ES	Community Development and Rural Sociology	6	14
ACRS 3681	Biostatistics	6	12		No equivalent –to be offered again		
AASC 3681	Genetics	6	12		No equivalent –to be offered again	6	12
AFST 3681	General Microbiology	6	12	F3611SG	General Microbiology	6	15
AFST 3691	Postharvest Technology	6	12	F3601SP	Postharvest	6	7
AFST 3601	Human Nutrition	6	8		No equivalent –to be offered again	6	8
AASC 3612	Biochemistry	6	16	F3611AB	Biochemistry	6	16
AFST 3682	Fruits and Veg. Technology	6	12	F3711SF	Fruits and Veg. Technology	7	17
AASC 3602	Livestock Prod. Systems	6	8		No equivalent –to be offered again		
AFST 3602	Food Technology	6	8		No equivalent –to be offered again	6	8
AFST 3692	Food Biotechnology	7	12	F3701SB	Food Biotechnology	7	8
AACA 3701	Field Attachment I	7	8	W3710SW	Workplace attachment	7	24
AFST 3781	Food Chemistry	7	12	F3711SC	Food Chemistry	7	17
AFST 3791	Food Microbiology	7	12	F3701SM	Food Microbiology	7	8
AFST 3701	Product Development and Sensory Evaluation.	7	8	F3702SP	Product Development	7	9
AFSC 3791	Food Processing Technology	7	12		Non-equivalent –to be offered again	6	8
AFSC 3781	Meat Science and Technology	7	12		No equivalent –to be offered again	7	12
ACSC 3792	Research Methods	7	12	F3712CB	Biometry	7	16

AFST 3702	Food Toxicology	7	8	F3811ST	Food Toxicology	8	19
AFST 3722	Food Analysis and Instrumentation	7	8	F3712SS	Food and Sensory Analysis	7	17
AAEC 3702	Entrepreneurship	7	8	F3811SE	Food Entrepreneurship and Management	8	18
AFSC 3782	Principles of Food Engineering	7	12	F3702SE	Food Engineering II	7	9
AAEC 3782	Agricultural Marketing	7	12	F3732EA	Agricultural Marketing	7	16
AFST 3810	Research Projects	8	16	F3883SR	Research project	8	8
AACA 3801	Field Attachment II	8	8		No equivalent –to be offered again	8	8
AFST 3841	Quality Management Systems	8	8	F3801SQ	Quality Management Systems	8	9
AFST 3881	Dairy Science and Technology	8	12		No equivalent –to be offered again	8	12
AFST 3891	Applied Food Engineering	8	12		No equivalent –to be offered again	8	12
AFST 3861	Food Packaging, Storage and Distribution	8	8		No equivalent –to be offered again	8	8
AFST 3810	Research Projects	8	16	F3883SR	Research Project	8	8
AFST 3862	Sea foods Technology	8	8		No equivalent –to be offered again	8	8
AFST 3882	Cereal Science and Technology	8	12	F3812SG	Grains and Cereals Processing	8	19
AFSC 3802	Edible Fats and Oils Technology	8	8	F3812SO	Oil seeds Processing Technology	8	19
AFST 3822	Plant Equipment and Management	8	8		No equivalent –to be offered again	8	8
AAEA 3882	Agric. Business Management	8	12		No equivalent –to be offered again	8	8

#### Modules Equivalence Table: Bachelor of Science in Animal Science Honours

OLD MODULES EQUIVALENTS	Module Code	NQF Level	Credits	NEW MODULE	Module Code	NQF Level	Credits
Introduction to Biology	SBLG3511	5	16	Introduction to Biochemistry	F3511AB	5	14
Physics for Life Sciences I	SPHY3501	5	8	General Physics I	P3511PG	5	14
Basic Mathematics	SMAT3511	5	16	Mathematics in Agriculture	F3531CA	5	12
Chemistry for Life Sciences	SCHM3532	5	16	None, to be offered again		5	16
Physics for Life Sciences II	SPHY3532	5	16	General Physics II	S3512PG	5	14
Diversity of life	SBLG3502	5	16	Diversity of life	S3512ED	5	16
Pre-calculus	SMAT3512	5	12	None, to be offered again		5	12
Principles of Microeconomics	AAEC3681	6	12	Principles of Economics	F3611AE	6	14
Rural Sociology	AEC3691	6	16	Community Development and Rural Sociology	F3631ES	6	14
Genetics	AASC3681	6	12	None, to be offered again		6	12
Introduction to Range Management	AASC3691	6	12	None, to be offered again		6	12
Biostatistics	ACRS3681	6	12	Introduction to Statistics	F3532AS	6	12
Agronomy	ACS3691	6	12	None, to be offered again		6	12
General Microbiology	AFST3681	6	12	General Microbiology	F3611SG	6	15

