



# Faculty of Agriculture & Natural Resources

*Prospectus 2015*



**UNAM**  
UNIVERSITY OF NAMIBIA

FACULTY PROSPECTUS 2015

FACULTY  
OF  
AGRICULTURE  
AND  
NATURAL RESOURCES



**UNAM**  
UNIVERSITY OF NAMIBIA

## **NOTE**

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This Faculty Prospectus is valid for 2015 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 Faculty 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 2015.

The fact that particulars of a specific programme, subject or module have been included in this Faculty Prospectus does not necessarily mean that such a programme, subject or module will be offered in 2015 or any subsequent year.

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

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## **FACULTY PREAMBLE**

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### **MISSION**

The Mission of the Faculty of Agriculture and Natural Resources 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 Faculty 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”**

## 2015 ACADEMIC CALENDAR

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### **SEMESTER 1**

08 January	University opens
19 January	Registration commences: Senior undergraduate and Postgraduate students: On-line (until 4 Feb)
19 January - 04 February	Registration (Last day for Late Registration: 11 February)
20 January	Academic staff resumes office duties
23 January	Registration: 1 <sup>st</sup> Year Postgraduate students
26 January	Registration commences: 1 <sup>st</sup> Year undergraduate students
04 February	Registration ends: All students
09 February	Lectures commence for <b>FIRST SEMESTER</b>
30 March	1 <sup>st</sup> Semester break starts
07 April	Lectures resume after 1 <sup>st</sup> Semester break
13 May	Lectures end for <b>FIRST SEMESTER</b>
19 May	Regular Examinations commence (Semester I modules)
10 June	Regular Examinations end
15 June - 19 June	Supplementary/Special Examinations
19 June	End of 1 <sup>st</sup> Semester
29 June - 03 July	Mid-year recess

### **SEMESTER 2**

13 July	Lectures commence for 2 <sup>nd</sup> Semester
24 August	2 <sup>nd</sup> Semester break starts
31 August	Lectures resume after 2 <sup>nd</sup> Semester break
16 October	Lectures end for 2 <sup>nd</sup> Semester
22 October	Regular Examinations commence (Semester 2 & Double modules)
12 November	Regular Examinations end
17 November - 23 Nov	Supplementary/Special Examinations
23 November	End of 2 <sup>nd</sup> Semester
15 December	Academic Year ends & University closes (until 11 January 2016)
11 January 2016	University opens (2016 academic year)
21 January 2016	Academic staff resumes office duties

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## 5. DUE DATES FOR THE 2015 ACADEMIC YEAR

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### (i) GENERAL

Last day for appeals (Sem 2 & Double modules – Reg & Supp/Spec exams of Nov 2014).....	22 Jan
Last day for application of retention of continuous assessment mark & Promotion Exam .....	06 Feb
Last day for application for exemption(s) .....	06 Feb
Last day for Late Registration ( <i>Late fee payable</i> ) .....	11 Feb
Last day for approval of exemption(s) .....	11 Feb
Last day for approval of retention of continuous assessment mark and Promotion Exam .....	11 Feb
Last day for approval of module(s) & qualification changes .....	11 Feb
Last day for change of Offering Types at Regional Centres (Semester 1 modules) .....	28 Apr
Last day for Appeals (Semester 1 modules (Reg & Supp/ Spec Exams of June 2015) .....	24 Jul
Last day to submit outstanding documentation .....	21 Aug
Last day to change Offering Types at Regional Centres (Semester 2 modules) .....	19 Sep
Last day to cancel enrolment .....	24 Sept
Last day to submit Theses and Dissertations for examinations.....	30 Oct

### (ii) CANCELLATIONS

#### **Semester 1 modules**

Last day to cancel Semester 1 modules.....08 May

#### **Semester 2 modules**

Last day to cancel Semester 2 modules.....24 Sept

#### **Double modules** (A double module normally extends over one academic year)

Last day to cancel Double modules.....24 Sept

### (iii) FINANCE

#### **Semester 1 modules**

Last day to cancel with 100 % credit.....6 March

Last day to cancel with 50 % credit.....17 April

#### **Semester 2 modules**

Last day to cancel with 100 % credit.....07 August

Last day to cancel with 50 % credit.....28 August

#### **Double modules** (a double module normally extends over one academic year)

Last day to cancel with 100 % credit.....6 March

Last day to cancel with 50 % credit.....5 June



## STRUCTURE AND PERSONNEL OF THE FACULTY

### OFFICE OF THE DEAN

☎ (+264 61) 206 3890 📠 (+264 61) 206 3013 ✉ [mtcloete@unam.na](mailto:mtcloete@unam.na) 📧 Private Bag 13301, Windhoek, Namibia

<b>Dean:</b>	Prof. F. Mause: BSc(Kharkov Zoo-Veterinary Institute Ukraine), MSc(Zoo-Veterinary Institute, Ukraine), PhD (Kharkov Livestock Research Institute, Ukrainian Academy of Agrarian Sciences, Ukraine)
<b>Deputy Dean (Neudamm Campus):</b>	Dr N P Petrus: B.Agric Animal Science Hons, University of Nigeria Nsukka (Nigeria); M.Sc. (CIRAD- Montpellier (France) ; PhD Agric (UNAM)
<b>Deputy Dean (Ogongo Campus):</b>	Dr J Njunge: B.Sc. Forestry (Moi University); M.Sc. Plant and Fungal Taxonomy (Reading Univ); PhD Forest Ecology (University of Wales)
<b>Faculty Officer:</b>	Mr E Nowaseb: B.A. (Augustana College, Rock Island, Illinois, USA)
<b>Examinations Officer:</b>	Mr J Tischer: Dipl in Education (MASTEP)
<b>Secretary:</b>	vacant
<b>Senior Researcher and Projects Coordinator:</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); M .A. 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: Dipl Information Studies (UNAM); B A Library Science & Records Mgt, History (UNAM); PG Dipl LIS (Univ Cape Town)
<b>Senior Library Assistant:</b>	Mr T Ntesa: Dipl Information Studies (UNAM)
<b>Library Assistant:</b>	Ms E Nguvauva: Dipl Records Management (Southern Business School)
<b>Library Assistant:</b>	Mrs M Kaahangoro: Dipl Records Management (Southern Business School)
<b>Student Support Officer:</b>	Mr K Katire (Office of the Dean of Students)

### NEUDAMM CAMPUS

☎ (+264 61) 206 4111 📠 (+264 61) 206 4027 ✉ [alubbe@unam.na](mailto:alubbe@unam.na) 📧 Private Bag 13188, Windhoek, Namibia

<b>Deputy Dean:</b>	Dr N P Petrus: B.Agric Animal Science Hons, University of Nigeria Nsukka (Nigeria); M.Sc. (CIRAD- Montpellier (France) ; PhD Agric (UNAM)
<b>Farm &amp; Campus Manager</b>	vacant
<b>Campus Administrator:</b>	Mrs A Lubbe: B.A., HED (University of Free State, Bloemfontein)
<b>Farm Administrator:</b>	Mr E Beukes: National Dipl. Agric (Tsumis)
<b>Administrative Assistant:</b>	Ms A R Beukes
<b>Cashier:</b>	Ms I W Mouton
<b>Estates Officer:</b>	Mr S Isaacs: Dipl. Urban Housing (IHS)
<b>Supervisor:</b>	Mr G V Kandjii: National Dip. Agric (Tsumis)
<b>Supervisor:</b>	Mr P Beukes: National Dip. Agric (Tsumis)
<b>Supervisor:</b>	Mr B M Matomola: National Dip. Agric (Neudamm)
<b>Supervisor:</b>	Mr J Ngavetene: National Dip. Agric (Neudamm)
<b>Supervisor:</b>	Mr W Goussard: Trade Dip. Motor Mechanic
<b>Assistant Supervisor:</b>	Mr G /Gomxob: Trade Dip. Diesel Mechanic
<b>Assistant Supervisor:</b>	Vacant
<b>Assistant Supervisor:</b>	Mr R Fredericks
<b>Assistant Supervisor:</b>	Mr R Kandjou
<b>Assistant Supervisor:</b>	Mr I Lisias

### OGONGO CAMPUS

☎ (+264 65) 223 5000 📠 (+264 65) 223 5265 ✉ [ikalimba@unam.na](mailto:ikalimba@unam.na) 📧 Private Bag 5520 Oshakati, Namibia

<b>Deputy Dean:</b>	Dr J Njunge: B.Sc. Forestry (Moi University); M.Sc. Plant and Fungal Taxonomy (Reading Univ); PhD Forest Ecology (University of Wales)
<b>Campus Manager:</b>	Mr M Nghihangwa: Dipl. pA (Polytechnic of Namibia); B-Tech (Unisa); Cert Ad Ed (Unisa); MpA (UWC)
<b>Farm Manager:</b>	Mr M Samuel: National Dipl Agric (Neudamm); B Sc Agric (Univ Free State, Bloemfontein)
<b>Student Support Officer:</b>	Mr I Kalimba: (A+ Cert (UNAM), Cert Client Server Tech (India), Dipl Info Tech (N.C.I) Nam, Dipl IBM. (BMT College, SA)

**Examinations Officer:** Ms J Amupolo: B. Econ (Unam); B.Econ (Hons) Univ Western Cape  
**Farm Administrator:** Mr V Namwoonde: Dipl Agric (Ogongo College)  
**Subject Librarian:** Ms C N Nakanduungile: Dip Information Studies (UNAM); B A Library Science & Records Management, Psychology (UNAM)  
**Senior Library Assistant:** Mr J Kambuta  
**Library Assistant:** Ms T N Andowa  
**Library Assistant:** Ms S Shiimbi: Dipl Information Studies  
**Administrative Assistant:** Ms M A N Mandumbwa-Kambatuku: Dipl Business Admin (DAPP); Dipl Public Relations (Unam)

**Administrative Assistant:** Ms T Abed  
**Assistant Stores Controller:** Ms A Negwila

**Finance and Procurement Officer:** Mr H Uupindi  
**Supervisor:** Mr T Lwiinga  
**Supervisor:** Mr F Ekondo  
**Supervisor:** Mr M Shishwandu  
**Manager:** A Malyenge  
**Assistant Supervisor:** Ms T Muhama  
**Assistant Supervisor:** Mr D Shikola

General enquiries regarding the programmes offered by the Faculty of Agriculture and Natural Resources should be directed to:

**The Faculty Officer**  
**Faculty of Agriculture and Natural Resources**  
**University of Namibia**  
**Private Bag 13301**  
**WINDHOEK**  
**Namibia**

**Tel:** (061) 206 3363 / 3890

**Fax:** (061) 206 3013 / 206 4027

**E-mail:** enowaseb@unam.na

**Website:** [www.unam.na](http://www.unam.na) → FANR (Faculty of Agriculture & Natural Resources)

Enquiries regarding specific subjects and departments must be addressed to the relevant Head of Department.

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## ACADEMIC DEPARTMENTS

### DEPARTMENT OF AGRICULTURAL ECONOMICS (Neudamm Campus)

☎ (+264 65) 223 5402 ☎ (+264 65) 223 5294 ✉ mhangula@unam.na ✉ Private Bag 5520, Oshakati, Namibia

<b>Head of Department:</b>	Ms M M Hangula
<b>Associate Professor:</b>	H. M Bello: B Sc (Hons) Agriculture ( Ahmadu Bello University- Nigeria); M Sc Agric Economics (Texas A & M University, USA); Ph.D. Agric Economics ( Usmanu Danfodiyo University, Nigeria)
<b>Lecturer:</b>	Mr S K Kalundu: NatDip Agric (Neudamm); B.Sc. Agric (UNAM); M.Sc. Agric Econ (Arkansas, USA) (Study Leave, PhD Univ Pretoria)
<b>Lecturer/Staff Dev Fellow:</b>	Ms M Nandi: Dip Agric (Polytechnic); B.Agric Mgt (Natal); M.Sc.Dev Econ (Norway)
<b>Lecturer:</b>	Mr M M Eiseb: Dip Agric (Polytechnic); B.Sc, M.Sc. Agric Econ (Fort Hare)
<b>Lecturer:</b>	Ms M M Hangula: NatDip Agric (Ogongo); B.Sc. Agric (UNAM); M. Sc. Agric & Resource Econ (Alberta, Canada)
<b>Lecturer:</b>	Mr M N Angula: NatDip Agric (Ogongo); B.Sc. Agric (UNAM); M.Sc. (Michigan,USA)
<b>Lecturer:</b>	Mr B Thomas: B.Sc. Agric (UNAM); M.Sc. Agric Econ (Stellenbosch)
<b>Lecturer:</b>	Mr C Togarepi: Bsc Agric (UNAM); PGDE (UNAM), M.Sc Agric Econ (UNAM)
<b>Lecturer:</b>	Ms C N Jona: B.Sc. Agric (UNAM); B.Sc. (Hons) Pretoria, M.Sc. Agric Extension (Pretoria) study leave (PhD Agric Extension, Pretoria)
<b>Assistant Lecturer:</b>	Ms E R Sheehama: B.Sc. Agric (UNAM); B.Sc. (Hons) Free State Univ.
<b>Assistant Lecturer:</b>	Mr T Maharero: B.Sc. Agric (Natal)

### DEPARTMENT OF ANIMAL SCIENCE (Neudamm Campus)

☎ (+264 61) 206 3930 ☎ (+264 61) 206 3013 ✉ sputeka@unam.na ✉ Private Bag 13301, Windhoek, Namibia

<b>Head of Department:</b>	Mr S.P. Muteka
<b>Professor:</b>	Vacant
<b>Associate Professor:</b>	Prof Irvin D.T. Mpofu: B.Sc. Animal Sci Hons (Zim), M.Sc. (Zim), PhD (Pretoria), MBA (Zim).
<b>Senior Lecturer:</b>	Dr E. Lutaaya: B.Sc. Agric. (Makerere); M.Sc. (Texas A & M); PhD (Georgia).
<b>Senior Lecturer:</b>	Dr T.O. Itenge: B.Sc. (Hons), Biomedical Sciences (Murdoch University, Western Australia); PhD, Molecular Genetics and Wool Science (Lincoln University, New Zealand).
<b>Senior Lecturer:</b>	Vacant
<b>Lecturer:</b>	Dr N.P. Petrus: B.Agric Animal Science Hons, University of Nigeria Nsukka (Nigeria); M.Sc. (CIRAD- Montpellier (France).
<b>Lecturer:</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>Lecturer:</b>	Mr S.P. Muteka: B.Sc. (Concordia), M.Sc. (Pretoria)
<b>Lecturer:</b>	Ms M. Shipandeni: National Dip Agric (Ogongo), B.Sc. Agric (UNAM); M Sc Animal Science/Animal Nutrition (Wageningen University, The Netherlands)
<b>Lecturer:</b>	Mr A. Kahumba: Diploma Agric, BSc Education Science (UNAM), MSc RR&M (UNAM)
<b>Lecturer:</b>	Mr O. K Mbango. BSc Agric, Animal science (UNAM); MSc RR&M (UNAM)
<b>Lecturer:</b>	Ms M. Nepembe: M.Sc. Agric (Patrice Lumumba P F Univ).
<b>Tutor:</b>	Vacant
<b>Technologist:</b>	Mr L.S. Samunzala: National Dip. Agric., Neudamm, BBA (UNAM)
<b>Technologist:</b>	Ms. S. Hafeni: B.Sc. Agric (UNAM); M.Sc. Agric. (UNAM)
<b>Technologist:</b>	Vacant

### DEPARTMENT OF CROP SCIENCE (Ogongo Campus)

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<b>Head of Department:</b>	FD Itanna
<b>Professor:</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>Professor:</b>	FD Itanna: BSc (Alemaya), MSc (Alemaya), PhD (Hohonheim)
<b>Professor:</b>	Prof. L S M Akundabweni: BSc, (Minnesota), MSc, PhD (South Dakota)
<b>Senior Lecturer:</b>	Dr C Gwanama: B.AgricSc; M Sc (University of Zambia); PhD (Univ Orange Free State)
<b>Lecturer:</b>	Ms S Niitembu: MSc.(Patrice Lumumba); Diploma Animal Health, (Torgau,Leipzig)

**Lecturer:** Ms O T Shivolo: Nat'l Dip Agric (Ogongo); B.Sc. Agric (UNAM), M.Sc. Crop Protection (University of Nairobi, Kenya)

**Lecturer:** Mr P A Ausiku: National Dip Agric (Ogongo); B.Sc. Agric (UNAM); M Sc Agric (Kinki Univ., Japan)

**Lecturer:** Ms N Nghishitivali: M.Sc. Agric (Cuba)

**Lecturer:** Mr F Shinombedi: M.Sc. Agric Eng (Czechelsovakia)

**Lecturer:** Mr G Hatutale: B.Sc. Agric (UNAM), M.Sc. Horticulture (Free-Sate Univ)

**Lecturer:** Mr K Hove: B Sc Mathematics (Hons) (MSU); M Sc Operations Research (NUST); PGDE (NUST)

**Lecturer:** Vacant (Agricultural Engineering)

**Lecturer:** Vacant (Agricultural Engineering)

**Assistant Lecturer:** Ms H Kandongo: B.Sc. Agric Mechanisation (Karl Marx University)

**Staff Dev Fellow:** Ms C. K. Kamburona-Ngavtene: B.Sc. Agric (UNAM); MSc. Genetics (Pretoria). Study Leave (Germany)

Mr S K Awala: National Dip Agric (Neudamm); B.Sc. Agric (UNAM), M. Agric. Sc. (Nagoya Univ., Japan). Study Leave (Kinki, Japan)

Mr P I Nanhapo: B.Sc. Agric (UNAM) M. Agric. Sc. (Nagoya Univ., Japan). Study Leave (Kinki, Japan)

**Technologist:** Ms A N Aluvilu: National Dip. Agric (Polytechnic of Namibia); B.Tech Agric (Cape Technikon), M. Agric (University of Limpopo)

#### DEPARTMENT OF FOOD SCIENCE & TECHNOLOGY (Neudamm Campus)

☎ (+264 61) 206 4003 ☎ (+264 61) 206 3013 ✉ mnambabi@unam.na ✉ Private Bag 13301, Windhoek, Namibia

**Head of Department:** Dr M NNN Shikongo-Nambabi

**Senior Lecturer:** Dr P G Bille: Dipl (credit) Dairy Technol. (Egerton); B. Sc. Hons Dairy/Food Science & Technol (California); M. Sc. Dairy/Food Science & Technol (Belfast); Ph. D (Food Science & Technol) (Univ. Pretoria; Certificate in Teaching Methodology (Royal Univ of Copenhagen)

**Senior Lecturer:** Dr M NNN Shikongo-Nambabi: B.Sc. Hons Biochemistry (Kent Univ); M.Sc. Applied Immunology (Brunel Univ.); Ph. D Microbiology (Univ. Pretoria)

**Lecturer:** Dr P Hiwilepo-Van Hal: B. Sc. Agric (UNAM); M. Sc; Ph D Food Science (Wageningen)

**Lecturer:** Mr C Samundengu: B. Eng. (UNSA); B. Eng. Hons; M. Eng. (Univ. Pretoria); Post Grad. Dip. Bus. Admin. (UNAM)

**Lecturer/Staff Dev Fellow:** Mr S C Barrion: B. Sc. Agric (UNAM); B. Sc. Hons Food Science (Univ. Pretoria), M. Sc. (Distinction) Food Science & Technology (Univ. Pretoria) (Study Leave, PhD University of Surrey)

**Lecturer:** Ms M Kandjou-Hambeka: B Sc. Agric Food Science & Technology (UNAM); M Sc Dairy Science & Technology (Univ Zimbabwe)

**Technologist:** Mr S Emvula: B Sc Agric (Unam); M Sc (Stellenbosch)

**Technologist:** Ms M H Hamunyela: B Sc Microbiology & Biochemistry (Unam)

#### DEPARTMENT OF FISHERIES & AQUATIC SCIENCES (Sam Nujoma Campus)

☎ (+264 64) 502 464 ✉ [lkandjengo@unam.na](mailto:lkandjengo@unam.na) ✉ P.O. Box 462, Henties Bay, Namibia

**Head of Department:** Mr L Kandjengo

**Professor:** Prof E Omoregie: B Sc (Univ of Jos, Nigeria); M Sc (Univ of Jos, Nigeria); M Sc (Portsmouth, UK); PhD (Univ of Jos, Nigeria)

**Senior Lecturer:** Dr C Hay: B.Sc. (Univ. Port Elizabeth) B.Sc. Hons. (Univ. of PE), M.Sc. & PhD (Univ. of Johannesburg)

**Senior Lecturer:** Mr F P Nashima: B.Sc. (UNAM); M.Sc. (UNAM)

**Lecturer:** Dr S K Mafwila: B.Sc. (UNAM); PGDE (UNAM); B.Sc.Hons (Rhodes); M.Sc. (UCT) PhD (UCT)

**Lecturer:** Mr L Kandjengo: B.Sc. (UNAM); B.Sc. Hons (UCT), M.Sc. (UCT)

**Lecturer:** Mr JA Esterhuizen: B.Sc. (UNAM); B.Sc. Hons, M.Sc. (Rhodes)

**Lecturer:** Mr M Tjipute: B.Sc. Astrakhan State Technical Univ, Russian Federation); M.Sc. (Russia); Postgraduate Certificate in Sustainable Aquaculture (United Nations Univ)

**Lecturer:** Mr A Samakupa: B.Sc (UNAM); Post graduate Certificate Fisheries Science (Univ Iceland); M.Sc. Fisheries Biology and Management (Bergen University)

**Lecturer:** Dr. JA litembu: B.Sc. (UNAM), M.Sc. (Univ. of Tromso), Ph.D. (Rhodes)

**Technologist:** Mr T Akawa: B.Sc. (UNAM), M Phil (Univ. of Stellenbosch)

**Technologist:** Mr M Hanghome: ND Natural Resources Management (PoN), Bachelors Cert. Env Engineering (CPUT), M.Sc. (UFS)

**SAM NUJOMA CAMPUS**

☎ (+264 64) 502 600 ✉ [euahindua@unam.na](mailto:euahindua@unam.na) ✉ P.O. Box 462, Henties Bay, Namibia

<b>Campus Director:</b>	Prof E Omoregie: B Sc (Univ of Jos, Nigeria); M Sc (Univ of Jos, Nigeria); M Sc (Portsmouth, UK); PhD (Univ of Jos, Nigeria)
<b>Head of Department:</b>	Mr L Kandjengo: B.Sc. (UNAM); B.Sc. Hons (UCT), M.Sc. (UCT)
<b>Office Administrator:</b>	Ms E Uahindua: Secretarial Certificate (CCOSA - Zimbabwe)
<b>Assistant Librarian:</b>	Ms L lipinge: B.A. Library Science and Resource Management (UNAM)
<b>Library Assistant:</b>	Mr E Thaniseb: Dipl Library and Information Studies (Univ of Botswana)
<b>Estates Officer:</b>	Mr M Dominicus: Dipl (WVTC)
<b>Security Officer</b>	Mr TS Shaanika
<b>Students Support Officer:</b>	Ms E Simon (Office of the Dean of Students)
<b>Student Records Officer:</b>	Vacant
<b>IT Officer</b>	Mr T Nampala

**DEPARTMENT OF INTEGRATED ENVIRONMENTAL SCIENCE (Ogongo Campus)**

☎ (+264 65) 223 5000 ✉ (+264 65) 223 5205 ✉ [endeunyema@unam.na](mailto:endeunyema@unam.na) ✉ Private Bag 5520 Oshakati, Namibia

<b>Head of Department:</b>	Dr E Ndeunyema
<b>Associate Professor:</b>	vacant
<b>Senior Lecturer:</b>	Dr J Njunge: B.Sc. Forestry (Moi University); M.Sc. Plant and Fungal Taxonomy (Reading Univ); PhD Forest Ecology (University of Wales)
<b>Lecturer:</b>	Dr E Ndeunyema: National Dip Agric (OAC); B.Sc. Forestry (Wales Univ, Bangor); M.Sc. Agroforestry (Wales Univ, Bangor), PhD Forestry (ethnobotany) (Wales Univ, Bangor)
<b>Lecturer:</b>	Dr J R Kambatuku: B Sc Zoology & Botany (Unam); M Sc Water Resources (Univ Wales); PhD Ecology (Univ Kwazulu-Natal)
<b>Lecturer:</b>	Ms A Ndeinoma: National Dipl Agric (OAC); B.Sc. Forestry, M.Sc. Environmental Impact Assessment (Stellenbosch); Postgraduate Diploma in Education (UNAM) study leave (Wageningen)
<b>Lecturer:</b>	Ms H Mavatera: B.Sc. Agric; M.Sc. Agric (CRUJ-ROMANIA)
<b>Lecturer:</b>	Ms L Halueendo: B.Sc. Zoology, Botany & Psychology (UNAM); B.Sc Hons Crop Protection (Pretoria); M.Sc. Crop Protection (Pretoria)
<b>Lecturer:</b>	Mr I Kaholongo: Cert Forestry (OAC); B.Sc. Forestry (Stellenbosch); M.Sc. Biodiversity Management and Research (UNAM)
<b>Lecturer:</b>	Ms J Niipele: B.A. Tourism (UNAM); M. Sc. Geo-Information Science & Earth Observation Nat Res Mgt (Univ. Twente, The Netherlands)
<b>Lecturer:</b>	Mr E. Kasiringua: M.Sc. Applied Ecology (Hedmark University College)
<b>Technologist:</b>	Mr J Hambia: B.Sc. Natural Resources (UNAM); B Sc (Hons) in Applied Science: Environmental Technology (Univ Pretoria)
<b>Technologist:</b>	Ms A I Shipanga: B.Sc. Environmental & Physiological and Molecular Biology (UNAM)
<b>Field Supervisor:</b>	Mr F Ekondo: National Dip Natural Resource Management (Polytechnic of Namibia); B Tech Agric Management (Polytechnic of Namibia); B. Hons Agric Management (Free State Univ)

**DEPARTMENT OF VETERINARY MEDICINE (Neudamm Campus)**

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<b>Head of Department:</b>	Prof. J. R. Lyaku: BVSc (Sokoine University of Agriculture, Tanzania); MVSc in Virology Immunology (Univ of Edinburgh, Scotland); PhD in Virology-Immunology (Univ of Glasgow, Scotland)
<b>Associate Professor:</b>	Prof. J. R. Lyaku: BVSc (Sokoine University of Agriculture, Tanzania); MVSc in Virology-Immunology (Univ of Edinburgh, Scotland); PhD in Virology-Immunology (Univ of Glasgow, Scotland)
<b>Associate Professor:</b>	Prof. F. Mause: BSc(Kharkov Zoo-Veterinary Institute Ukraine), MSc(Zoo-Veterinary Institute, Ukraine), PhD (Kharkov Livestock Research Institute, Ukrainian Academy of Agrarian Sciences, Ukraine)
<b>Associate Professor:</b>	Vacant

**Senior Lecturer:** Dr. C. Ntahonshikira: B Sc, MSc in Veterinary Medicine (Kiev, Ukraine); PhD in Veterinary Microbiology & Virology (Kiev Veterinary Research Institute (Ukraine))

**Lecturer:** Dr Y B Kaurivi: B Sc (Biology) UNAM; BVSc(Univ Zimbabwe); MVET (Ruminant Advanced Reproduction Technologies) Univ Sydney, Australia)

**Lecturer:** Vacant

**Technologist** Ms K Nghole: National Dipl Agric (UNAM); B Sc Agric (UNAM)

**DEPARTMENT OF WILDLIFE MANAGEMENT (Katima Mulilo Campus)**

☎ (+264 66) 262 6000 📠 (+264 66) 253 964 ✉ [eklingelhoefter@unam.na](mailto:eklingelhoefter@unam.na) Private Bag 1096, Venela Road, Katima Mulilo, Namibia

**Head of Department:** Dr E Klingelhoefter

**Associate Professor:** Prof G Kopij: M.Sc. Animal Ecology (Wroclaw University), PhD Ornithology (University of Orange Free State)

**Senior Lecturer:** Dr. A. Maroyi: M.Sc. Botany (University of Zimbabwe); PhD Plant Taxonomy (University of Natal)

**Senior Lecturer:** Dr E Klingelhoefter: PhD – Oceanography/Fish Stock Assessment: University of Port Elizabeth (UPE) - Nelson Mandela Metropolitan University, South Africa; Master of Science (MSc) – Terrestrial Ecology/Wildlife Management (University of Pretoria), South Africa; Bachelor of Science Honours (BSc Hon) in Wildlife Management (University of Pretoria, South Africa); Bachelor of Science (BSc) with major in Zoology and Botany: University of Port Elizabeth (UPE) – South Africa; Tertiary Education Diploma (major in Androgocis and Gerongocis) – University of South Africa (UNISA), South Africa.

**Senior Lecturer:** Mr J Kairu: Dip-Wildlife Management (CAWM, Mweka Tanzania); B.Sc. Wildlife (Moi University, Kenya); PGD-MNRSA (AUN, Norway) M.Sc. Mgmt of Nat Resources (AUN, Norway).

**Lecturer:** Dr E Fabiano: B.Sc. Computer Science (UNAM); M.Sc. Environment and Development: Protected Area Management (University of KwaZulu-Natal); PhD Zoology (Pontificia Catholic University of Rio Grande do Sul)

**Lecturer:** Ms D Nakwaya: B Sc Natural Resources (UNAM); M Sc Biodiversity Management & Research (UNAM)

**Lecturer:** Mr E Simasiku: B.Sc. Fisheries and Aquatic Science (UNAM); B.sc Hon. Zoology (UCT); M.Sc. Fisheries Ichthyology (Rhodes University)

**Lecturer:** Ms. F.N. Kangombe: M.Sc. Plant Ecology (University of Pretoria)

**Technologist:** BSc (Hons) Integrated Environmental Science, UNAM  
Diploma in Agriculture, Ogongo College

## A. REGULATIONS

The regulations of the Faculty of Agriculture and Natural Resources (FANR) 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.1 COURSES OF STUDY

The Faculty may offer the following diploma and degree programmes:

#### A.1.1 UNDERGRADUATE PROGRAMMES

##### Diplomas

(Code)		Minimum Duration
(17HDAG)	Higher Diploma in Agriculture	3 years full-time
(17HDNR)	Higher Diploma in Natural Resources Management	3 years full-time
(17HDAH)	Higher Diploma in Animal Health	3 years full-time

##### Degrees

(Code)		Minimum Duration
(17BSAE)	Bachelor of Science in Agriculture (Agricultural Economics) Hons	4 years full-time
(17BSAS)	Bachelor of Science in Agriculture (Animal Science) Hons	4 years full-time
(17BSCS)	Bachelor of Science in Agriculture (Crop Science) Hons	4 years full-time
(17BSFS)	Bachelor of Science in Agriculture (Food Science) Hons	4 years full-time
(17BSFA)	Bachelor of Science in Fisheries & Aquatic Sciences (Hons)	4 years full-time
(17BSIE)	Bachelor of Science in Integrated Environmental Science (Hons)	4 years full-time
(17BSWM)	Bachelor of Science in Wildlife Management & Ecotourism (Hons)	4 years full-time
(17BVET)	Bachelor of Veterinary Medicine (BVM)	6 years full-time

##### **Old programme being phased out by 2015:**

(17BSAG)	Bachelor of Science in Agriculture (Hons)	4 years full-time
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#### A.1.2 POSTGRADUATE PROGRAMMES

##### Degree

(Code)		Minimum Duration
(17MSRR)	Master of Science in Rangeland Resources Management	2 years full-time

***Apart from the above M Sc Rangeland Resources Management degree programme, the Faculty also offers M Sc and PhD degree programmes by research and thesis in accordance with the general regulations of the University of Namibia.***

### A.2 GENERAL ADMISSION CRITERIA FOR UNDERGRADUATE PROGRAMMES:

#### A.2.1 DIPLOMA PROGRAMMES

A.2.1.1 The normal basic requirement for entrance to Diploma programmes shall be a Namibian Senior Secondary Certificate Ordinary Level (NSSC O-Level) or a recognized equivalent, provided that a candidate has passed five subjects with a minimum of 22 points on the UNAM Evaluation Point Scale. The following minimum requirements will apply:

- i) English with a "D" symbol at NSSC O-Level (English as a Second Language);
- ii) Mathematics with a "D" symbol;
- iii) For Higher Diploma in Agriculture: Any two of the following: Biology NSSC O-Level (D symbol or better), Agriculture NSSC O-Level (D symbol or better) or Physical Science (or Chemistry) NSSC O-Level (E symbol or better);
- iv) For Higher Diploma in Natural Resources Management: Any two of the following: Biology NSSC O-Level (D symbol or better), Agriculture NSSC O-Level (D symbol or better), and Physical Science NSSC O-Level (E symbol or better) or Geography NSSC O-Level (E symbol or better);
- v) For Higher Diploma in Animal Health: Any two of the following: Biology NSSC O-

Level (D symbol or better), Agriculture NSSC O-Level (D symbol or better), and Physical Science (or Chemistry) NSSC O-Level (E symbol or better) or Geography NSSC O-Level (E symbol or better); and

vi) Any fifth additional subject.

A.2.1.2 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 Faculty reserves the right to interview candidates before admission.

## A.2.2 UNDERGRADUATE DEGREE PROGRAMMES

A.2.2.1 The University of Namibia General Regulations governing admission of students to first year undergraduate degree programmes shall apply.

A.2.2.2 Notwithstanding the above, candidates wishing to join the following programmes in the Faculty must have obtained the following grades at NSSC Ordinary Level, or its recognized equivalent;

A.2.2.2.1 B Sc in Agriculture (Hons): Candidates must have obtained a "C" symbol in Mathematics and Biology, and at least a "D" symbol in Physical Science, Chemistry or Physics.

A.2.2.2.2 B Sc in Fisheries & Aquatic Sciences (Hons): Candidates must have obtained a "C" symbol in Mathematics and Biology, and at least a "D" symbol in Physical Science, Chemistry or Physics.

A.2.2.2.3 B Sc in Integrated Environmental Science (Hons) and B Sc in Wildlife Management & Ecotourism (Hons): Candidates must have obtained a "C" symbol in Mathematics and Biology, and at least a "D" symbol in Geography, Physical Science, Chemistry or Physics.

A.2.2.2.4 Candidates with a three-year Higher Diploma in Agriculture, Forestry, Natural Resources or Fisheries and Marine/Aquatic Sciences from a recognized and accredited institution may be granted admission to the Faculty's undergraduate degree programmes. Such candidates may be exempted from certain modules in the degree programme provided that equivalent modules were completed with a pass mark of 60% or higher.

A.2.2.3 Admission to the six-year fully-fledged Bachelor of Veterinary Medicine (BVM) Programme requires 30 points from five subjects including a "B" symbol in English, Biology, Mathematics and Physical Science (or Chemistry) at NSSC Ordinary Level or a 3 grade or higher in Mathematics and Physical Science (or Chemistry) at NSSC Higher Level. Candidates with a three-year Higher Diploma in Animal Health or related field with a combined average pass of 70% or higher from a recognized and accredited institution may also be granted admission to the first year the Bachelor of Veterinary Medicine (BVM) degree programme at the discretion of the Faculty.

A.2.2.4 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 Faculty reserves the right to interview candidates before admission.

## A.3 MATURE AGE ENTRY SCHEME FOR UNDERGRADUATE DEGREE AND DIPLOMA PROGRAMMES.

A.3.1 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.3.2 Candidates who, in the opinion of the examiners, merit further consideration, may be called for an oral interview before the final selection is made.

## A.4 CONDUCT OF THE PROGRAMMES

A.4.1 First year B.Sc. students admitted into the Faculty will spend the year at the University's Main Campus. The students will continue with their professional training in the second year at Neudamm or Ogongo Campus.

A.4.2 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.4.3 A student may, with the approval of the Faculty and Department, take modules from other Faculties provided that doing so will not affect his or her programme of study.



A.4.4 The following undergraduate Diploma programmes may be offered:

- Higher Diploma in Agriculture (Ogongo Campus);
- Higher Diploma in Natural Resources Management (Ogongo Campus); and
- Higher Diploma in Animal Health (Katima Mulilo Campus)

A.4.5 The following undergraduate degree programmes may be offered:

- B Sc in Agriculture (Hons) *to be phased out by 2015*;
- B Sc in Agriculture (Agricultural Economics) Hons;
- B Sc in Agriculture (Animal Science) Hons;
- B Sc in Agriculture (Crop Science) Hons;
- B Sc in Agriculture (Food Science & Technology) Hons;
- B Sc in Fisheries & Aquatic Sciences (Hons);
- B.Sc in Integrated Environmental Science (Hons) with the following two options / specializations:
  - Environmental Science; and
  - Forestry.
- B Sc in Wildlife Management & Ecotourism (Hons)
- Bachelor of Veterinary Medicine (BVM) – six-year programme

A.4.6 The following M Sc degree programme may be offered:

- Master of Science in Rangeland Resources Management

## A.5 **DURATION OF STUDY (UNDERGRADUATE PROGRAMMES)**

A.5.1 Subject to the provisions of Faculty Special Regulations the minimum duration of full-time study for a Bachelor's degree shall normally be four years, and that of the Diploma normally three years.

A.5.2 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.

## A.6 **MODULE STRUCTURE AND CODING**

A.6.1 Modules are coded with three alpha codes denoting the field of study as well as the Department under which a module is offered, for example: AEC (Agricultural Economics), ASC (Animal Science), CSC (Crop Science), FAS (Fisheries & Aquatic Sciences), FST (Food Science & Technology), IES (Integrated Environmental Science), WLM (Wildlife Management & Ecotourism).

The three alpha codes are followed by four numeric codes denoting the following:

1 <sup>st</sup> numeric code:	qualification type
2 <sup>nd</sup> numeric code:	NQF level
3 <sup>rd</sup> numeric code:	module size (module type)
4 <sup>th</sup> numeric code:	semester in which the module is offered

## A.7 **FIELD ATTACHMENT REGULATIONS**

A.7.1 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.7.2 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.7.3 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.7.4 Field Attachment will be assessed based on i) written attachment report and ii) an oral presentation.

## A.8 ASSESSMENT

A.8.1 General Examination Regulations as set out in the General Information & Regulations Prospectus shall apply.

A.8.2 Unless otherwise stipulated in these regulations, module assessment for the diploma and undergraduate degree programmes will be as follows:

### DIPLOMA PROGRAMMES

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.

### UNDERGRADUATE DEGREE PROGRAMMES

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 lectures and practicals.

A.8.3 Continuous Assessment will include at least 2 written tests and 1 assignment, including practical reports.

## A.9. MINIMUM REQUIREMENTS FOR RE-ADMISSION INTO THE FACULTY

### A.9.1 HIGHER DIPLOMA PROGRAMMES

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

- 40 credits by the end of the First Year of which 16 credits must be of a non-UNAM core module;
- 100 credits by the end of the Second Year;
- 196 credits by the end of the Third Year;
- 292 credits by the end of the Fourth Year.

### A.9.2 DEGREE PROGRAMMES

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

- 48 credits by the end of the First Year of which 16 credits must be of a non-UNAM core module;
- 120 credits by the end of the Second Year;
- 224 credits by the end of the Third Year;
- 328 credits by the end of the Fourth Year;
- 432 credits by the end of the Fifth Year.