Production Economics	AAEC3682	6	12	None		6	12
Biochemistry	AASC3612	6	16	Biochemistry	F3611AB	6	16
Livestock Production Systems	F3512AL	6	8	None, to be offered again		6	8
Food Technology	AFST 3602	6	8	None, to be offered again		6	8
Field Attachment I	AACA 3701	7	8	Field Attachment for Animal Scientists	F3783AA	7	24
Animal Nutrition	AASC 3701	7	8	None, to be offered again		7	8
Agricultural Engineering	ACSE 3781	7	12	None, to be offered again		7	12
Animal Health	AASC 3791	7	12	Animal Health	F3712AH	7	17
Animal Breeding	AASC 3792	7	12	Animal Breeding	F3732AA	7	18
Farm Planning and Management	AAEC 3781	7	12	Farm Management	F3612EF	7	14
Animal Anatomy and Physiology	AASC 3711	7	16	None, to be offered again		7	16
Research Methods	ACSC 3792	7	12	Biometry	F3712CB	7	16
Agricultural Extension	AAEC 3712	7	16	None, to be offered again		7	16
Feeds and Feeding	AASF 3702	7	8	None, to be offered again		7	8
Game Ranching	AASC 3741	7	8	Game Ranching	F3601AG	8	16
Entrepreneurship	AAEC 3702	7	8	Entrepreneurship	F3731AE	7	16
Agricultural Marketing	AAEC3782	7	12	Agricultural Marketing	F3711EP	7	16
Field Attachment II	AACA 3801	7	8	Animal Science Practices and Equipment	F3711AP	8	18
Research Project	ACSC 3810	8	16	Research Project	F3883AR	8	16
Project Planning and Management	AAEC 3881	8	12	None, to be offered again		8	12
Range and Pasture Management	AASC 3811	8	16	Range Management	F3831AP	8	20
Beef Production	AASC 3881	8	12	Beef Production	F3811AB	8	20
Poultry Production	AASC 3821	8	8	Monogastric Animal Production	F3832AM	8	20
Small Ruminant Production	AASC3892	8	12	Small Ruminant Production	F3812AS	8	20
Dairy Production	AASC 3810	8	8	Dairy Production	F3802AD	8	10
Meat Science	AASM 3882	8	12	Meat Science and Animal Products	F3801AM	8	10
Biotechnology of Animal Reproduction	AASB 3882	8	12	None, to be offered again		8	12
Pig Production	AASC 3822	8	8	Monogastric Animal Production	F3832AM	8	20