## A.10 ACADEMIC ADVANCEMENT REGULATIONS

A student advances to the following academic year of study when at least 2/3 of the modules of the curriculum for a specific year have been passed. If a student passed only 1/3 of the full curriculum of a specific year, he/she may not register for any modules of the following year. In all cases, pre-requisites for modules have to be passed before a student can proceed to register for modules that require prerequisites.

### A.10.1 DIPLOMA PROGRAMMES

- From Year 1 to 2:  
At least 88 credits by the end of the First Year, including a pass in Biology (ASC 2401);
- From Year 2 to 3:  
At least 212 credits by the end of the Second Year.

### A.10.2 DEGREE PROGRAMMES

- From Year 1 to 2:  
At least 96 credits by the end of the First Year, including passes in Introduction to Biology (BLG 3511) and Diversity of Life (BLG 3512);
- From Year 2 to 3:  
At least 232 credits by the end of the Second Year;
- From Year 3 to 4:  
At least 364 credits by the end of the Third Year, including all First Year modules.

## A.11 **AWARDING OF DIPLOMAS AND DEGREES**

A.11.1 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.

A.11.2 The diploma or degree Certificate shall be classified in accordance with the provisions of the Academic General Regulations of the University of Namibia.

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

### B.1 CURRICULUM

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	
ACA 2400	Farm Duties I	4	8	C	
Total Credits Semester 1			72		
<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	
ACA 2400	Farm Duties I	4	8	C	
Total credits Semester 2			60		
<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
ACA 2500	Farm Duties II	5	8	C	None
Total Credits Semester 1			60		
<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
ACA 2500	Farm Duties II	5	8	C	None
Total credits Semester 2			64		
<b>TOTAL CREDITS YEAR 2</b>			<b>124</b>		
<b>Year 3 Semester 1</b>					
ACA 2600	Special Study	6	8	C	ACSC2582 (Introduction to Research)
ACA 2601	Field Attachment	6	8	C	None
AAEC	Principles of Agricultural	6	8	C	None

2641	Extension				
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
Total Credits Semester 1			68		
Year 3 Semester 2					
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
Total credits Semester 2			68		
TOTAL CREDITS YEAR 3			132		
TOTAL PRGOGRAMME CREDITS			388		

## B.2 MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### ULEG 2410: ENGLISH FOR GENERAL COMMUNICATION

**Module title:** ENGLISH FOR GENERAL COMMUNICATION

**Code:** ULEG 2410

**NQF Level:** 4

**Contact hours:** 4 hours per week for 28 weeks

**Credits:** 32

**Module Assessment:** Continuous Assessment (60%): 4 reading tests, 4 writing tests, 2 oral presentations, 1 literature worksheet. Examination (40%): 1x3 hour paper

**Pre-requisites:** None

**Module description (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

**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 description:** 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.

**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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## CSI 3580 CONTEMPORARY SOCIAL ISSUES

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<b>Module Title:</b>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code:</b>	<b>CSI 3580</b>
<b>NQF:</b>	5
<b>Credits:</b>	8
<b>Prerequisite:</b>	None

### Module Description:

***This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives.*** In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership.

### Aims of the Course:

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability,

Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

### Learning Outcomes:

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

## **Assessment Strategies:**

### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (100%), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

## **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

## **Course Content:**

Following six (6) broad themes shall be covered:

### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

### **Ethics:**

Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

### **Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

**Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

**PART B: COURSE SPECIFICATION****Course Title: MATHEMATICS AND BASIC STATISTICS**

<b>Course Code</b>	AAEC 2411
<b>NQF Level</b>	4
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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

**Course Aims**

This modules develops a student's understanding of concepts in the general branches of mathematics. It also introduces students to statistical theory in preparation for research methodology courses

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Carry out simple arithmetic calculations
2. Solve linear and quadratic equations
3. Express and solve geometric and trigonometric relationships
4. Carry out simple analysis of data

**Course 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.

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

**Course Title: BIOLOGY**

<b>Course Code</b>	AASC 2431
<b>NQF Level</b>	4
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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

**Course Aims**

This module develops a student's understanding of plant, animal and microbial biology as a basis for agricultural science



**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Demonstrate understanding of the molecular basis of life
2. Describe plant structure and function
3. Describe animal anatomy and function
4. Carry out taxonomic classification of plants, animals and micro-organisms
5. Demonstrate understanding of basic laws of heredity
6. Describe ecological cycles
7. Demonstrate understanding of agroecosystems

**Course 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.

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

<b>Course Title: FARM DUTIES I</b>	
<b>Course Code</b>	AACA 2400
<b>NQF Level</b>	4
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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
<b>Course Aims</b>	
This module develops a student's skills and attitudes regarding general farm duties. It gives the student practical exposure to all farm operations taking place on the University Farm	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. be competent in driving a tractor and operating tractor-drawn implements and equipment
2. be competent in handling and training draft animals
3. be competent in milking dairy animals and in the storage of dairy products
4. be competent with all crop husbandry practices
5. be competent in feeding all categories of farm animals and in ensuring their hygiene and health

**Course 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).

**Assessment Strategies**

Pass or fail grade. Pass with more than 80 % attendance

<b>Course Title: Basic Economics</b>	
<b>Course Code</b>	AAEC2482
<b>NQF Level</b>	4
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course introduces the students to basics concepts in microeconomics and macroeconomics and functioning of the economy.	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Explain the concept of resource scarcity
2. Explain the concepts of demand and supply, production theory, consumer theory and choice under uncertainty
3. Discuss the concept of theory of the firm and differentiate between the market structures
4. Explain the concept of general equilibrium analysis, externalities and public goods
5. Describe Key macroeconomic models, variables and use the theory to predict the movements of the key economic indicators

**Course 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.

**Assessment Strategies**

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

<b>Course Title: PHYSICAL SCIENCE</b>	
<b>Course Code</b>	AASC 2432
<b>NQF Level</b>	4
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours per week lectures; 3 hours practical for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module develops a student's understanding of the basic concepts of physics and chemistry	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. carry out calculations of stoichiometric quantities of chemical reagents and products
2. describe the major groupings of biological compounds and their properties
3. carry out calculations of motion, current, force, power and energy
4. explain the different types of energy and their inter-convention

**Course content:**

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

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

<b>Course Title: ANIMAL ANATOMY, PHYSIOLOGY AND REPRODUCTION</b>	
<b>Course Code</b>	AASC 2422
<b>NQF Level</b>	4
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Describe the anatomy of various categories of livestock and poultry
2. Describe reproductive processes in livestock and poultry
3. Carry out proper dissections of livestock and poultry in order to observe their anatomy
4. Make and stain good histological slides

**Course 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.

**Assessment Strategies**

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

**SECOND YEAR MODULES**

<b>Course Title: FARM DUTIES II</b>	
<b>Course Code</b>	AACA 2500
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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
<b>Course Aims</b>	
This module further develops a student's skills and attitudes regarding general farm duties. It gives the student practical exposure to all farm operations taking place on the University Farm	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. be competent in driving a tractor and operating tractor-drawn implements and equipment
2. be competent in handling and training draft animals
3. be competent in milking dairy animals and in the storage of dairy products
4. be competent with all crop husbandry practices
5. be competent in feeding all categories of farm animals and in ensuring their hygiene and health

**Course 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).

### Assessment Strategies

Pass or fail grade. Pass with more than 80 % attendance

<b>Course Title: Communication and Information Systems</b>	
<b>Course Code</b>	AAEC 2541
<b>NQF Level</b>	5
<b>Notional Hours</b>	8
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
The course exposes students to concept of channels of communication; importance of group dynamics, techniques and different leadership styles	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Explain the importance of communication and main elements of communication process
2. Distinguish appropriate oral and written communication techniques for agricultural work
3. Identify and make use of appropriate communication methods and/ audio visual aids
4. Design communication materials
5. Analyze and Manage conflict and negotiations at work place

### Course 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

### Assessment Strategies

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

<b>Course Title: Financial Management</b>	
<b>Course Code</b>	AAEC 2501
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	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
<b>Course Aims</b>	
The course exposes students to the concepts and tools of financial management and analysis in agribusiness and farming.	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Compile and compare financial statements (balance sheets, income statements and cash flows)
2. Assess viability of planned farm activities and carry out investment analysis
3. Explain the importance of capital in agriculture, time value of money, the concepts of capital structure, leverage and financial risk.
4. Analyse how farmers cope with risk and uncertainty in agriculture
5. Conduct financial planning and feasibility analysis

### Course 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.

### Assessment Strategies

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

<b>Course Title: Introduction to Rural Sociology</b>	
<b>Course Code</b>	AAEC 2521
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	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
<b>Course Aims</b>	
This course provides students with the basic sociological concepts and their application to agricultural and rural development	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Analyse the significance of rural sociology to agricultural extension and rural development as well as different cultures
2. Compare rural and urban communities and the implications of rural urban migration;
3. Discuss role of social institutions in agriculture and rural development; social change, gender analysis
4. Appreciate the importance of indigenous knowledge in research process
5. Discuss the impact of HIV/AIDS on agricultural production

### Course 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.

### Assessment Strategies

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

<b>Course Title: SOIL SCIENCE</b>	
<b>Course Code</b>	ACSC 2581
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
This module aims to develop the student's understanding of soil as a medium for plant growth.	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Recognize and identify different soil texture
2. Describe the basic interaction of soil fertility and plant nutrition
3. Employ soil sampling methods
4. Describe soil water and plant relationships

### Course 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.

### Assessment Strategies

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

<b>Course Title: APPLIED ANIMAL HEALTH</b>	
<b>Course Code</b>	AASC 2551
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 lectures per week; 3 hours practicals for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding of livestock and poultry diseases in Namibia and his/her skills in diagnosing and treating them	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Describe the development and epidemiology of common livestock and poultry diseases in Namibia
2. Discuss common diseases of categories of livestock in Namibia
3. Restrain livestock and obtain disease specimens
4. Correctly administer drugs to livestock and poultry for diagnoses diseases

### Course 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.

### Assessment Strategies

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

<b>Course Title: INTRODUCTION TO RESEARCH</b>	
<b>Course Code</b>	ACSC 2582
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	3 hours lectures per week; 3 hours practicals/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
<b>Course Aims</b>	
This module introduces students to concepts of statistics, agricultural experimentation and social research. It prepares students to analyse experiments and present findings in formats that are understandable to other researchers and the public	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Demonstrate understanding of scientific research methodology
2. Carry out basic statistical calculations
3. Formulate research questions, design data collection methods.

### Course 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.

#### Assessment Strategies

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

<b>Course Title: WORKSHOP TECHNOLOGY, SURVEYING AND FARM STRUCTURES</b>	
<b>Course Code</b>	ACSC 2522
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
This module introduces students to basics of workshop machinery and environment. It also introduces students to the basics of land survey and farm structures	

#### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Apply workshop techniques to make farm machinery components
2. Describe basic surveying techniques
3. Generate and interpret surveying variables
4. Identify building materials for various farm structures
5. Describe procedures for installation of water, electricity and sewerage systems in farm structures

#### Course 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.

#### Assessment Strategies

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

<b>Course Title: VEGETABLE AND FRUIT PRODUCTION</b>	
<b>Course Code</b>	ACSC 2532
<b>NQF Level</b>	5
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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
<b>Course Aims</b>	
This module develops a student's understanding of principles and practices employed in the production of vegetables and fruits.	

#### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Describe climatic and soil conditions required for different fruit and vegetable species
2. Plan, establish and manage a vegetable and fruit nursery
3. Select vegetable cultivars suitable to seasons and locations
4. Explain and practice the different management practices required by different fruit and vegetable species
5. Describe the important aspects of mushroom production

**Course 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.

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

<b>Course Title: CROP PRODUCTION</b>	
<b>Course Code</b>	ACSC 2592
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
This module develops a student's understanding of the principles and practices of field crop production in Namibia	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Distinguish among crop production systems
2. Identify and discuss land preparation methods
3. Describe crop management practices

**Course 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.

**Assessment Strategies**

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

<b>Course Title: APPLIED ANIMAL BREEDING</b>	
<b>Course Code</b>	AASC 2502
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
This module develops a student's understanding of the applications of quantitative genetics to animal breeding	



**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Carry out calculations of gene frequencies and heritability
2. Discuss application of quantitative genetics to livestock improvement
3. Discuss breeding values and their application to livestock and poultry improvement

**Course 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

**Assessment Strategies**

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

**THIRD YEAR MODULES**

<b>Course Title: SPECIAL STUDY</b>	
<b>Course Code</b>	AACA 2600
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	32
<b>Prerequisite</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2
<b>Course Aims</b>	
The Special Study aims to introduce students to basic research skills such as proposal and report writing; oral presentations; data collection and analysis; experimental design.	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Demonstrate basic understanding of statistics
2. Demonstrate research problem solving methodology
3. Demonstrate knowledge and skill of using computers in research report writing
4. Give an oral presentation of a research project and a research report

**Course 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.

**Assessment Strategies**

Research proposal write-up (20 %), presentation of the research proposal in seminar (10 %), presentation of empirical findings in a second seminar (10%), and final report (60 %).

<b>Course Title:</b>	<b>FIELD ATTACHMENT</b>
<b>Course Code</b>	AACA 2601
<b>NQF Level</b>	6
<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
<b>Course Aims</b>	
This module is designed to further expose students to practical experience of actual operations on farms, agro-industries, and research institutions in Namibia	

#### Learning Outcomes/Specific Outcomes

Upon completion of this course, the student should be able to:

1. Demonstrate the attainment of practice-oriented experiences beyond the classroom in executing high quality crop, livestock and poultry management activities
2. Increase interaction with key agronomic role players and/or public service activities designed to enhance food, agricultural and natural resource system

#### Course 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 1<sup>st</sup> and 2<sup>nd</sup> year and again between 2<sup>nd</sup> and 3<sup>rd</sup> year) and the winter recess in the 2<sup>nd</sup> 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.

#### Methods of Facilitation of Learning

The course will be facilitated through the following learning activities:

On-job training and mentorship approach; apply knowledge and concepts through problem solving; 100% attendance and participation; compulsory practicals, seminars and field visits; use and synthesize available materials and other resources; work effectively both individually and in groups; uphold academic integrity; supervisor consultations promoted; evaluate course delivery.

#### Assessment Strategies

Assessment will consist of on-site inspection, a report by the field supervisor and a written report and oral presentation by the student.

<b>Course Title: Principles of Agricultural Extension</b>	
<b>Course Code</b>	AAEC 2641
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	2 hours lectures and 2 hr practical alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course exposes students to concepts, theory and principles of extension, their role and application in agricultural extension and sustainable agricultural development	

#### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Understand the need for extension with particular reference to its role in sustainable agricultural development.
2. Analyse the various methods and approaches to agricultural extension
3. Understanding the elements of diffusion and innovations
4. Understand motivational theory (Maslow's Hierarchy of needs)
5. Plan, design and implement an extension programme

**Course 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

**Assessment Strategies**

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

<b>Course Title: Agricultural Marketing and Policy</b>	
<b>Course Code</b>	AAEC 2661
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	2 lectures per week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
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	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Define basic agricultural marketing concepts and principles
2. Describe approaches and functions of marketing
3. Explain pricing methods, alternatives and strategies for agricultural products
4. Perform food supply chain analysis
5. Discuss the importance of government policy intervention in agricultural marketing and the impact of international agricultural trade policies

**Course content:**

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, futures 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.

**Assessment Strategies**

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

<b>Course Title: INTENSIVE ANIMAL PRODUCTION</b>	
<b>Course Code</b>	AASC 2681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact Hours</b>	03 Lecture hours / week for 14 weeks; 03 Practical hours / weeks alternating for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory

<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course develops the students' understanding of pig, dairy and poultry production.	

**Learning Outcomes:**

*Upon successful completion of this module, students should be able to:*

1. Discuss the management of pigs, dairy cattle and poultry for profitable production.
2. Outline the selection criteria of breeding animals.
3. Describe the methods used to assess product quality.
4. Incubate eggs and discuss the incubation of eggs confidently.
5. Process meat.

**Course Content:**

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

**Assessment Strategies**

Continuous Assessment: 60 % (2x assignments + 2 tests + at least 5 marked practicals); Exam: 40% (1 x 2 hr paper)

<b>Course Title: WATER MANAGEMENT AND SOIL CONSERVATION</b>	
<b>Course Code</b>	ACSC 2601
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	2 lectures per week, 3 hours practical alternate weeks for 14 weeks
<b>Prerequisite</b>	ACSC 2581 Soil Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course develops a student's understanding of irrigation crop water requirements and the process of soil erosion	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Identify and describe the different types of erosion in Namibia and their control
2. Describe sources, storage, uses and quality of water in Namibia
3. Identify types of irrigation methods and the suitability of land for irrigation
4. Determine crop water requirements
5. Describe the determination of irrigation application rate and scheduling

**Course 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 of 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)

<b>Course Title: RANGE MANAGEMENT</b>	
<b>Course Code</b>	AASC 2691
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
This course aims to develop 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.	

1. Upon successful completion of this module, students should be able to:
2. Construct modes of plant succession using known models & theories.
3. Demonstrate how you would successfully establish cultivated pastures.
4. Identify range plants and, discuss their roles on range, proneness to defoliation and the conservative grazing management you would adopt for all.
5. Carry out range carrying capacity determination.
6. Advise producers on rangeland rehabilitation.

#### Course 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.

#### Assessment Strategies

Continuous Assessment: 60% (2x assignments + 2 tests + at least 5 marked practicals); Exam: 40% (1 x2 hr paper)

<b>Course Title: Project Management</b>	
<b>Course Code</b>	AAEC 2602
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
The course exposes students to principles and applications of project planning and management in agriculture.	

#### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Describe the project cycle and management concepts
2. Identify and formulate plans of sound agricultural projects among alternative development opportunities which are likely to accelerate economic development most rapidly;
3. Identify project benefits and target groups and weaknesses and risks and provide remedial measures
4. Use economic and financial analysis techniques to evaluate projects.
5. Manage and monitor agricultural projects.

#### Course 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.

#### Assessment Strategies

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

<b>Course Title: ANIMAL NUTRITION AND FEEDING</b>	
<b>Course Code</b>	AASC 2622
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
This module develops a student's understanding of animal feeds and his/her skills in making feed ratios	

#### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Describe digestibility and metabolism of animal feeds
2. Discuss the nutritional composition of common animal feeds in Namibia
3. Formulate animal feeds using available feedstuffs in Namibia

#### Course 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.

#### Assessment Strategies

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

<b>Course Title: Entrepreneurship</b>	
<b>Course Code</b>	AAEC 2622
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
The course introduces students to the concepts of entrepreneurship	

#### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Explain the characteristics of an entrepreneur, entrepreneurial process and its importance, and role of entrepreneurship in the economy
2. Differentiate types of business organization
3. Discuss major strategic management issues
4. Analyse the major factors in business opportunity identification
5. Carry out feasibility studies/SWOT analysis
6. Prepare a business plan

#### Course 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.

**Assessment Strategies**

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

<b>Course Title: GAME FARMING</b>	
<b>Course Code</b>	AASC 2602
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	2 hours per week lectures; 3 hours practical alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module introduces students to game ranching and conservancy management	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Discuss game management in Namibian conservancies
2. Discuss the suitability of land and climatic environment for game farming
3. Discuss national regulatory policies for game farming

**Course content:**

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.

**Assessment Strategies**

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

<b>Course Title: EXTENSIVE ANIMAL PRODUCTION</b>	
<b>Course Code</b>	AASC 2642
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding cattle ranching, sheep and goat production	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Discuss the management of beef cattle sheep and goats for profitable production.
2. Outline the selection criteria of breeding animals.
3. Describe the methods used to assess product quality.
4. Discuss formation and composition of muscle in beef cattle, sheep and goats

**Course 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.

### Assessment Strategies

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

<b>Course Title: FARM POWER AND MACHINERY</b>	
<b>Course Code</b>	ACSC 2682
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
This module develops a student's understanding of farm power sources and farm machinery	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Identify and explain different sources of farm power
2. Describe the importance and development of draft animal power in Namibia
3. Describe the operation, calibration and maintenance of farm machinery and implements, crop storage, handling and processing equipment.
4. Select farm machinery for specific purposes
5. Identify and describe different drying methods, farm storage and processing of agricultural crops.

### Course 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.

### Assessment Strategies

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

<b>Course Title: CROP PROTECTION</b>	
<b>Course Code</b>	ACSC 2622
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
This course develops a student's understanding of insect pests, nematodes, diseases of plants and their control in an environmentally friendly manner	

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Discuss importance of crop protection
2. Differentiate among crop protection methods and their applications
3. Describe disease incidence, pest and weed infestation and control
4. Collect and classify pests, diseases and weeds of agricultural importance
5. Describe international code of conduct on safe use and distribution of pesticides

### Course 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.

**Assessment Strategies**

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

## C. HIGHER DIPLOMA IN NATURAL RESOURCES MANAGEMENT (Ogongo Campus) [17HDNR]

### C.1 CURRICULUM

Course code	Course name	NQF Level	Credits	Compulsory(C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
ULEG2410	English for General Communication	4	16	C	
UCLC3509	Computer Literacy	5	8	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
AAEC2411	Mathematics and Basic Statistics	4	16	C	
AASC 2431	Biology	4	16	C	
<b>Total Credits Semester 1</b>					<b>64</b>
<b>Year 1 Semester 2</b>					
ULEG2410	English for General Communication	4	16	C	
AIES2402	Nursery Management	4	8	C	
AIES 2422	Plant Taxonomy	4	8	C	
AIES2442	General Ecology	4	8	C	
AAEC2482	Basic Economics	4	12	C	
AASC2432	Physical Science	4	16	C	
<b>Total credits Semester 2</b>					<b>68</b>
<b>TOTAL CREDITS YEAR 1</b>					<b>132</b>
<b>Year 2 Semester 1</b>					
AIES2531	Introduction to Agroforestry	5	16	C	None
AIES2551	Forest and Veld Fire Management	5	16	C	None
AAEC2501	Financial Management	5	8	C	None
AAEC2521	Introduction to Rural Sociology	5	8	C	None
AAEC 2541	Communication and Information Systems	5	8	C	None
ACSC2581	Soil Science	5	12	C	None
<b>Total Credits Semester 1</b>					<b>68</b>
<b>Year 2 Semester 2</b>					
AIES2582	Vegetation Assessment & Monitoring Techniques	5	12	C	None
AIES 2502	Plant Pathology	5	8	C	None
AIES2542	Silviculture	5	8	C	AIES 2402 (Nursery Management)
AIES 2562	Applied Entomology	5	8	C	None
ACSC 2582	Introduction to Research	5	12	C	AAEC 2411 (Basic Mathematics & Statistics)
ACSC 2592	Crop Production	5	12	C	None
<b>Total credits Semester 2</b>					<b>60</b>
<b>TOTAL CREDITS YEAR 2</b>					<b>128</b>
<b>Year 3 Semester 1</b>					
AIES 2651	Natural Resources Policies and Administration	6	16	C	None
AIES 2671	Forest Products & Services	6	16	C	None
AAEC2641	Principles of Agricultural Extension	6	8	C	None
ACSC2601	Water Management and Soil Conservation	6	8	C	AASC 2581 Soil Science
AACA2601	Field Attachment	6	8	C	None
AASC2600	Special Study	6	8	C	ACSC 2582 (Intro to Research)
<b>Total Credits Semester 1</b>					<b>64</b>
<b>Year 3 Semester 2</b>					
AIES 2632	Natural Resource Management	6	16	C	None
AIES 2652	Principles of Wildlife Management	6	16	C	None
AIES 2672	Economics of Natural Resources	6	16	C	None
AAEC2602	Project Management	6	8	C	None
A ASC2600	Special Study	6	8	C	AASC 2582(Introduction to Research)
<b>Total credits Semester 2</b>					<b>64</b>
<b>TOTAL CREDITS YEAR 3</b>					<b>128</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>388</b>

**FIRST YEAR MODULES****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 description (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>	<b>CLC3509</b>
<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 description:** 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.

**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.

**CSI 3580 CONTEMPORARY SOCIAL ISSUES**

<b>Module Title:</b>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code:</b>	<b>CSI 3580</b>
<b>NQF:</b>	5
<b>Credits:</b>	8
<b>Prerequisite:</b>	None

**Module Description:**

*This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives. In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership.*

**Aims of the Course:**

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability,

Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

### **Learning Outcomes:**

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

### **Assessment Strategies:**

#### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (**100%**), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

#### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

#### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

### **Course Content:**

Following six (6) broad themes shall be covered:

**Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

**Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

**Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

**Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

**Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

<b>Course Title: MATHEMATICS AND BASIC STATISTICS</b>	
<b>Course Code</b>	AAEC 2411
<b>NQF Level</b>	4
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours lectures per week; 2 hours tutorials per week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Course 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.

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

<b>Course Title: BIOLOGY</b>	
<b>Course Code</b>	AASC 2431
<b>NQF Level</b>	4
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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

**Course 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.

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

<b>Course Title: PHYSICAL SCIENCE</b>	
<b>Course Code</b>	AASC 2432
<b>NQF Level</b>	4
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours per week lectures; 3 hours practical per week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Course content:**

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

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment); Examination 40% (1 x 3 hour paper)

<b>Course Title: Basic Economics</b>	
<b>Course Code</b>	AAEC2482
<b>NQF Level</b>	4
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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

**Course 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.

### Assessment Strategies

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

COURSE TITLE: NURSERY MANAGEMENT	
Code	AIES 2402
NQF level	4
Notional Hours	80
NQF Credits	8
Contact hours	2 hours of lectures per week, 3 h practicals alternate week
Prerequisites	None
Compulsory/Elective	Compulsory
Semester offered	2

### Course content

Introduction to silviculture. Forest nurseries. Types of forest nurseries: permanent, temporary, satellite and flying nurseries. Selection of nursery site. Seedlings growing media. Seed technology: history of seed production, forecasting seed yield, seed collection and extraction, seed testing, computation of seeds requirements and seed storage. Seed sowing. Vegetative propagation: definition, types and techniques of vegetative propagation. Nursery tending operation. Nursery protection. Seedling distribution. Nursery records. Nursery planning, work organization and administration.

### Assessment strategies

Continuous assessment 60% (minimum 2 tests, 2 assignments, 5 assessed practicals); Examination 40% (1 x 2 hour theory paper).

COURSE TITLE: PLANT TAXONOMY	
Code	AIES 2422
NQF level	5
Notional Hours	80
NQF Credits	8
Contact hours	2 hours of lectures per week, 3 h practicals per week
Prerequisites	General Biology
Compulsory/Elective	Compulsory
Semester offered	2

### Course content

Introduction to botanical concepts and plant anatomy. Plant taxonomy; classification and nomenclature. Plants identification; trees, shrubs and herbs. Botanical keys; types and use. Major plant families in Namibia and Specimen collection; Fabaceae (3 sub-families), Euphorbiaceae, Rubiaceae, Combretaceae.

### Assessment strategies

Continuous assessments 60% (minimum 2 tests, 4 assessed practical and 1 assignment); Examination 40% (1 x 2 hour theory paper).

COURSE TITLE: GENERAL ECOLOGY	
Code	AIES2442
NQF level	4
Notional Hours	80
NQF Credits	8
Contact hours	2 hours of lectures per week, 3 h practicals alternate week
Prerequisites	
Compulsory/Elective	Compulsory
Semester offered	2

### Course content

Introduction to ecology: Concepts of ecology. Ecosystems of arid zones: terrestrial, freshwater and marine. Biomes of Southern Africa: physical and climatic characteristics. Constituents of the ecosystem: Biotic and abiotic components. Nutrient cycles: Food chain, Nitrogen cycle, Phosphorus cycle and carbon cycle. Plant succession and ecosystem disturbance. Ecosystem maintenance/conservation.

### Assessment strategies

Continuous assessments 60% (Minimum 2 tests, 3 practical, 1 assignment); Examination 40% (1x2 hour theory paper).

<b>COURSE TITLE: INTRODUCTION TO AGROFORESTRY</b>	
<b>Code</b>	AIES2531
<b>NQF level</b>	5
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours of lectures per week, 3 hours of practicals per week
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1

#### **Course content**

Introduction to agroforestry: Definition and principles of agroforestry, integrated land-use system, need for agroforestry, cause and consequences of deforestation. Multi-purpose tree species and their uses. Agroforestry systems. Agroforestry establishment techniques; ecological and economic interactions. Indigenous fruit trees. Agroforestry project work. Principles of beekeeping: biology of honeybees, beekeeping management, honey and other bee products. Crop pollination, bee diseases, parasites and poisoning of honeybees and their control.

#### **Assessment strategies**

Continuous assessments 60% (2 tests, 4 practical reports, and 2 assignments); Examination 40% (1 x 3 hours paper).

<b>COURSE TITLE: FOREST AND VELD FIRE MANAGEMENT</b>	
<b>Code</b>	AIES2551
<b>NQF level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours of lectures per week, 3 hours practicals per week
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1

#### **Course content**

Introduction to veld and forest fires: definition of veld and forest fires, significance of veld and forest fires in savanna management, Forest fire and the environment: causes of fires, types of fires, effects of fire, forest fuels, fire behaviour, fire danger rating system, rate of spread, parts of veld and forest fire, classification of veld and forest fires. Fire prevention: community participation in fire prevention, early controlled burning, principles of fire breaks and fire break maintenance, fire protection plan. Fire detection: general detection, organized detection, fire lookout personnel, communication. Fire suppression: Tools, equipment and techniques, phases of fire suppression tactics, basic rules of fire suppression tactics, methods of fire attack, factors affecting choice of attack, principle techniques for fire line construction, fire reports and records. Uses of fire in forest and range management: protective tool, land clearing, grazing, other uses. Fire control organization: functions of fire control section, personnel and their specific duties, the Government and other stakeholders. Safety and survival methods: general safety measures, accident prevention, fire fighting safety rules, dangerous situations, welfare of the fire fighting crew.

#### **Assessment strategies**

Continuous assessment 60% (minimum 2 tests, 1 assignment, 2 graded practical, 1 field trip report, 1 fire management plan). Examination 40% (1 x 3 hourstheory paper).

<b>Course Title: Introduction to Rural Sociology</b>	
<b>Course Code</b>	AAEC 2521
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	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



**Course 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.

**Assessment Strategies**

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

<b>Course Title: Communication and Information Systems</b>	
<b>Course Code</b>	AAEC 2541
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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

**Course 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

**Assessment Strategies**

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

<b>Course Title: Financial Management</b>	
<b>Course Code</b>	AAEC 2501
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	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

**Course 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.

**Assessment Strategies**

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

<b>Course Title: SOIL SCIENCE</b>	
<b>Course Code</b>	ACSC 2581
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
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**Course 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.

**Assessment Strategies**

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

<b>COURSE TITLE: VEGETATION ASSESSMENT AND MONITORING TECHNIQUES</b>	
<b>Code</b>	AIES2582
<b>NQF level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	3 hours of lectures per week, 2 hour practicals per week
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

**Course content**

Introduction to vegetation assessments and inventory. Vegetation assessment: sampling: line transects, plot sampling: circular plots and quadrats; diversity indices; designs; result reporting. Forest mensuration systems, concepts and models. Tree measurement: measurement and computation of tree characteristics. Stand measurement. Inventories in large forest areas: Use Natural resource assessment methods to quantify and monitor changes in natural resources; Introduction to the use of Geographic Information System (GIS) tool for natural resource assessment.

**Assessment strategies**

Continuous assessments 60% (minimum 2 tests, 3 assessed practical, 1 inventory report); Examination 40% (1x2 hour theory paper).

<b>COURSE TITLE: PLANT PATHOLOGY</b>	
<b>Code</b>	AAIES 2502
<b>NQF level</b>	5
<b>Notional Hours</b>	8
<b>Contact hours</b>	2 hour of lectures per week, 3 hour practicals alternate week
<b>NQF Credits</b>	8
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

**Course content**

Introduction to Plant Pathology. Non-infectious agents: Biology and diseases. Infectious agents: Biology and diseases. Concept of disease development. Disease identification. Diseases caused by fungi, bacteria and viruses. Common plant diseases in Namibia. Beneficial microorganisms. Disease prevention and control (management practices). Plant diseases and trading of plants and plant products.

**Assessment strategies**

Continuous assessments 60% (Minimum 2 tests, 4 graded practical reports, and 2 assignments). Examination 40% (1 x 2 hours paper).

<b>COURSE TITLE: SILVICULTURE</b>	
<b>Code</b>	AIES2542
<b>NQF level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	2 hour of lectures per week, 3 hour practicals alternate week
<b>Prerequisites</b>	AIES 2402: Nursery Management
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

**Course content**

Introduction: definitions and concepts, importance of establishing and tending of trees and forests. Land preparation methods. Forest establishment techniques. Weeding operations. Pruning operation. Thinning operation: reasons for thinning, thinning intensity and timing, thinning regimes, methods of thinning. Introduction to silvicultural systems: forms and composition of stands. Factors affecting the selection of a silvicultural system. Indigenous knowledge methods and their role in tending and management of indigenous trees and forests for better growth.

**Assessment strategies**

Continuous assessments 60% (2 tests, 4 practical reports, and 2 assignments); Examination 40% (1 x 3 hours paper).

<b>COURSE TITLE: APPLIED ENTOMOLOGY</b>	
<b>Code</b>	AIES 2562
<b>NQF level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	2 hour of lectures per week, 3 hour practicals alternate week
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

**Course content**

Introduction to Applied Entomology. General insect biology. Insect classification. Insects as pests. Assessment of insect population dynamics. Damage caused by insects/pests. Insects/pests in Namibian Forests. Beneficial insects. Preventive and control measures. Integrated pest management. Pests and trading of plants and plant products.

**Assessment strategies**

Continuous assessments 60% (Minimum 2 tests, 3 graded practical, and 1 assignment); Examination 40% (1 x 2 hour theory paper)

<b>Course Title: INTRODUCTION TO RESEARCH</b>	
<b>Course Code</b>	ACSC 2582
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	3 hours lectures per week; 3 hours practicals/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

**Course 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 schedule 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.

**Assessment Strategies**

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

<b>Course Title: CROP PRODUCTION</b>	
<b>Course Code</b>	ACSC 2592
<b>NQF Level</b>	5
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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

**Course 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.

**Assessment Strategies**

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

**THIRD YEAR MODULES**

<b>COURSE TITLE: NATURAL RESOURCE POLICIES AND ADMINISTRATION</b>	
<b>Code</b>	AAIES2651
<b>NQF level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hour of lectures per week, 3 hour practicals alternate week
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

**Course content**

Definition of terms: Principal legislation, Subsidiary legislation, Act, policy, law, work plan. Objectives and strategies of formulating the policy. Introduction to the provisions of natural resources policies, laws and international conventions (emphasis Nature Conservation Act, Mining, Forest Act, Environmental Management Act and land reform acts; UN Conventions relating to natural resource conservation). Provision of natural resource regulations and procedures. Natural Resource policies and politics: Case studies from Namibia. Indigenous laws of Namibia related to environment conservation.

**Assessment strategies**

Continuous assessments 60% (minimum of 2 tests, 2 practical reports, and 2 assignments); Examination 40% (1 x 3 hours theory paper).

<b>COURSE TITLE: FOREST PRODUCTS AND SERVICES</b>	
<b>Code</b>	AAIES 2671
<b>NQF level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours of lectures per week, 3 hours practicals per week
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1

**Course content**

**INTRODUCTION:** definitions of forests and related landscapes, wood forest products, non-wood forest products (NWFPs) and services; Contribution of forest products and services to local, national and international economy and trade.

**FOREST PRODUCTS:** Wood products harvesting techniques, extraction methods and processing in Namibia and in the world with special references to wood products in Namibia such as (fuelwood, charcoal and other wood energy, industrial round wood, sawn wood, pulpwood, particles and other industrial roundwood, fencing and other construction poles, handicrafts and traditional implements); Factors affecting harvesting, transportation system and processing of wood products (economic, social, political and environmental). Consumption rate of selected forest products (fuel wood, poles, etc)

NON-WOOD FOREST PRODUCTS (NWFPs): Contribution to household economy, local economy and food security (animal origin (food, medicine), plant origin (food and medicine), handicrafts, fodder); Factors affecting the development of indigenous natural products (INPs) and trade; Utilization and value addition of selected INPs (Devil's claw, marula fruit, hoodia plant, melons seed, *Ximenia* fruit, etc)

FOREST SERVICES: Eco-tourism, recreation, spiritual and cultural uses; Environmental services: environmental protection of fragile ecosystems (drylands and uplands), combating desertification, watershed management, climate change (carbon sequestration), and biodiversity conservation.

#### Assessment strategies

Continuous assessments 60% (Minimum of 2 tests, 4 graded practical reports, and 2 assignments); Examination 40% (1 x 3 hours theory paper).

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

#### Course 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 of 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)

<b>Course Title: Principles of Agricultural Extension</b>	
<b>Course Code</b>	AAEC 2641
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	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

#### Course 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

#### Assessment Strategies

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

<b>Course Title:</b>	<b>FIELD ATTACHMENT</b>
<b>Course Code</b>	AACA 2601
<b>NQF Level</b>	6
<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

#### Course 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 1<sup>st</sup> and 2<sup>nd</sup> year and again between 2<sup>nd</sup> and 3<sup>rd</sup> year) and the winter

recess in the 2<sup>nd</sup> 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.

#### Assessment Strategies

Assessment will consist of on-site inspection, a report by the field supervisor and a written report and oral presentation by the student.

<b>Course Title: SPECIAL STUDY</b>	
<b>Course Code</b>	AACA 2600
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	2 hours per week for 28 weeks
<b>Prerequisite</b>	ACSC 2582: Introduction to Research
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

#### Course 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.

#### Assessment Strategies

Research proposal write-up (20 %), presentation of the research proposal in seminar (10 %), presentation of empirical findings in a second seminar (10%), and final report (60 %).

<b>COURSE TITLE: NATURAL RESOURCES MANAGEMENT</b>	
<b>Code</b>	AAIES 2632
<b>NQF level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours of lectures per week, 3 hours practicals per week
<b>Prerequisites</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Course content

Introduction: definition and approaches; community, natural resources, resource integration and planning. Rural development and rural livelihood strategies. Natural resource management; Processes and procedures for community forestry, conservancy initiative formations. Policy and strategy frames relevant to community forestry and conservancies; Conflict management over natural resource use. Integrated natural resource management plan; concept and approaches, components and their interactions (land, water, forests, water, non-wood products and services). Methods and processes for integrated natural resource management plan formulation for water, rangelands and forests. Evaluation and monitoring methods for integrated natural resource management plan.

#### Assessment strategies

Continuous assessments 60% (minimum 2 tests, 4 practical reports, and 2 assignments); Examination 40% (1 x 3 hours theory paper).

<b>COURSE TITLE: PRINCIPLES OF WILDLIFE MANAGEMENT</b>	
<b>Code</b>	AAIES 2652
<b>NQF level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours of lectures per week, 3 hours practicals per week
<b>Prerequisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1

#### Course content

An introduction to basic principles used in the management of wildlife populations, their habitats and their human users. General concepts in: ecological processes; population dynamics and structure; sampling in wildlife; life history

patterns, biotic and abiotic factors structuring wildlife populations and endangered species. Home range and territoriality; coloniality; mating systems; hierarchy. Response of wildlife to humans. Plant-herbivore system. Herbivore-carnivore system. Predation of domestic animals by wild animals. Nutritional ecology (anatomy and physiology; feeding ecology; diet composition and analysis; nutritional value of plants; plant chemicals and toxins; management of toxic plants and affected game; grazing and browsing capacity; mineral deficiencies and supplementary feeding; nutrition in captivity). Animals and their characteristics. Management techniques of wildlife. Rangeland management (principles and practices; inter-relationships between plant species, common range plants, cultivated pastures and fodders). Survey & Monitoring Techniques: atlasing, mapping method, line transect method, point count method, trap-retrap method; biases and errors; environmental variables.