#### Modules Equivalence Table: Bachelor of Science in Fisheries and Ocean Sciences

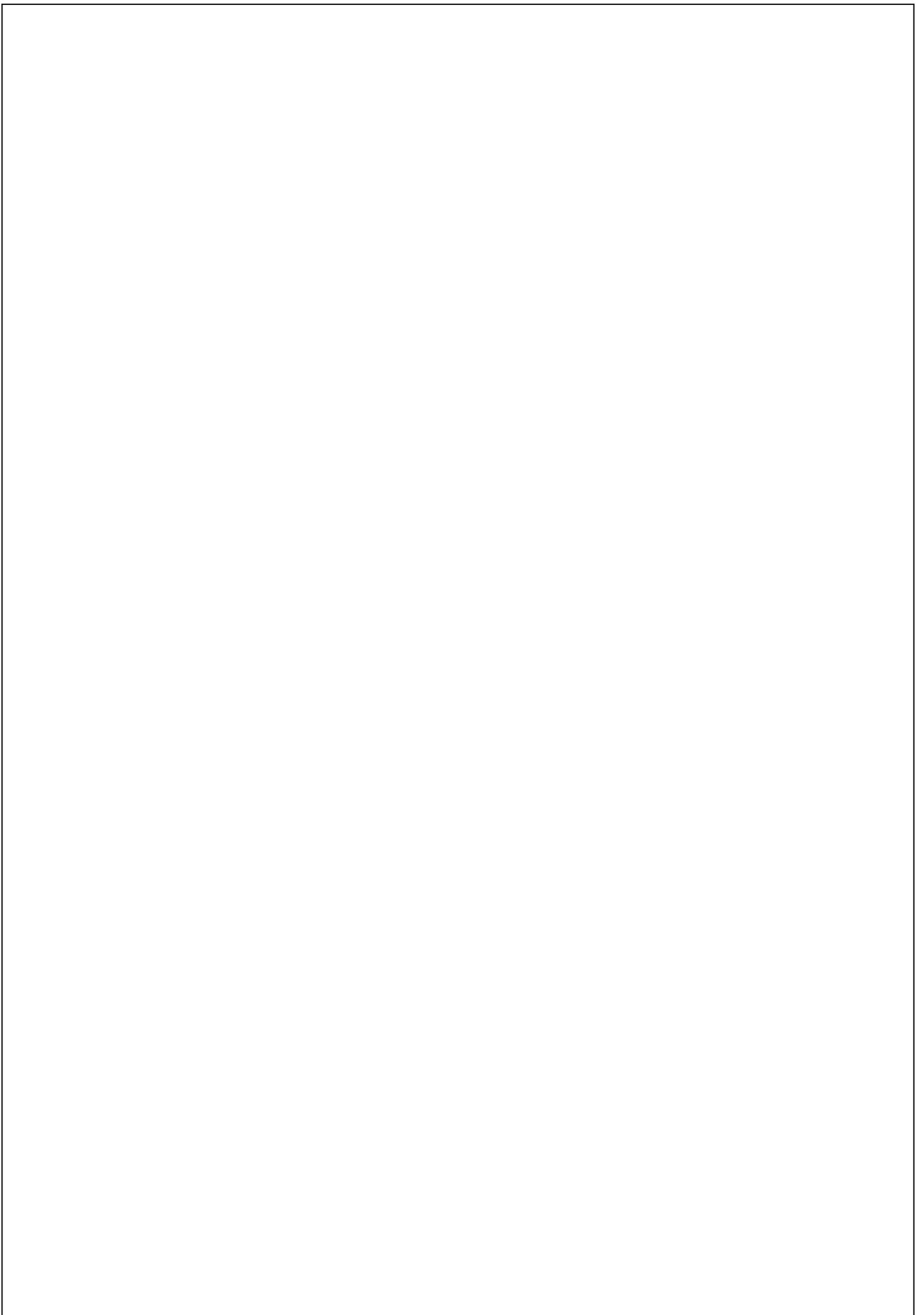
Old modules	NQF Level	Credit	Equivalent	NQF Level	Credit
SBLG 3511: Introduction to Biology	5	16	None -to be offered again	5	16
SPHY 3501: Physics for Life Sciences I	5	8	P3511PG: General Physics I	5	14
SMAT 3511: Basic Mathematics	5	16	F3531CA: Mathematics for Agriculture	5	12
SCHM 3532: Chemistry for Life Sciences	5	16	None -to be offered again	5	16
SBLG 3512: Diversity of Life	5	16	F3511OL: Introduction to Aquatic Life	5	13

SMAT 3512: Pre-calculus	5	16	None -to be offered again	5	16
AAEC 3681: Principles of Microeconomics	6	12	None -to be offered again	6	12
AAEC 3691: Rural Sociology	6	12	F3751OE: Fisheries and Aquaculture Extension	7	16
AASC 3681: Genetics	6	12	F3631OG: Genetics for Aquatic Resources	6	14
AFST 3681: General Microbiology	6	12	F3611SG: General Microbiology	6	15
AAEC 3682: Production Economics	6	12	F3631EP: Production Economics	6	14
AFAS 3682: Introduction to Aquaculture	6	12	F3632OQ: Aquaculture	6	14
AACA 3701: Field Attachment I	7	8	W3750OT: Field Attachment	7	24
AFAP 3781: Physical Oceanography	7	12	None -to be offered again	7	12
AFAS 3781: Aquaculture and Fisheries products	7	12	None -to be offered again	7	12
AFAS 3791: Fisheries Management I	7	12	F3751OM: Fisheries Management	7	16
AAEC 3781: Farm Planning and Management	7	12	None -to be offered again	7	12
AFAS 3782: Basic Aquaculture Engineering	7	12	None -to be offered again	7	12
AFAS 3792: Fisheries Management II	7	12	None -to be offered again	7	12
AFAS 3712: Integrated Coastal Zone Management	7	16	None -to be offered again	7	16
AFAA 3782: Aquaculture Nutrition and Feed Manufacturing	7	12	None -to be offered again	7	12
ACSC 3792: Research Methods	7	12	None -to be offered again	7	12
AFAS 3810: Research Project	8	16	None -to be offered again	7	16
AFAS 3811: Biological Oceanography	8	16	Biological Oceanography	7	16
AACA 3801: Field Attachment II	8	8	None -to be offered again	8	8
AFAS 3891: Fisheries Economics	8	12	None -to be offered again	8	12
AFAS 3831: Fish Pathology	8	16	None -to be offered again	8	16
AENE 3882: Environmental Impact Assessment	8	12	None -to be offered again	8	12
AFAS 3812: Fish Population Dynamics	8	16	None -to be offered again	8	16
AFAS 3832: Aquaculture Management	8	16	None -to be offered again	8	16