#### Assessment strategies

Continuous assessment: 60% (at least three assessments); Exam: 40% (1 x 3 hr paper)

#### Quality assurance arrangements

- Internal and external moderation of exam papers and scripts,
- Peer review of course outlines and teaching
- Student evaluation
- Regular review of course content
- Effective and efficient supervision and monitoring assignment, tests and exams

<b>COURSE TITLE: ECONOMICS OF NATURAL RESOURCES</b>	
<b>Code</b>	AAIES2672
<b>NQF level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact hours</b>	4 hours of lectures per week, 3 hours practicals alternate week
<b>Prerequisites</b>	AAEC 2482: Basic Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2

#### Course content

Introduction of natural resources economics. Classification of resources. Review of economic principles: scarcity, opportunity and environmental cost, costs of production, types of capital in relation to natural resources., price formation, capital and interest, depreciation. Economic analysis: Investment analysis, productivity, economic efficiency, uncertainty. Economic valuation of natural resources products and services; valuation techniques and surrogate markets; natural resources contribution to the national economy.

#### Assessment strategies

Continuous assessments 60% (minimum of 2 tests, 4 practical reports, and 2 assignments); Examination 40% (1 x 2 hours theory paper).

<b>Course Title: Project Management</b>	
<b>Course Code</b>	AAEC 2602
<b>NQF Level</b>	5
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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

#### Course 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.

#### Assessment Strategies

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

## D. HIGHER DIPLOMA IN ANIMAL HEALTH (17HDAH) – Katima Mulilo Campus

### D.1 CURRICULUM

#### YEAR 1 (136 CREDITS)

##### Semester 1

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
LEG 2410	English for General Communication	4	04/56	0	16		
CSI 3580	Contemporary Social Issues	5	01/14	0	4		
CLC 3509	Computer Literacy	5	02/28	0	8		
VAH 2411	Principles of Biology	4	04/56	42	16		
VAH 2431	Applied Mathematics and Basic Statistics	4	04/56	42	16		
VAH 2401	Fundamentals of Physical Science	4	04/56	42	8		
<b>Total semester 1 credits:</b>					<b>68</b>		

##### Semester 2

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
LEG 2410	English for General Communication	4	04/56	0	16		
VAH 2452	Animal Anatomy	4	04/56	42	16		
VAH 2432	Animal Physiology	4	04/56	42	16		
CSI 3580	Contemporary Social Issues	5	01/14	0	4		
VAH 2422	Basic Animal Behaviour, Welfare and Health	4	04/56	21	16		
<b>Total Semester 2 credits:</b>					<b>68</b>		

#### YEAR 2 (128 CREDITS)

##### Semester 1

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
VAH 2501	Basic Veterinary Parasitology	5	02/28	21	8	VAH 2411	
VAH 2551	Infectious Diseases I	5	04/56	42	16	VAH 2411	
VAH 2511	Animal Nutrition	5	04/56	42	16		
VAH 2531	Basic Pharmacology and Toxicology	5	04/56	42	16	VAH 2432	
VAH 2521	Legislation and Jurisprudence	5	02/28	0	8		
VAH 2580	Veterinary Paraprofessional Skills	5	01/14	0	4		
<b>Total semester 1 credits:</b>					<b>68</b>		

##### Semester 2

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
VAH 2502	Infectious Diseases II	5	02/28	21	8		VAH 2551
VAH 2522	Research Methods	5	02/28	0	8		
VAH 2580	Veterinary Paraprofessional Skills	5	01/14	0	4		
VAH 2542	Introduction to Veterinary Epidemiology	5	02/28	14	8		
VAH 2532	Introduction to Animal Production	4	04/56	42	16		
VAH 2512	General and Systemic Pathology	5	04/56	42	16	VAH 2452; VAH 2432	
VAH 2509	Field Attachment I (Animal Production)	5	2 weeks				
<b>Total semester 2 credits:</b>					<b>60</b>		



**YEAR 3 (132 CREDITS)****Semester 1**

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
VAH 2681	Principles of Veterinary Public Health	6	03/42	21	12	VAH 2512	
VAH 2611	Principles of Herd and Flock Health Management	6	04/56	42	16		
VAH 2631	Special Project	6	07/98		16	VAH 2522	
In addition to the above students in Animal Health option will cover the following modules							
VAH 2601	Animal Health Extension	6	02/28	21	8		
VAH 2651	Veterinary First Aid	6	04/56	42	16		
Students in Laboratory Technologist option will cover the following modules							
VAH 2621	Laboratory Biosafety and Biosecurity	6	02/28	21	8		
VAH 2671	Laboratory Techniques	6	04/56	42	16		
<b>Total semester 1 credits:</b>					<b>68</b>		

**Semester 2: Rotations****I. Animal Health Technician option (AHT)**

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
VAH 2682	Para-Professional Rotations AHT	6	14 weeks		64		
<b>Total semester 2 credits:</b>					<b>64</b>		

**II. Laboratory Technologist option (LT)**

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
VAH 2692	Para-Professional Rotations LT	6	14 weeks		64		
<b>Total semester 2 credits:</b>					<b>64</b>		

**TOTAL PROGRAMME CREDITS: 396**

## E. 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 Faculty 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.

### E.1 CURRICULUM

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>					
CEMA3572	Basic Macroeconomic	5	16	C	
SBLG 3512	Diversity of Life	5	16	C	
SMAT 3512	Pre-calculus	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>
<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		None
					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)
					None
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>
<b>Year 3 Semester 1</b>					
AACA 3701	Field Attachment I*	7	8	C	
ACSE 3781	Agricultural Engineering	7	12	C	None
AAEC 3731	Econometrics	7	16	C	AAEC 3612 (Mathematical Economics & Linear Programming)
AAER 3781	Resource Economics	7	12	C	AAEI 3681 (Intermediate

AAEC 3781	Farm Planning and Management	7	12	C	Microeconomics) None
AAED 3781	Development Economics	7	12	C	None
<b>Total Credits Semester 1</b>					<b>70</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		None
AAEA 3782	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>138</b>
<b>Year 4 Semester 1</b>					
AACA 3801	Field Attachment II	8	8	C	
AAEC 3810	Research Project in Agricultural Economics	8	16	C	AAER 3782 (Research Methodology in 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>62</b>
<b>Year 4 Semester 2</b>					
AAEC 3810	Research Project in Agricultural Economics	8	16		AAER 3782 (Research Methodology in Agricultural Economics)
AAEC 3882	Agricultural Policy Analysis	8	12		None
AAEA 3882	Agric. Business Management	8	12		None
AASC3892	Small Ruminant Production	8	12		None
AAEC 3842	Rural Development	8	8		AAEC 3712 (Agricultural Extension)
<b>Total credits Semester 2</b>					<b>60</b>
<b>TOTAL CREDITS YEAR 4</b>					<b>122</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>532</b>

## E.2 MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### CLC3509 COMPUTER LITERACY

<b>Module title:</b>	<b>COMPUTER LITERACY</b>
<b>Code:</b>	<b>CLC3509</b>
<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 description:** 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.

**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>	<b>ENGLISH COMMUNICATION AND STUDY SKILLS</b>
<b>Code:</b>	<b>LCE3419</b>
<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 description:** 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>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code:</b>	<b>CSI 3580</b>
<b>NQF:</b>	5
<b>Credits:</b>	8
<b>Prerequisite:</b>	None

**Module Description:**

***This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives.*** In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership.

**Aims of the Course:**

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability,

Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

### **Learning Outcomes:**

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

### **Assessment Strategies:**

#### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (**100%**), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

#### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

#### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

### **Course Content:**

Following six (6) broad themes shall be covered:

#### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

#### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

#### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

**Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

**Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

**SBLG 3511: INTRODUCTION TO BIOLOGY**

**Module title:** INTRODUCTION TO BIOLOGY  
**Code:** SBLG 3511  
**Course Equivalent:** Biology 1A  
**NQF level:** 4  
**Contact hours:** 4 lectures/ week for 14 weeks and one 3-hour practical session per week.  
**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.  
**Prerequisites:** NSSC (Biology C or better)  
**Module description (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.

**SMAT 3511: BASIC MATHEMATICS**

**Module name:** BASIC MATHEMATICS  
**Code:** SMAT 3511  
**NQF level:** 5  
**Contact hours:** 4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks  
**Credits:** 16  
**Module Assessment:** Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).  
**Prerequisite:** NSSC Mathematics  
**Module description (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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**BASIC MICROECONOMICS CEMI3571**

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**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 Description:**

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**

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**Module title:** ENGLISH FOR ACADEMIC PURPOSES

**Code:** LEA3519

**NQF level:** 5

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

**Credits:** 16

**Module assessment:** Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral presentation

Examination (40%) : One three hour examination paper

**Prerequisites:** None

**Module description:** 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**

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**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 description (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**

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**Module name:** PRE-CALCULUS  
**Code:** SMAT 3512  
**NQF level:** 5  
**Contact hours:** 4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks  
**Credits:** 16  
**Assessment:** Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).  
**Prerequisite:** NSSC Mathematics

**Module description (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 Description (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, inters- 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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**BASIC MACROECONOMICS****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 Description:**

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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**SECOND YEAR MODULES****PART B: COURSE SPECIFICATION****Course Title: Intermediate Microeconomics**

<b>Course Code</b>	AAEI 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	3 lectures per week for 14 weeks
<b>Prerequisite</b>	CEMI 3571 Basic Microeconomics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1

**Course Aims**

This course exposes students to basic concepts and principles in microeconomics, and provides an essential foundation for higher level agricultural economics courses such as Marketing, Production Economics, and Farm management.

**Learning outcomes:**



Upon completion of this course, the student should be able to:

1. Analyze microeconomic issues and suggest alternative solutions to these issues
2. Evaluate the nature and dynamics of consumers in a market regarding choice, budgeting and preferences
3. Compare and contrast algebraically demand and supply analysis models for consumer and producer behavior
4. Evaluate the notion of consumer equilibrium and utility maximization
5. Discuss the relationship between profit maximization and cost minimization in imperfect markets

**Course 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.

**Assessment Strategies:**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Rural Sociology</b>	
<b>Course Code</b>	AAEC 3691
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	3 lectures per week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course investigates the basic sociological concepts and their application to agricultural progress and rural development	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Understand sociological concept and Analyze the significance of rural sociology to agricultural extension and rural development
2. Compare rural and urban populations and their causes;
3. Analyze different cultures and measure its significance in society
4. Discuss social structure and the role of social institutions in agriculture and rural development;
5. Analyze issues of rural urban migration and environment

**Course 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.

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Financial Management</b>	
<b>Course Code</b>	AAEF 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact Hour</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
<b>Course Aims</b>	
The course exposes students to the concepts and tools of financial management and analysis in agribusiness and farming	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Discuss concepts used in financial management of agribusiness and farming enterprises.
2. Prepare, Analyze and interpret financial statements and ratios and assess profitability, liquidity, solvency and leverage (credit) of enterprises.
3. Understand farm financing by financial institutions.
4. Explain the importance of capital in agriculture, time value of money
5. Explain the concepts of capital structure, leverage and financial risk.

**Course 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).

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Agricultural Communication and Group Dynamics</b>	
<b>Course Code</b>	AAEA 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 lectures per week for 14 weeks; 1 practical for 2 hours alternate week for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course exposes students to concept of channels of communication; importance of group dynamics, techniques and different leadership styles	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Discuss the critical factors and problems of effective communication
2. Explain elements that comprise the process of communication
3. Explain the relevance of ICT in agriculture,
4. Establish good effective oral presentation
5. Understanding group techniques and formation of group and analyse the different behaviour and attitude in a group
6. Analyse different leadership styles

**Course 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;

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Production Economics</b>	
<b>Course Code</b>	AAEC 3682
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	3 lectures per week for 14 weeks and 1 hour of practical/week
<b>Prerequisite</b>	CEMI 3571 Basic Microeconomics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
It introduces students to uses of economic principles in the process of decision making for optimal resource	

**Learning outcomes:**

Upon completion of this Course, students should be able to:

1. Demonstrate an understanding of microeconomic concepts used in agricultural production economics.
2. Determine optimal allocation of resources, and profit maximization.
3. Analyze issues of risk in agriculture and basic production data and
4. Apply appropriate economic tools, concepts to make sound economic decisions.

**Course 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.

**Assessment Strategies**

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

**PART B: COURSE SPECIFICATION****Course Title: Intermediate Macroeconomics**

<b>Course Code</b>	AAEI 3682
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	3 lectures per week for 14 weeks
<b>Prerequisite</b>	CEMA 3572 Basic Macroeconomics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course aims to introduce to students the economic aggregates variables that relates to the national economy as a whole.	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Analyze macroeconomic issues and suggest alternative solutions to these issues
2. Evaluate the efficacy of macroeconomic policies designed to achieve full employment, price stability, and economic growth, equitable distribution of income and healthy balance of payment situation.
3. Formulate macroeconomic policies relating to unemployment (using the Phillip's curve), inflation, and national budgeting,
4. Compare and contrast algebraically IS – LM model and classical and Keynesian economic models
5. Evaluate money and banking, product market and investment proposals in the context of Namibia

**Course 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.

**Assessment Strategies**

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

**PART B: COURSE SPECIFICATION****Course Title: Mathematical Economics and Linear Programming**

<b>Course Code</b>	AEC 3612
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16

<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
<b>Course Aims</b>	
The course provides students with the knowledge of mathematical concepts and tools that are often used for proper understanding of agricultural economics	

#### Learning outcomes:

Upon successful completion of this module, students should be able to:

1. Explain mathematical concepts commonly used to solve problems in agricultural economics.
2. Identify and assess appropriate typical mathematical tools use to solve economic problems.
3. To apply various mathematical tools (matrix algebra, and calculus) to solve problems in agricultural economics and business.
4. Formulate the linear programming models and determine optimal solutions by simplex methods and through use of linear programming computer based software.
5. Interpret the economic meaning of the mathematical solutions.

#### Course 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.

#### Assessment Strategies

Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 3 hour paper)

### THIRD YEAR MODULES

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Field Attachment I</b>	
<b>Course Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>Notional Hours</b>	60
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
This course aims to reinforce classroom work with practical while exposing students to agricultural economics discipline, agriculture and rural development.	

#### Learning Outcomes

Upon successful completion of this module, students should be able to:

1. understand the demand of the work force in the agricultural economics discipline
2. apply knowledge and skills acquired
3. Increase interaction with agro-food industries and other related institutions.

#### 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 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.

#### Assessment Strategies

40% (Class oral presentation); 60% (report write up.)

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Econometrics</b>	
<b>Course Code</b>	AAEC 3731
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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

<b>Course Aims</b>
The course introduces students to basic concepts in econometrics and provides skills to undertake econometric estimation using OLS methods.

**Learning outcomes:**

*Upon successful completion of this module, students should be able to:*

1. Describe the classical linear regression model and its assumptions
2. Formulate and estimate an econometric model using relevant data.
3. Formulate and test hypotheses and interpret results and produce a report.
4. Identify and rectify problems of violations of OLS assumptions in a multiple regression model.
5. Use relevant computer software to do econometric and basic statistical analysis

**Course 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)

**Assessment Strategies**

Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 3 hour paper)

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Resource Economics</b>	
<b>Course Code</b>	AAER 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course exposes students to the concepts of natural resource and environmental economics and how they are applied in agriculture and related fields.	

**Learning outcomes:**

*Upon successful completion of this module, students should be able to:*

1. Apply the principles of economics to identify causes and consequences of natural resource problems in developing and developed countries.
2. Evaluate and identify appropriate environmental and natural resources policy instruments for optimal use of natural resources, under different circumstances.
3. Develop an understanding of the economic valuation tools and valuation techniques used in natural resource economics and management
4. Analyze resource management issues and their relationship to property rights, externalities and discount rate.

**Course 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.

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Farm Planning and Management</b>	
<b>Course Code</b>	AAEC 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course exposes students to essential functions of management (planning, implementation, and control) and skills which are essential to managing, advising, and/ or servicing farm enterprises and other agribusinesses.	

**Learning outcomes:**

Upon completion of this Course, students should be able to:

1. Discuss functions of management and decision-making process of a farm business.
2. Understand and discuss the management principles and concepts to apply in managing a farm business successfully.
3. Formulate, compare and appraise farm financing plans.
4. Identify strategies for dealing with risk and uncertainty in the farm business.
5. Apply budgeting techniques and computer skills to analyze farm enterprise budgets and conduct whole farm planning.

**Course 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.

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Development Economics</b>	
<b>Course Code</b>	AAED 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
This course introduces students to development theories and application to economic problems facing developing countries.	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Identify and describe economic problems facing developing countries.
2. Analyze why some poor nations experienced rapid economic development while others are stuck in poverty.
3. Calculate various measures of income inequality and poverty.
4. Evaluate theories of economic development in terms of their condition and ability to explain observed phenomena.
5. Appreciate the roles of agricultural markets in development.
6. Judge whether increased international trade has been beneficial to developing countries or not.
7. Identify the conditions that may lead to a balance of payment crisis.
8. Analyze the effectiveness of foreign aid on development.

**Course 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.

**Assessment Strategies:**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Research Methodology in Agricultural Economics</b>	
<b>Course Code</b>	AAER 3782
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
This course exposes students to basic concepts of research methodology and the types of research employed in the field of agricultural economics.	

**Learning outcomes:**

Upon completion of this Course, the student should be able to:

1. Apply critical thinking in problem identification and literature review.
2. Understand the research process and be able to apply it in developing a research proposal.
3. Distinguish types of research and sampling methods, and be able to analyze research data and produce a research paper.

**Course Content:**

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

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Agricultural Extension</b>	
<b>Course Code</b>	AAEC 3712
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<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
<b>Course Aims</b>	
The course exposes students to concepts of extension, principles and theories of extension, their role and application in agricultural extension and sustainable agricultural development.	

**Learning outcomes:**

Upon completion of this Course, students should be able to:

1. Assess and evaluate the need for extension and its role in sustainable agricultural development.
2. Analyze the various methods and approaches to agricultural extension
3. Identify workable and effective extension strategies.
4. Understanding the elements of diffusion and innovations
5. Plan and implement an extension activity/service

**Course Content:**

The course explore 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.

### Assessment Strategies

Continuous assessment 40% (minimum 2 tests and 1 assignment); Examination 60% (1 x 3 hour paper)

<b>Course Title: Entrepreneurship</b>	
<b>Course Code</b>	AAEC 3702
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
The course introduces students to the concepts of entrepreneurship	

#### Learning outcomes:

Upon successful completion of this module, students should be able to:

6. Explain the entrepreneurial process, origin and its importance
7. Analyze the characteristics of an entrepreneur and their role in the economy
8. Analyze the major factors in business opportunity identification and how to write a business plan to exploit those opportunities
9. Discuss the concept of Innovation and the source of innovation

#### Course 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).

### Assessment Strategies

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Agricultural Price Analysis and Forecasting</b>	
<b>Course Code</b>	AAEA 3782
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course exposes students to	

#### Learning outcomes:

Upon completion of this Course, students should be able to:

1. Define price, price determination and price discovery
2. Explain the concept of index numbers, price movement trend analysis and least square regression in price forecasting
3. Explain the relationship between data series and cycles
4. Discuss the concept of seasonality
5. Explain the concept of price discovery models and causality



**Course 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.

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Agricultural Marketing</b>	
<b>Course Code</b>	AAEC 3782
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course introduces students to concepts and theory in agricultural marketing and will provide skills required in management of efficient agricultural marketing systems in developing countries.	

**Learning Outcomes:**

At the end of this course students should be able to:

1. Foster an understanding of marketing functions and the complex of food agricultural and food marketing systems.
2. Develop skills on how to apply economic analytical tools to understand the market forces that affect agricultural prices.
3. Appreciate the basics mechanisms of futures markets for hedgers and speculators and learn how these may be used to reduce economic risk.
4. Conduct market research and analyze the internal and marketing environment of a farm or an agribusiness firm for a strategically planned and executed business plan
5. Analyze and develop enhancing skills in managing supply chains for key Namibia's Agricultural Products

**Course 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.

**Assessment Strategies:**

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

**FOURTH YEAR MODULES**

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Field Attachment II</b>	
<b>Course Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>Notional Hours</b>	60
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
This course aims to reinforce classroom work with practical while exposing students to agricultural economics discipline, agriculture and rural development.	

**Learning Outcomes**

Upon successful completion of this module, students should be able to:

1. understand the demand of the work force in the agricultural economics discipline
2. apply knowledge and skills acquired
3. Increase interaction with agro-food industries and other related institutions.

**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 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.

**Assessment Strategies**

40% (Class oral presentation); 60% (report write up.)

**PART B: COURSE SPECIFICATION****Course Title: Research Project in Agricultural Economics**

<b>Course Code</b>	AAEC 3810
<b>NQF Level</b>	8
<b>Notional Hours</b>	320
<b>NQF Credits</b>	32
<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

**Course Aims**

The aim of this course is to develop student's skills in initiating and executing a scientific research project in specific area of Agricultural economics and related fields.

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Develop a research project proposal.
2. Implement a research project; analyze/interpret data and write up
3. Enhanced communications skills: high quality presentations to a wide audience.
4. Carry out supervised scientific project with maturity and a degree of independence.

**Course 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.

**PART B: COURSE SPECIFICATION****Course Title: Project Planning and Management**

<b>Course Code</b>	AAEC 3881
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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

**Course Aims**

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

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Describe the project cycle and management concepts
2. Identify and formulate plans of sound agricultural projects among alternative development opportunities which are likely to accelerate economic development most rapidly;
3. Identify project benefits and target groups and weaknesses and risks and provide remedial measures
4. Identify various types and sources of data (technical) required in project planning and management.
5. Use economic and financial analysis techniques to evaluate projects.
6. Manage and monitor agricultural projects.
7. Use best practices in agricultural project planning and management in order to improve project sustainability.

**Course 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

**Assessment Strategies:**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: International Agricultural Trade</b>	
<b>Course Code</b>	AAEC 3891
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course exposes students to concepts and theories of international agricultural trade and policy for exporting countries and importing countries	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Discuss the rationale for domestic and international trade in agriculture, key concepts and trade theories and their application in agricultural trade.
2. Explain different trade policies for SADC and none SADC countries and emerging issues on trade agreements and regional economic integration.
3. Evaluate the welfare effects of trade policies on exporting and importing nation's economic welfare (consumer welfare, producer welfare, society welfare, government) and gains/losses and dead weight losses thereof.

**Course 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.

**Assessment Strategies:**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Agricultural Policy Analysis</b>	
<b>Course Code</b>	AAEC 3882
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course exposes students to fundamental concepts of policy analysis and the welfare analysis using the partial equilibrium framework.	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Comprehend and apply economic principles to the analysis of agricultural policy issues, food safety, nutrition and food security of developing countries.
2. Assess the macro economic variables which affects the agricultural economy
3. Describe macroeconomic tools that are used to influence those variables
4. Assess the driving forces of commercialization of subsistence agriculture and aspects of contract farming

**Course 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.

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Agribusiness Management</b>	
<b>Course Code</b>	AAEA 3882
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<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
<b>Course Aims</b>	
The course introduces students to the concepts of entrepreneurship and agribusiness formulation	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Explain the agribusiness management process and its importance
2. Perform industry competitive analysis
3. Discuss the process of strategy formulation, implementation and control
4. Discuss strategy implementation and control

**Course 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.

**Assessment Strategies**

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

<b>PART B: COURSE SPECIFICATION</b>	
<b>Course Title: Rural Development</b>	
<b>Course Code</b>	AAEC 3842
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<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
<b>Course Aims</b>	
The course exposes students to theories and issues of rural development and skills to manage rural development projects in developing countries.	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Explain the concept of rural development and its importance in poverty reduction and increasing food security.
2. Evaluate rural development models and strategies and their relevance to local situations.
3. Identify lessons of good practices in order to enhance rural development and sustainable development.
4. Apply knowledge of rural development theories and practices and work as a change agent interdisciplinary teams to support integrated rural development efforts.
5. Plan and manage agricultural projects that are in line with priority rural development programmes.

**Course 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.

**Assessment Strategies:**

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

**SECOND YEAR AGRICULTURAL ECONOMICS MODULES TAUGHT AS SERVICE MODULES TO OTHER DEPARTMENTS:**

<b>Course Title:</b>	<b>PRINCIPLES OF MICROECONOMICS</b>
<b>Course Code</b>	AAEC 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course exposes students to basic concepts and principles in microeconomics, and provides an essential foundation for higher level agricultural economics courses such as Marketing, Production Economics, and Farm management.	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>1. Define basic microeconomics concepts</li> <li>2. Explain the concept of resource scarcity</li> <li>3. Explain concept of demand and supply</li> <li>4. Explain the concept of consumer theory</li> <li>5. Discuss the concept of theory of the firm</li> <li>6. Differentiate between the market structures</li> <li>7. Explain externalities and public goods</li> </ol>	

**Course Content**

The course includes issues such as: introduction to the concept of scarcity, consumer theory, , the theory of the firm under perfect competition, supply and demand, monopoly and other market structures, externalities, and public goods.

**Assessment Strategies**

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals); Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>PRINCIPLES OF MACROECONOMICS</b>
<b>Course Code</b>	AAEC 3692
<b>NQF Level</b>	6
<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>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
The course introduces the students to basics concepts in macroeconomics and functioning of the economy in aggregate	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>1. Define macroeconomics concepts;</li> <li>2. Describe several macroeconomic variables;</li> <li>3. Explain the national accounting models;</li> <li>4. Explain the concept of aggregate demand and aggregate supply (IS and LM curves)</li> <li>5. Use macroeconomic theory to predict the movements of the key economic indicators;</li> <li>6. Evaluate the effectiveness of macroeconomic policy (fiscal and monetary policy)</li> </ol>	

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals); Examination: 60% (01 x 02 hours paper)



## F. B.SC. AGRICULTURE (ANIMAL SCIENCE) HONS [17BSAS]

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by Faculty 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 CURRICULUM

Coursecode	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>
<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
AASC 3681	Introduction to Range Management	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	None
AASC 3612	Biochemistry	6	16	C	SCHM 3532 (Chemistry for Life Sciences)
AASC 3602	Livestock Production Systems	6	8	C	None
ACSC 3691	Agronomy	6	12	C	None
AFST 3602	Food Technology	6	8	C	None
ACSC 3692	Biostatistics	6	12	C	None
<b>Total credits Semester 2</b>					<b>68</b>
<b>TOTAL CREDITS YEAR 2</b>					<b>128</b>
<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 3791	Animal Health	6	12	C	FST 3681 (General Microbiology)
AASC 3741	Game Ranching	7	8	C	None
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	ACSC 3692 (Biostatistics)
AAEC 3712	Agricultural Extension	7	16	C	None
AASF 3702	Feeds and Feeding	7	8	C	AASC 3701 (Animal Nutrition)
AASC 3792	Animal Breeding	7	12	C	AASC 3681 (Genetics)
AAEC3782	Agricultural marketing	7	12	C	None
AAEC 3702	Entrepreneurship	7	8	C	None
<b>Total credits Semester 2</b>					<b>64</b>
<b>TOTAL CREDITS YEAR 3</b>					<b>140</b>
<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		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>544</b>

## F.2. MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### 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 description:** 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.

**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>	<b>ENGLISH COMMUNICATION AND STUDY SKILLS</b>
<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 description:** 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>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code:</b>	<b>CSI 3580</b>
<b>NQF:</b>	5
<b>Credits:</b>	8
<b>Prerequisite:</b>	None

**Module Description:**

*This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives. In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership.*

**Aims of the Course:**

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability,

Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

**Learning Outcomes:**

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

### **Assessment Strategies:**

#### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (100%), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

#### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

#### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

### **Course Content:**

Following six (6) broad themes shall be covered:

#### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

#### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

#### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

**Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

**Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

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**SBLG 3511: INTRODUCTION TO BIOLOGY**

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**Module title:** INTRODUCTION TO BIOLOGY

**Code:** SBLG 3511

**Course Equivalent:** Biology 1A

**NQF level:** 4

**Contact hours:** 4 lectures/ week for 14 weeks and one 3-hour practical session per week.

**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.

**Prerequisites:** NSCC (Biology C or better)

**Module description (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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**Module title:** PHYSICS FOR LIFE SCIENCES I

**Code:** SPHY3501

**NQF level:** 4

**NPSC:** N/A

**Contact hours:** 28 Lectures and 14 Practical Sessions/Tutorials

**Credits:** 8

**Module assessment:** Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.

**Pre-requisites:** None

**Module description (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>	<b>BASIC MATHEMATICS</b>
<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 description (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**

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<b>Module title:</b>	<b>ENGLISH FOR ACADEMIC PURPOSES</b>
<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
<b>Module description:</b>	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>	<b>CHEMISTRY FOR LIFE SCIENCES</b>
<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
<b>Module Description:</b>	

This module is designed for students that have insufficient background in chemistry and for non-chemistry majors. It is an introduction to topics in general and organic chemistry, and biochemistry. The following will be covered:

**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>	<b>PHYSICS FOR LIFE SCIENCES II</b>
<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)

**Credits:** 16  
**Module assessment:** Continuous assessment (50%, Minimum 2 tests, 4 assignments and practical reports) and Examination (50%, 1 x 3-hour paper)  
**Pre-requisites:** NSSC Physical Science  
**Co-Requisites:** SPHY 3401: Physics for Life Sciences I; SMAT3511: Basic Mathematics; SMAT3512: Pre-calculus;  
**Module description (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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#### SBLG 3512: DIVERSITY OF LIFE

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**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 description (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.)***

#### SECOND YEAR MODULES

<b>Course Title:</b>	<b>GENETICS</b>
<b>Course Code</b>	AASC 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 x 1 hour Lectures / week for 14 weeks (42hours); Practicals: 1X 3 hour s /fort weekly for 7 weeks (21 hours)
<b>Prerequisite</b>	Introduction to Biology (BLG 3411)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	To present advanced genetic concepts covering general genetics, with particular emphasis on molecular genetics. Examples are used from different species of eukaryotes and prokaryotes.

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

- Explain the modified Mendelian ratio.
- Apply the principles of inheritance, including multiple allelism, lethal alleles, gene interactions, and sex-linked transmission.
- Discuss the structure, function and variations of chromosomes.
- Discuss the types of mutations, causes and detection methods.
- Describe the molecular structure of DNA and its functional role in encoding genetic material.
- Explain the significance of genetic variations.
- Discuss sex determination in eukaryotic species.
- Describe the basic aspects of the flow of genetic information from DNA to proteins and self-replication.
- Explain basic molecular techniques such as DNA extraction, PCR, DNA sequencing and gene cloning

**Course 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 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.

**Assessment Strategies**

Continuous Assessment: 40% (2 tests + at least 5x marked practicals / assignments).

Exam: 60% (1 x2 hour paper).

<b>Course Title: INTRODUCTION TO RANGE MANAGEMENT</b>	
<b>Course Code</b>	AASC 3691
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>Prerequisite</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course aims to develop the students' understanding, skills and attitude regarding range management through coverage of the following: Namibian range types in the farming areas of Namibia; Overview of the Namibian rangeland resources.	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

- Explain the importance of rangelands to the Namibian economy
- Demonstrate how you would distinguish between various trophic levels.
- Identify range plants and, discuss their roles on range.
- Explain the effect of climate change on the rangelands.
- Explain how farmers can manage their rangelands sustainably.

**Course 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.

### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: BIOCHEMISTRY</b>	
<b>Course Code</b>	AASC 3612
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<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>Prerequisite</b>	Chemistry for Life Sciences (CHM3532)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims:</b> This course is designed to help students gain key concepts of biochemistry of living cells so as to comprehend life process in both plants and animals.	

**Learning outcomes:** Upon completion of this course the student should be able to:

- Describe acids, bases, buffers and P<sup>H</sup>
- Describe the chemical structures and functions of carbohydrates, proteins, lipids, vitamins and coenzymes
- Explain the role of enzymes in biological systems and discuss the factors affecting enzyme activities.
- Describe the concepts of enzyme kinetics, enzyme inhibition and allosterism
- Distinguish between water soluble and fat soluble vitamins and describe the functions of vitamins in animal nutrition
- Discuss catabolic biochemical reactions such as glycolysis, TCA cycle, that take place in living tissues to provide energy in the form of ATP.
- Discuss anabolic biochemical processes such as pentose phosphate pathway and gluconeogenesis
- Describe the glyoxylate cycle in oily seeds
- Describe the more common laboratory tests for determining the presence of sugars, proteins and lipids

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (2 tests + at least 5x marked practicals / assignments).

Exam: 60% (1 x3 hour paper).

<b>Course Title: LIVESTOCK PRODUCTION SYSTEMS</b>	
<b>Course Code</b>	AASC 3602
<b>NQF Level</b>	6
<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>Prerequisite</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course aims to cover the role of livestock and agriculture in the national economy and gives a broad overview of the industry, potentials, competitiveness and constraints.	

#### **Learning outcomes:**

*Upon successful completion of this module, students should be able to:*

- Discuss the different livestock production systems in Namibia.
- Discuss the contribution of the livestock industry to the Namibian economy.
- Explain the influence of nutrition, health, breeding and management on livestock production and productivity.
- Discuss climate and environmental factors affecting productivity.
- Discuss the impact of livestock on the environment, diversity and water resources.
- Show how livestock contribute to sustainability of agricultural production.
- Discuss the challenges facing the livestock industry and strategies to address them.

#### **Course 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

#### **Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals).

Exam: 60% (1 x2 hr paper)

### **THIRD YEAR MODULES**

#### **PART B: COURSE SPECIFICATION**

##### **Course Title: Field Attachment I**

<b>Course Code</b>	AACA 3701
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<b>NQF Level</b>	7
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<b>Notional Hours</b>	60
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<b>NQF Credits</b>	8
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<b>Contact Hours</b>	6 weeks of Field Attachment
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<b>Prerequisite</b>	None
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<b>Compulsory/Elective</b>	Compulsory
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<b>Semester Offered</b>	1 and 2
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##### **Course Aims**

This course aims to reinforce classroom work with practical while exposing students to agricultural economics discipline, agriculture and rural development.

#### **Learning Outcomes**

*Upon successful completion of this module, students should be able to:*

4. understand the demand of the work force in the agricultural economics discipline
5. apply knowledge and skills acquired
6. Increase interaction with agro-food industries and other related institutions.

#### **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 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.

#### **Assessment Strategies**

40% (Class oral presentation); 60% (report write up.)



<b>Course Title: ANIMAL NUTRITION</b>	
<b>Course 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; 03 Practical hours alternate weeks for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module trains students in pertinent animal nutrition concepts and analytical techniques in assessing the feeding value and potential role of animal nutrition in animal production.	

#### **Learning outcomes:**

*Upon successful completion of this module, students should be able to:*

- Discuss the different livestock feed resources in Namibia.
- Describe the major feed nutrients and discuss their importance to livestock.
- Discuss the contribution of feed analysis and evaluation to livestock production.
- Explain the influence of vitamin and mineral nutrition to farm animal.
- Discuss factors affecting nutritive value of feedstuffs.
- Contrast the digestive systems of different livestock species.
- Compare and contrast digestion and absorption of feed in ruminants and non-ruminants.

#### **Course 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.

#### **Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals); Exam: 60% (1 x2 hr paper)

<b>Course Title: ANIMAL HEALTH</b>	
<b>Course 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>Prerequisite</b>	FST 3681 (General Microbiology)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
Students are introduced to concepts pertaining to all livestock types of parasites at a phylum, subphylum, class, family, genera, and species level. The understanding of definitions of parasitism, symbiosis and commensalisms are emphasized, Evolution of parasitism, structural, physiological and behavioral adaptations of parasites are emphasized. Students acquaint themselves with the basic understanding of the relationship between morphology, habitat, distribution, life cycles and modes of transmitting diseases by parasites. Economic and socio-cultural importance in domestic animals and methods of control are discussed.	

#### **Learning Outcomes:**

*Upon successful completion of this module, students should be able to:*

- Describe how environmental factors affect disease outbreaks
- Explain various disease control methods
- Diagnose diseases using various techniques
- Distinguish between infectious and non-infectious diseases of livestock
- Know reservoirs of infection of livestock diseases
- Classify livestock parasites as internal or external
- Describe lifecycles of animal parasites
- Outline the seasonal occurrence of parasitic diseases
- enumerate economic importance of parasitic diseases

- Explain control measures of parasitic diseases
- Describe the distribution of parasitic diseases in Namibia

**Course 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, Demodecosis. Ticks – hard and soft ticks, Lice, Flies, Fleas,

**Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals); Exam: 60% (1 x2 hr paper)

<b>Course Title:</b> Game Ranching	
<b>Course 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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course aim to familiarizes students with Game Ranching issues in Namibia and develops the students' understanding, skills and attitude pertinent to Game Ranching taking into account topics conservation of biodiversity in the rangelands.	

**Learning outcomes**

*Upon successful completion of this module, students should be able to:*

- Manage game animals as sound and economically as possible.
- Conduct out routine practices as found in a game ranch, park or Lodge.
- Demonstrate a thorough comprehension on the importance & establishment of, and the legal requirements for conservancies.
- Relate the game industry in Namibia including role players, functionality, policies, imports and exports to the socio-economic and technological challenges.
- Identify game animals using either physical or non-physical characteristics.

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 10 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: ANIMAL ANATOMY AND PHYSIOLOGY</b>	
<b>Course 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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
Students are introduced to concepts pertaining to the morphology function of the circulatory, respiratory, nervous, skeletal and locomotory systems of farm animals (ruminants, mono-gastric animals, and poultry).	

#### Learning outcomes

Upon successful completion of this module, students should be able to:

- Describe the structures and functions of various body organs and tissues.
- Understand interrelationships between body systems.
- Explain how various body systems are integrated to work as one organism.
- Identify body organs morphologically by visual examination

#### Course 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.

#### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals).

Exam: 60% (1 x3 hr paper)

<b>Course Title: FEEDS AND FEEDING</b>	
<b>Course Code</b>	AASF 3702
<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; 02 Practical hours alternate week for 14 weeks
<b>Co-requisite</b>	Animal Nutrition (AASC 3701)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module trains students in applied feeds and feeding concepts and acquaints students to ways of improving feeding value of low quality feedstuffs.	

#### Learning outcomes:

Upon successful completion of this module, students should be able to:

- Advise producers on different animal feeding regimes.
- Students should be able interpret animal feeding tables and feeding standard values and their use in feed formulation.
- Students should be able to design livestock pen feeding programs that exploit the livestock market.
- Students should also have an understanding of the role of feed formulation and feed manufacturing processes on feed quality in livestock improvement operations.
- Use feeding standards & tables and, predict feed intake of different livestock.
- Advise farmers on best feeding strategies.

#### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals). Exam: 60% (1 x2 hr paper)

### Quality assurance arrangements

- 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

<b>Course Title: ANIMAL BREEDING</b>	
<b>Course Code</b>	AASC 3792
<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; 02 Practical hours alternate week for 14 weeks
<b>Prerequisite</b>	Genetics (AASC 3601)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course aims to equip students with concepts and methods on the application of population and quantitative genetics principles to the genetic improvement of livestock and poultry.	

### Learning outcomes:

*Upon successful completion of this module, students should be able to:*

- Explain key principles in population genetics including Hardy-Weinberg equilibrium, forces that change gene frequencies and their relevance to animal breeding.
- Compute measures of variation and association for variables (mean, variance, standard deviation, coefficient of variation, correlation, regression) from data sets and interpret.
- Describe methods for estimating heritability.
- Discuss principles of selection, sources of information used in selection, aids to selection, multiple trait selection.
- Compute and interpret inbreeding coefficients, relationship coefficients.
- Explain the phenotypic and genotypic effects of inbreeding and heterosis.
- Discuss categories of commercial livestock breeding programmes (straight breeding, rotational crosses, terminal sire systems, combination systems, composites).
- Discuss performance and progeny testing programmes in dairy and beef cattle.
- Discuss current applications of DNA technologies in livestock improvement and the challenges.

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (7 x assignments + 2 tests + 1 written report).  
Exam: 60% (1 x2 hr paper)

**PART B: COURSE SPECIFICATION**

**Course Title: Field Attachment II**

<b>Course Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>Notional Hours</b>	60
<b>NQF Credits</b>	8
<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

**Course Aims**

This course aims to reinforce classroom work with practical while exposing students to agricultural economics discipline, agriculture and rural development.

**Learning Outcomes**

*Upon successful completion of this module, students should be able to:*

4. understand the demand of the work force in the agricultural economics discipline
5. apply knowledge and skills acquired
6. Increase interaction with agro-food industries and other related institutions.

**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 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.

40% (Class oral presentation); 60% (report write up.)

**Course Title: RESEARCH PROJECT**

<b>Course Code</b>	AASC 3810
<b>NQF Level</b>	8
<b>Notional Hours</b>	320
<b>NQF Credits</b>	32
<b>Contact hours:</b>	32 hours
<b>Prerequisite</b>	CSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2

**Course Aims**

The course aims to develop students' ability and skills to carry out an investigation by following the scientific methodology, on an identified research problem. Critical and creative thinking is also enhanced through material search in the library, conducting the experiment or field survey under the guidance of their supervisor(s).

**Learning Outcomes**

*Upon successful completion of this module, students should be able to:*

- Design and report on an experiment in a way that will permit it to be replicated.
- Integrate theory from different courses and use it to solve a practical problem.
- Carry out appropriate statistical analysis using a software package.
- Communicate results of scientific investigation in oral and written reports.
- Write a research proposal of acceptable quality.
- Perform laboratory procedures independently.
- Recommend the appropriate format for presenting and interpretation of results.

**Course Content:** Research based.  
 Methods of facilitation of learning  
 Lectures, written assignments, group work, class discussions and presentations.

**Assessment Strategies**

Continuous Assessment: Continuous assessment 40% (oral presentation) 60% Project write-up

<b>Course Title: RANGE AND PASTURE MANAGEMENT</b>	
<b>Course Code</b>	AASC 3811
<b>NQF Level</b>	8
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course aims to develop 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.	

**Learning outcomes**

*Upon successful completion of this module, students should be able to:*

- Construct modes of plant succession using the known models and theories.
- Demonstrate successful establishment of cultivated pastures.
- Identify range plants and, discuss their roles on range, proneness to defoliation and the conservative grazing management you would adopt for all.
- Determine the carrying capacity of rangelands.
- Advise farmers on rangeland rehabilitation.

**Course 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, C<sub>3</sub> vs. C<sub>4</sub>, 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.

**Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals).  
 Exam: 60% (1 x3 hr paper)

<b>Course Title: BEEF PRODUCTION</b>	
<b>Course 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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course aims to train students in beef cattle production systems, animal selection and breeding, calving and calf management, sound beef cattle husbandry techniques and the marketing of beef cattle.	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

- Carry out animal husbandry practices such as identification, castration, dehorning, vaccination etc.
- Draw up a herd management calendar.
- Outline the slaughter procedure for slaughtering beef cattle.
- Describe carcass classification.
- Discuss strategies for drought management in Namibia.
- Explain livestock and livestock products traceability.

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: POULTRY PRODUCTION</b>	
<b>Course Code</b>	AASC 3821
<b>NQF Level</b>	8
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course develops the students' understanding in poultry feeding, health, housing, general management, breeding and marketing.	
<b>Learning Outcomes:</b>	
Upon successful completion of this module, students should be able to:	
<ul style="list-style-type: none"> <li>• Explain routine management techniques for poultry including feeding, health, general management and breeding.</li> <li>• Describe different housing requirements (floor space, feeder and water space) for poultry.</li> <li>• Discuss feed formulation in broiler and poultry chickens.</li> <li>• Discuss strategies for disease prevention and control and ways to address emerging disease threats e.g. avian influenza.</li> <li>• Discuss aspects of hatchery management.</li> <li>• Discuss recent developments in the Namibian poultry industry.</li> </ul>	

**Course 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.

### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: SMALL RUMINANT PRODUCTION</b>	
<b>Course Code</b>	AASC 3882
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course develops the students' understanding in feeding habits of sheep and goats, grazing management, nutrient requirement of sheep and goats, animal selection and livestock marketing.	

### Learning Outcomes:

Upon successful completion of this module, students should be able to:

- Describe the feeding habits of sheep and goats and manage grazing and feeding operations for profitable farming.
- Determine the nutritional requirements of different classes of sheep and goats at different levels of production.
- Explain the factors that should be considered when selecting breeding and market ready animals.
- Design mating operation schemes of small ruminants to get advantages of early breeding in sheep and goats.
- Conduct the different husbandry techniques such as identification, castration, tail docking, hoof trimming, record-keeping etc.
- Discuss the main aspects of livestock marketing, traceability and animal welfare

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: DAIRY PRODUCTION</b>	
<b>Course Code</b>	AASC 3802
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course aims at training students dairy husbandry and practices to enable them participate effectively in dairy industry development in Namibia so as to improve and increase human nutrition.	

### Learning Outcomes

Upon successful completion of this module, students should be able to:

- Describe the setup of a dairy farm



- Discuss the importance and challenges of the dairy industry
- Discuss lactation physiology
- Explain how milk is formed, let down and the milking process.
- Discuss aspects of dairy husbandry with respect to animal health, feeding and breeding.

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: MEAT SCIENCE</b>	
<b>Course Code</b>	AASM 3882
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course aims to train students in muscle physiology and carcass composition and emphasize the importance on handling meat, preservation, storage as well as public health hazards.	

**Learning outcomes:**

*Upon successful completion of this module, students should be able to:*

- Outline carcass classification for cattle, sheep, goats and chicken.
- Explain the microanatomy of skeletal muscle and its importance in carcasses quality.
- Differentiate normal from abnormal muscle growth and development.
- Process and preserve meat and meat products.
- Develop abattoir hygiene plans that incorporate the knowledge of microbiology, general layout and construction designs, personal hygiene habits, handling of waste and condemned material, pest control, sanitation and meat quality and safety.
- Explain factors affecting meat quality.
- Choose appropriate packaging and storage options for meat and meat products and livestock products
- Discuss public hazards with regard to the consumption of meat.

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 10 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: BIOTECHNOLOGY OF ANIMAL REPRODUCTION</b>	
<b>Course Code</b>	AASB 3882
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact Hours</b>	3 x 1 hour Lectures / week for 14 weeks; 03 Practical hours alternate weeks for 14 weeks
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course aims to develop the students' understanding, skills and attitude regarding modern animal assisted reproduction technologies and procedures	

### Learning outcomes

Upon successful completion of this module, students should be able to:

- Advise producers on techniques for accelerating animal reproduction and selection
- Advise producers on how to shorten the interval between parturitions through synchronization of reproductive cycles and artificial insemination;
- Apply genetic engineering for embryo manipulations enabling a production of multiple offsprings of improved genetic merit;
- Collect, evaluate, process semen and oocytes aimed at *in vitro* fertilization and/or cryopreservation;
- Perform *in vitro* embryo culture, evaluation, grading and either transfer to female recipient or use for scientific purposes

### Course 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;

### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals).

Exam: 60% (1 x2 hr paper)

<b>Course Title: PIG PRODUCTION</b>	
<b>Course Code</b>	AASC 3822
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course aims to introduce students to methods of pig farming in both intensive and extensive systems. It also aims to exposes students to routine management practices performed in pig industries.	

### Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5 marked practicals); Exam: 60% (1 x2 hr paper)

## G. B.SC. AGRICULTURE (CROP SCIENCE) HONS (Ogongo Campus) [17BSCS]

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by Faculty 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.

### G.1 CURRICULUM

Course code	Course name	NQF Level	Credits	Compulsory (C) / Elective (E)	(Co-requisite) / Pre-requisite
<b>Year 1 Semester 1</b>					
ULCE 3419	English for Communication and Study Skills	4	8	C	
UCL 3509	Computer Literacy	5	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	
SMAT 3512	Pre-calculus	5	16	C	
<b>Total credits Semester 2</b>			<b>80</b>		
<b>TOTAL CREDITS YEAR 1</b>			<b>152</b>		
<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
ACSC 3681	Plant Science	6	12	C	None
ACSS 3681	Soil Science for Crop Production	6	12	C	None
ACSC 3691	Agronomy	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
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
ACSC 3692	Biostatistics	6	12	C	None
<b>Total credits Semester 2</b>			<b>64</b>		
<b>TOTAL CREDITS YEAR 2</b>			<b>136</b>		
<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
ACSC 3741	Horticulture I—Vegetables, Herbs and Spices	7	8	C	ACSC 3681 (Plant Science) and ACSC 3691

					(Agronomy)
ACRS 3781	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 3692 (Biostatistics)
ACSC 3702	Crop Ecophysiology	7	8	C	ACSC 3681 Plant Science
ACSC 3722	Crop Handling and Storage	7	8	C	None
ACSC 3742	Farm mechanisation	7	8	C	ACSE 3781 (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>			
<b>Year 4 Semester 1</b>					
ACSC 3810	Research Project	8	16	C	ACSC 3792 (Research Methods)
AACA 3801	Field Attachment II	8	8	C	None
ACSC 3841	Seed Science and Technology	8	8	C	CSC 3681 (Plant Science)
ACSC 3861	Agricultural Entomology	8	8	C	None
ACSC 3881	Soil Fertility and Plant Nutrition	8	12	C	ACSS 3681 (Soil Science for Crop Production)
AAEC 3881	Project Planning and Management		12	C	None
<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	ACSS 3681 (Soil Science for Crop Production)
<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>544</b>

## G.2 MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### 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 description:** 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.

**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>	<b>ENGLISH COMMUNICATION AND STUDY SKILLS</b>
<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 description:** 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>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code:</b>	<b>CSI 3580</b>
<b>NQF:</b>	5
<b>Credits:</b>	8
<b>Prerequisite:</b>	None

**Module Description:**

*This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives. In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership.*

**Aims of the Course:**

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability,

Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

### **Learning Outcomes:**

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

### **Assessment Strategies:**

#### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (100%), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

#### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

#### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

### **Course Content:**

Following six (6) broad themes shall be covered:

#### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

#### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

#### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

**Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

**Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

**SBLG 3511: INTRODUCTION TO BIOLOGY**

**Module title:** INTRODUCTION TO BIOLOGY  
**Code:** SBLG 3511  
**Course Equivalent:** Biology 1A  
**NQF level:** 4  
**Contact hours:** 4 lectures/ week for 14 weeks and one 3-hour practical session per week.  
**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.  
**Prerequisites:** NSCC (Biology C or better)

**Module description (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**

**Module title:** PHYSICS FOR LIFE SCIENCES I  
**Code:** SPHY3501  
**NQF level:** 4  
**NPSC:** N/A  
**Contact hours:** 28 Lectures and 14 Practical Sessions/Tutorials  
**Credits:** 8  
**Module assessment:** Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.  
**Pre-requisites:** None

**Module description (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 career.

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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**Module name:** BASIC MATHEMATICS  
**Code:** SMAT 3511  
**NQF level:** 5  
**Contact hours:** 4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks  
**Credits:** 16  
**Module Assessment:** Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).  
**Prerequisite:** NSSC Mathematics  
**Module description (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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**Module title:** ENGLISH FOR ACADEMIC PURPOSES  
**Code:** LEA3519  
**NQF level:** 5  
**Contact hours:** 4 periods per week for 14 weeks  
**Credits:** 16  
**Module assessment:** Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral presentation  
Examination (40%) : One three hour examination paper  
**Prerequisites:** None  
**Module description:** 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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**Module Title:** CHEMISTRY FOR LIFE SCIENCES  
**Code:** SCHM3523  
**NQF Level:** 5  
**Contact Hours:** 56 hours of lectures, 42 hours of practical sessions.  
**Credits:** 16  
**Module Assessment:** CA: 50% (minimum 3 tests 80%, laboratory component 20%, tutorial assignments 10%). Final Exam: 50%; (1 x 3 hour exam paper)  
**Pre-requisites:** None  
**Module Description:**

This module is designed for students that have insufficient background in chemistry and for non-chemistry majors. It is an introduction to topics in general and organic chemistry, and biochemistry. The following will be covered:

**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>	<b>PHYSICS FOR LIFE SCIENCES II</b>
<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;
<b>Module description (Content):</b>	

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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**SBLG 3512: DIVERSITY OF LIFE**

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<b>Module title:</b>	<b>DIVERSITY OF LIFE</b>
<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)
<b>Module description (Content):</b>	

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, Annelida, 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**

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<b>Module name:</b>	<b>PRE-CALCULUS</b>
<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>Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics
<b>Module description (Content):</b>	

**Module description (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.)*

<b>PART B: COURSE SPECIFICATION:</b>	
<b>Course Title:</b>	<b>PLANT SCIENCE</b>
<b>Course Code</b>	ACSC 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding agricultural botany and plant physiology as a basis for plant production. Concepts covered will form the core understanding to be applied in most of the subsequent modules in agronomy, crop improvement and horticulture	
<b>Learning Outcomes/Specific Outcomes</b>	
On completing the course students should be able to:	
1. Recognize the functions and role of various plant organs	
2. Describe range of physiological processes in plants	
3. Compare and contrast the relationship between plants and their environment	
4. Discuss the environmental factors which influence plant growth and development	

### Course 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.

### Assessment Strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>AGRONOMY</b>
<b>Course Code</b>	ACSC 3691
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks; 03 Practical hours / week for 14 weeks (alternate)
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding the basic principles and practices of field and horticultural crops	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Prepare timely land management practices for optimum crop establishment and growth	
2. Assess factors affecting seeding and stand establishment	
3. Describe major tillage and cultivation practices	
4. Describe cropping systems suitable for different categories of farmers	

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>SOIL SCIENCE FOR CROP PRODUCTION</b>
<b>Course Code</b>	ACSS 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module aims to develop the student's understanding of soil as a medium for plant growth. Concepts covered enhance understanding of soil, land and crop management strategies	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Describe the process of soil formation to appreciate the soil as a triphasic system	
2. Recognize and identify different soil texture	
3. Describe the basic interaction of soil fertility and plant nutrition	
4. Employ soil sampling methods	
5. Describe soil water and plant relationships	

### Course 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

### Assessment Strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>BIOSTATISTICS</b>
<b>Course Code</b>	ACSC 3692
<b>NQF Level</b>	
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 lecture hours / week for 14 weeks; 3 tutorial / practical hours alternate weeks for 14
<b>NQF Credits</b>	12
<b>Prerequisite</b>	SMAT 3511 Basic Mathematics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module introduces students to concepts of statistics and experimentation. It prepares students to design, execute and analyse experiments and present findings in formats that are understandable to other researchers and the public	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Perform calculations in basic statistics and probability	
2. Validate research hypothesis on the basis of statistical inference tools	
3. Demonstrate understanding scientific research methodology	
4. Design experiments, collect data, analyse and interpret	
5. Present statistical data in formats acceptable for scientific writing and public consumption	

### Course 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.

### Assessment Strategies

Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 02 hour examination paper

## THIRD YEAR MODULES

<b>Course Title:</b>	<b>FIELD CROP PRODUCTION</b>
<b>Course Code</b>	ACSC 3791
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks
<b>NQF Credits</b>	12
<b>Prerequisite</b>	ACSC 3681 Plant Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module further develops a student's understanding and skills on soil and crop management that were covered in in general earlier modules. These concepts are given detailed application to specific crops and crop categories	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Interpret environmental conditions for optimum production of field crops	
2. Know the economic importance of field crops to Namibia	
3. Describe limitations to filed crop production in given geographical areas	

### Course 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

### Assessment Strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>AGRICULTURAL ENGINEERING</b>
<b>Course Code</b>	ACSE 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 Lecture hours / week for 14 weeks 02 Practical hours / week for 14 weeks
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding basic agricultural engineering concepts that are relevant in executing crop management practices	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Recognize the different farm machinery and power sources of farm power	
2. Describe the components of an internal combustion engine and their functions	
3. Demonstrate soil and water erosion processes and conservation methods in agriculture	
4. Evaluate the role of irrigation and drainage in crop production	

### Course 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.

### Assessment Strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>HORTICULTURE I—VEGETABLES, HERBS AND SPICES</b>
<b>Course Code</b>	ACSC 3741
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<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
<b>Course Aims</b>	
This module develops a student's understanding of principles and practices employed in the production of vegetables, herbs and practices. Building on concepts presented in earlier modules, the course gives in-depth application of crop and soil management principles to specific crop species and categories of crop species that comprise vegetables, herbs and spices	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>1. Describe the important concepts of nursery cultivation and management</li> <li>2. Describe the cultivation of fruit, leaf, root vegetable crops in relation to soil and climatic requirements and crop management practices</li> <li>3. Evaluate important concepts in suitable hydroponics systems to Namibia, the economic comparative advantages to field production and the management of infrastructure</li> </ol>	

### Course 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.

### Assessment Strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>WEED SCIENCE</b>
<b>Course Code</b>	ACSC 3721
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<b>Contact hours</b>	2 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding of weeds in order to formulate crop management strategies to minimise yield reduction in crops caused by weeds	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>1. Relate the characteristics of weeds to their effects on crop growth</li> <li>2. Identify and classify weed species common in crop producing areas</li> <li>3. Assess weed-crop competition and interference in farms</li> <li>4. Formulate weed control strategies to alleviate weed problems faced by farmers</li> <li>5. Evaluate herbicide selectivity and effects on important weed species</li> </ol>	

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>FIELD ATTACHMENT I</b>
<b>Course Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>Notional Hours</b>	60
<b>Contact hours</b>	6 weeks
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module is designed to expose students to practical experience of actual operations on farms, agro-industries, and research institutions in Namibia	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Demonstrate the attainment of practice-oriented experiences beyond the classroom in executing high quality crop farming activities	
2. Increase interaction with key agronomic role players and/or public service activities designed to enhance food, agricultural and natural resource system.	

### Course 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.

integrity; supervisor consultations promoted; evaluate course delivery.