**Modules Equivalence Table: Bachelor of Science in Agricultural Engineering Honours**

Current Module Title	2021 CODE	NQF level	Credit	Replacement Module Title	2023 CODE	NQF level	Credit
<b>YEAR 1 Semester 1</b>							
Engineering Mathematics I	TEGM3591	5	12	Engineering Mathematics I	I3511IM	5	16
Engineering Drawing	TEGT3561	5	8	Engineering Drawing	I3531ID	5	16
Physics for Physical Sciences I	SPHY3511	5	16	Physics for Engineers I	I3521NP	5	12
Computing Fundamentals	TCME3521	5	8	Computing Fundamentals	I3551CC	5	12
Workshop Practice	TEGW3590	5	8	Workshop Practice	I3640IW	6	8
Materials Science	TEGS3591	5	12	Materials Science	I3572IS	5	12
Fundamentals of Engineering	TEGT3521	5	8	None equivalent, to be offered again		5	8
<b>YEAR 1 Semester 2</b>							
Engineering Mathematics II	TEGM3512	5	16	Engineering Mathematics II	I3512IM	5	16
Fundamentals of Electrical Engineering	TEGT3542	5	8	Fundamentals of Electrical Engineering	I3502EE	5	8
Physics for Physical Sciences II	SPHY3512	5	16	Physics for Engineers II	I3542NP	5	13
Engineering Mechanics I	TEGT3592	5	12	Engineering Mechanics I	I3532NM	5	12
Chemistry 1B	SCHM3512	5	16	Chemistry for Engineers	I3511NC	5	16

<b>YEAR 2 Semester 1</b>							
Engineering Mathematics III	TEGT3671	6	16	Engineering Mathematics III	I3611IM	6	16
Computer Science for Engineers	TCME3621	6	8	Computer Programming I	I3631CP	6	12
Engineering Mechanics II	TEGT3641	6	8	Engineering Mechanics II	I3642IM	6	8
Statistics for Engineers	TEGS3661	6	8	Statistics for Engineers	I3552IS	6	12
Strength of Materials I	TCVM3621	6	8	Strength of Materials I	I3651VM	6	12
Fluid Mechanics	TMEM3681	6	12	Fluid Mechanics 1	I3632NF	6	12
Computer-Aided Drawing	TEGT3661	6	8	None equivalent, to be offered again		6	8
<b>YEAR 2 Semester 2</b>							
Engineering Mathematics IV	TEGT3672	6	16	Engineering Mathematics IV	I3612IM	6	16
Engineering Thermodynamics	TMED3642	6	8	None			
Mechanical Engineering Design I	TMEM3642	6	8	Mechanical Engineering Design I	I3622ND	6	8
Engineering Materials	TMEM3622	6	8	Engineering Materials	I3661NM	6	8
Computer Programming	TCMS3692	6	12	Computer Programming II	I3652CP	6	12
Electrical Machines	TECP3622	6	8	Electrical Machines	I3652EM	6	12
Measurements and Instrumentation	TETA3622	6	8	Measurements and Instrumentation	I3622CM	6	8
Industrial Attachment I	TEGT3600	6	-	Workshop Practice	I3640IW	6	8
HIV and the Organization	TEGT3602	6	-	None -to be offered again		6	-
<b>YEAR 3 Semester 1</b>							
Modelling and Analysis of Dynamic Systems	TMEM3781	7	12	Control Systems	I3731NM	7	12
<b>NEW MODULES</b>							
	<b>YEAR 4 Semester 1</b>						
Society and the Engineer	TEGT3821	8	8	Engineering Ethics and Practice	I3862IP	8	8
<b>NEW MODULES FOR THE REST OF SEMESTERS 1 AND 2</b>							



# Prospectus 2023