### Assessment Strategies

Final assessment 100% (Attachment report and Oral Presentation)

<b>Course Title:</b>	<b>PLANT BREEDING</b>
<b>Course Code</b>	ACRS 3781
<b>NQF Level</b>	7
<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>NQF Credits</b>	12
<b>Prerequisite</b>	AASC 3681 Genetics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding of techniques for improvement of crop cultivars and germplasm conservation and utilisation	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Design a breeding nursery for improvement of specific crop traits.	
2. Design breeding strategies of important crops	
3. Discuss importance of plant reproduction systems of important crops	
4. Discuss germplasm assembly, storage and utilisation	

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>RESEARCH METHODS</b>
<b>Course Code</b>	ACSC 3792
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 lecture hours / week for 14 weeks; 3 tutorial hours / practical hours alternate weeks for 14 weeks
<b>NQF Credits</b>	12
<b>Co-requisite</b>	ACSC 3692: BIOSTATISTICS
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module further develops the student's understanding of research concepts that were not covered in Biostatistics and to design, execute, analyse and present research findings.	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>1. Perform calculations with non-parametric data and make statistical inferences</li> <li>2. Design experiments, analyse, interpret and present results</li> <li>3. Design field surveys, collect data, analyse and interpret results</li> <li>4. Utilise computer software in controlled experiments and field survey data analysis</li> <li>5. Evaluate critical results of experiments published in journal articles</li> </ol>	

### Course 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

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>CROP ECOPHYSIOLOGY</b>
<b>Course Code</b>	ACSC 3702
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<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>Pre-requisite</b>	ACSC 3681 Plant Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module develops a student's understanding regarding environmental crop physiology. It advances concepts of plant physiology covered in the Plant Science module and applies them to yield formation in crop plants	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>1. Analyze plant growth based on environmental factors affecting optimum development</li> <li>2. Explain biological nitrogen fixation and its relevance to plant growth</li> <li>3. Assess the effects of abiotic and biotic stresses on crop growth and development</li> <li>4. Identify factors affecting plant growth, fruit development and harvestable yield</li> </ol>	

### Course 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.

#### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>CROP STORAGE AND HANDLING</b>
<b>Course Code</b>	ACSC 3722
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<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>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding post-harvest principles, processing, storage and handling of crops	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Describe the post-harvest system and properties of crops in storage	
2. Illustrate the importance and factors necessary for drying harvested produce before storage	
3. Employ mechanisms for processing cereals, grain legume and horticultural crops, including the management of grain storage structures	
4. Identify the various types of drying methods used for grain and horticultural crops	
5. Assess the threshing and shelling efficiency and accomplishment of grain crops	

#### Course 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

#### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>FARM MECHANISATION</b>
<b>Course Code</b>	ACSC 3742
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<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>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding farm machinery operation applied in the production of crops	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Determine the functional requirements of different farm equipment	
2. Apply the principles of efficient operations of a wide range of agricultural machinery	
3. Compare and contrast primary and secondary tillage systems under various farm power sources	
4. Determine the operational efficiency of various combine harvesters based on cropping objective and	

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

## FOURTH YEAR MODULES

<b>Course Title:</b>	<b>RESEARCH PROJECT</b>
<b>Course Code</b>	ACSC 3810
<b>NQF Level</b>	16
<b>Notional Hours</b>	320
<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
<b>Course Aims</b>	
This module develops a student's capability to carry out independent investigation, namely to plan, execute, analyse and report a research topic	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Demonstrate basic and/or advanced field and laboratory research skills	
2. Demonstrate problem-solving and enhanced communications skills	
3. Demonstrate knowledge and skill of using computers in research	
4. Prepare research results for publication in scientific journals	

### Course 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.

<b>Course Title:</b>	<b>FIELD ATTACHMENT II</b>
<b>Course Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>Notional Hours</b>	60
<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
<b>Course Aims</b>	
This module is designed to further expose students to practical experience of actual operations on farms, agro-industries, and research institutions in Namibia	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Demonstrate the attainment of practice-oriented experiences beyond the classroom in executing high quality crop management activities	
2. Increase interaction with key agronomic role players and/or public service activities designed to enhance food, agricultural and natural resource system	

### Course 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.

<b>Course Title:</b>	<b>SEED SCIENCE AND TECHNOLOGY</b>
<b>Course Code</b>	ACSC 3841
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<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>Pre-requisite</b>	ACSC 3681 Plant Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding seed science and technology concepts. It prepares the student for industrial practice as a seed manager or inspector.	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Apply the principles of crop variety breeding and seed multiplication for economically important crops	
2. Know environmental requirements for seed production	
3. Explain the importance of seed analysis and seed germination on seed production	
4. Describe seed quality control, grading, inspection, packaging and testing measures	

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>AGRICULTURAL ENTOMOLOGY</b>
<b>Course Code</b>	ACSC 3861
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<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>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding insect crop pests and how to manage them to minimise crop damage that results in yield and quality reduction, as well as storage losses	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Identify insect pests of importance to economic crops grown in Namibia	
2. Evaluate insect pest problems and their interactions with host crops	
3. Investigate and alleviate insect pest problems faced by farmers	
4. Describe the internal and external anatomy of a generalized insect	

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>SOIL FERTILITY AND PLANT NUTRITION</b>
<b>Course Code</b>	ACSC 3881
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<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>	ACSS 3681 Soil Science for Crop Production
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding soil fertility and plant nutrition in order to maximise crop growth and yield in both optimal and sub-optimal soil conditions	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Explain the role of major nutrients and their availability for plant nutrition	
2. Analyze the soil condition for plant nutrients and predict plant growth its suitability for plant growth	
3. Work out fertilizer formulas and devise fertilizer application programs for specified crops	

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>HORTICULTURE II—Fruit Crops and Ornamental Plants</b>
<b>Course 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>NQF Credits</b>	12
<b>Pre-requisite</b>	ACSC 3681 Plant Science
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module develops a student's understanding of principles and practices employed in the production of fruits and ornamental plants. Building on concepts presented in earlier modules, the course gives in-depth application of crop and soil management principles to specific crop species and categories of fruit crops, flowers and ornamental plants	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Distinguish between cultivation systems of various fruit and nut crops, stimulant plants, ornamental and landscape plants	
2. Devise appropriate management systems for fruit tree nurseries	
3. Apply pre- and post-harvest technology practices used in commercial horticulture	
4. Explain environmental factors affecting plant growth and development	

5. Select ornamental and landscaping cultivars which are suitable to purpose and location.

### Course 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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>PLANT PATHOLOGY</b>
<b>Course Code</b>	ACSC 3802
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>Contact hours</b>	02 Lecture hours / week for 14 weeks 02 Practical hours / alternate week for 14 weeks
<b>NQF Credits</b>	8
<b>Pre-requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding plant diseases and how to manage them in order to minimise their effects crop yield and quality	
<b>Learning Outcomes/Specific Outcomes</b>	
<ol style="list-style-type: none"> <li>1. Identify fungal, viral and bacterial diseases of economic crops in Namibia</li> <li>2. Formulate a sustainable disease management strategy for a given situation</li> <li>3. Assess crop losses due to diseases</li> <li>4. Conduct correct pesticides application measures</li> <li>5. Operate instruments used in pathology and practice aseptic conditions required in pathology laboratory</li> </ol>	

### Course Content

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.

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>PLANT BIOTECHNOLOGY</b>
<b>Course 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>NQF Credits</b>	8
<b>Pre-requisite</b>	AASC 3681 Genetics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module develops a student's understanding and skills regarding plant biotechnology both for the production of crops with novel methods and to offer effective biosafety advice to policy makers and the public	
<b>Learning Outcomes/Specific Outcomes</b>	
<p>Upon successful completion of this module, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Apply the principles of genetic engineering in plant improvement</li> </ol>	

2. Employ tissue culture technology for crop improvement and propagation purposes
3. Compare and contrast somaclonal variations and hybrids
4. Explain biochemical and molecular markers
5. Discuss application of Bio-safety procedures in Namibia

### Course Content

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.

### Assessment strategies

continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>Course Title:</b>	<b>SOIL CONSERVATION AND IRRIGATION</b>
<b>Course Code</b>	ACSC 3812
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<b>Contact hours</b>	04 Lecture hours / week for 14 weeks 03 Practical hours / week for 14 weeks
<b>NQF Credits</b>	16
<b>Pre-requisite</b>	ACSC 3601 Soil Science for Crop Production
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course develops a student's understanding, skills and attitude regarding soil degradation and conservation as well as use of water in irrigated agriculture and	
<b>Learning Outcomes/Specific Outcomes</b>	
<i>Upon successful completion of this module, students should be able to:</i>	
<ol style="list-style-type: none"> <li>1. Describe sound soil and water management principles to maintain and enhance productivity of agricultural lands</li> <li>2. Describe the erosion processes and suitable erosion control measures and distinguish between the various models of estimating soil loss</li> <li>3. Apply various formulae to determine crop water requirements, irrigation application rates and scheduling</li> <li>4. Design an irrigation project and analytically assess the advantages and disadvantages</li> <li>5. Analytically compare the various methods of drainage of irrigated lands</li> </ol>	

### Course Content

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.

### Assessment Strategies

Continuous Assessment: 40% (1x assignments + 2 tests + at least 3 marked practicals).

Exam: 60% (1 x3 hr paper)

## H. B.SC. AGRICULTURE (FOOD SCIENCE & TECHNOLOGY) HONS [17BSFS]

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by Faculty 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.

### H.1 CURRICULUM

Course Code	Course name	NQF Level	Credits	Compulsory (C) /Elective (E)	(Co-requisite)/Pre-requisites
Year 1 Semester 1					
UCLC 3509	Computer Literacy	5	8	C	None
ULCE 3419	English Communication and Study Skills	4	16	C	None
UCSI 3580	Contemporary Social Issues	5	8	C	None
SBLG 3511	Introduction to Biology	4	16	C	None
SPHY 3501	Physics for Life Sciences I	5	8	C	None
SMAT 3511	Basic Mathematics	5	16	C	None
Total Credits Semester 1					72
Year 1 Semester 2					
ULEA 3519	English for Academic Purposes	5	16	C	None
SCHM 3532	Chemistry for Life Sciences	5	16	C	None
SPHY 3532	Physics for Life Science II	5	16	C	None
SBLG 3512	Diversity of Life	5	16	C	None
SMAT3512	Pre-calculus	5	16	C	None
Total credits Semester 2					80
TOTAL CREDITS YEAR 1					152
Year 2 Semester 1					
AAEC 3681	Principles of Microeconomics	6	12	C	None
AAEC 3691	Rural Sociology	6	12	C	None
AASC 3681	Genetics	6	12	C	None
AAST 3681	General Microbiology	6	12	C	None
AFST 3691	Post-Harvest Technology	6	12	C	None
AAST 3601	Human Nutrition	6	8	C	None
Total Credits Semester 1					68
Year 2 Semester 2					
ACSC 3692	Biostatistics	6	12	C	None
AASC 3612	Biochemistry	6	16	C	SCHM3532 (Chemistry for Life Sciences)
AFST 3682	Fruits and Vegetable Technology	6	12	C	None
AASC 3602	Livestock Production Systems	6	8	C	None
AFST 3602	Food Technology	6	8	C	None
AFST 3692	Food Biotechnology	6	12	C	
Total Credits Semester 2					68
TOTAL CREDITS YEAR 2					136
Year 3 Semester 1					
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 &	7	12	C	FST 3602 (Food

Course Code	Course name	NQF Level	Credits	Compulsory (C) /Elective (E)	(Co-requisite)/Pre-requisites
	Technology				Technology)
Total Credits Semester 1					62
Year 3 Semester 2					
ACSC3792	Research Methods	7	12	C	ACSC3692 (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
Total Credits Semester 2					60
TOTAL CREDITS YEAR 3					122
Year 4 Semester 1					
AFST 3810	Research Project	8	16	C	CSC 3792 (Research Methods)
AACA 3801	Field Attachment II	8	8	C	None
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
Total Credits Semester 1					62
Year 4 Semester 2					
AFST 3810	Research Project	8	16	C	CSC 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)
Total Credits Semester 2					64
TOTAL CREDITS YEAR 4					126
TOTAL CREDITS FOR THE PROGRAMME					536

## H.2 MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### 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 description:** 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.

**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>	<b>ENGLISH COMMUNICATION AND STUDY SKILLS</b>
<b>Code:</b>	<b>LCE3419</b>
<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 description:** 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>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code:</b>	<b>CSI 3580</b>
<b>NQF:</b>	5
<b>Credits:</b>	8
<b>Prerequisite:</b>	None

**Module Description:**

*This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives. In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership.*

**Aims of the Course:**

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability,

Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoked critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

**Learning Outcomes:**

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

#### **Assessment Strategies:**

##### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (100%), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

##### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

##### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

#### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

#### **Course Content:**

Following six (6) broad themes shall be covered:

#### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

#### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

#### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice.

Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

**Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

**Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

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**SBLG 3511: INTRODUCTION TO BIOLOGY**

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**Module title:** INTRODUCTION TO BIOLOGY  
**Code:** SBLG 3511  
**Course Equivalent:** Biology 1A  
**NQF level:** 4  
**Contact hours:** 4 lectures/ week for 14 weeks and one 3-hour practical session per week.  
**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.  
**Prerequisites:** NSCC (Biology C or better)

**Module description (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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**Module title:** PHYSICS FOR LIFE SCIENCES I  
**Code:** SPHY3501  
**NQF level:** 4  
**NPSC:** N/A  
**Contact hours:** 28 Lectures and 14 Practical Sessions/Tutorials  
**Credits:** 8  
**Module assessment:** Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.  
**Pre-requisites:** None

**Module description (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>	<b>BASIC MATHEMATICS</b>
<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 description (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**

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<b>Module title:</b>	<b>ENGLISH FOR ACADEMIC PURPOSES</b>
<b>Code:</b>	<b>LEA3519</b>
<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 description:** 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>	<b>CHEMISTRY FOR LIFE SCIENCES</b>
<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 Description:**

This module is designed for students that have insufficient background in chemistry and for non-chemistry majors. It is an introduction to topics in general and organic chemistry, and biochemistry. The following will be covered:

**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>	<b>PHYSICS FOR LIFE SCIENCES II</b>
<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 description (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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**SBLG 3512: DIVERSITY OF LIFE**

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<b>Module title:</b>	<b>DIVERSITY OF LIFE</b>
<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 description (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**

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<b>Module name:</b>	<b>PRE-CALCULUS</b>
<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>Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

**Module description (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.)*

## SECOND YEAR MODULES

<b>Course Title:</b> POST HARVEST TECHNOLOGY	
<b>Course Code</b>	AFST3691
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course imparts an in depth knowledge on the physiology and biochemical reactions prevalent in agricultural products before and after ripening and harvesting. It familiarizes students with predisposing factors to postharvest losses of common national grains and the possible ways to circumvent these losses.	

### Learning Outcomes:

Upon successful completion of this module, students should be able to

1. Discuss different type of produce and their response to specific postharvest situations
2. Identify main factors causing postharvest losses
3. Contrast between climacteric and non-climacteric / environmental conditions
4. Analysis of the pre-harvest losses
5. Predict transportation spillage
6. Identify all physiological stages of fruits and vegetables
7. discuss developmental stages of growth, maturation, ripening until senescence
8. contrast between CAS and MAP
9. Discuss the effects of primary and secondary processing
10. Discuss the effects of microorganisms and pests
11. Employ postharvest treatments to increase the shelf life of fruits and vegetables
12. Assess the quality of fruits and vegetables.

### Course 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.

### Assessment strategies:

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Exam: 60% (1 x 3 hr paper).

<b>Course Title:</b> GENERAL MICROBIOLOGY	
<b>Course Code</b>	AFST 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>Prerequisite</b>	

<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course provides students with in-depth knowledge about the different groups of microorganisms; growing and controlling microorganisms, their effect to plant human and animal health as well as the environment. It imparts in depth knowledge about the prokaryotic cell external and internal features. It also describes the biology and taxonomy of prokaryotes, eukaryotes, and viruses.	

#### Learning Outcomes:

Upon successful completion of this module, students should be able to:

1. Describe known groups of microorganisms and microscopic particles; and describe the diversity of microbial habitats.
2. Describe methods of prokaryotic taxonomy.
3. Propagate microorganism and identify them on the basis of structure and morphology.
4. Describe and use aseptic and pure culture techniques
5. Demonstrate the ability to control the growth and survival of microorganisms.
6. Describe the mode of feeding, reproduction and habitat of fungi, algae, protozoa and viruses
7. Be able to describe important pathogens of plants and animals and how their importance to the economy in Namibia

#### Course 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.

#### Assessment Strategies

Continuous Assessment 40% (minimum 2 tests, 2 assignments and 4 practicals). Examination: 60% (1 x 2hr paper)

<b>Course Title:</b> HUMAN NUTRITION	
<b>Course Code</b>	AFST 3601
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	Two Lecture hours / week for 14 weeks; 03 Practical hours / week for alternating weeks. Duration of 14 weeks.
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course aims to cover all aspects of food nutrients, digestion, nutrients deficiency disorders & excesses, BMI, BMR & PAL, formulation of balanced ratios, food toxicology, intolerance and allergies and the role of nutrition in respect to HIV/AIDS.	

#### Learning outcomes:

Upon successful completion of this module, students should be able to:

1. Carry out anthropometric measurements, Mass Index (BMI), Basal Metabolic Rate (BMR) and Physical Activity Level (PAL)
2. Determine nutritional disorders resulting from deficiencies and excesses
3. Describe the cause of Blindness, Marasmus, Kwashiorkor, Obesity and other macronutrient deficiencies such as Rickets and Anaemia.
4. Formulate Balanced ration for each group of people
5. Describe methods of preservation of nutrients, causes of food intolerances and allergies.
6. Explain the role of nutrition with respect to HIV/AIDS

#### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals). Exam: 60% (1 x2hr paper)

<b>Course Title:</b> FRUITS AND VEGETABLES TECHNOLOGY	
<b>Course Code:</b>	AFST 3682
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>Prerequisite</b>	NONE
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
The course discloses relevant information on different types of fruits and vegetables; their structure, composition, preservation, processing methods and value addition.	

<b>Learning Outcomes</b>
On completing the course students should be able to: <ol style="list-style-type: none"><li>1. Interpreted the nutritional quality of fruits and vegetables</li><li>2. Discuss the quality of fruits and vegetables for processing</li><li>3. Determine the maturity of the products for harvesting and processing</li><li>4. Discuss the types of products that can be processed from fruits and vegetables</li><li>5. Discuss the methods of preservation that can be used for the products</li><li>6. Discuss the similarities and differences between fruits and vegetables</li><li>7. Discuss the modes of processing suitable for fruits and vegetables</li><li>8. Determine the appropriate preservatives and methods of packaging.</li><li>9. Explain the role of fruits and vegetables in our diets</li><li>10. Discuss the nutrients available in fruits and vegetables and their importance in diet.</li><li>11. Compare the nutritional quality between fruits and vegetables</li><li>12. Differentiate traditional methods of preservation from the modern methods</li><li>13. Determine the appropriate packaging systems for the value added products for distribution.</li></ol>

### Course 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 produces 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).

### Assessment strategies:

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)

<b>Course Title:</b> FOOD TECHNOLOGY	
<b>Course Code</b>	AFST 3602
<b>NQF Level</b>	6
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims:</b>	
The course aims to provide knowledge of available local and exotic technologies and the effect of various processing methods on food quality and nutrition. The course gives an insight into the existing food laws and food quality management systems	

<b>Learning Outcomes:</b> Upon successful completion of this module, students should be able to: <ol style="list-style-type: none"><li>1. Develop plans for teaching</li><li>2. Appreciate the meaning and importance of food technology.</li><li>3. Discuss the importance of food industries in Namibia and the region</li></ol>
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4. Discuss impact of food technology on traditional foods and diets
5. Discuss influence of technology on the culture and civilization on food consumption in Namibia
6. Discuss the implication of population growth on the advancement of food technology.
7. Describe food laws and quality management systems put in place to monitor food safety.
8. Design learning sessions and experiences
9. Explain the role of food technology in maintaining supply of food to world populations
10. Discuss processing and preservation methods used to control spoilages and shelf life of foods
11. Describe methods used in food technology to prevent hazards in foods.
12. Discuss technological methods of converting raw food materials to value added products
13. Discuss issues of attitudes towards food handling, preservation, processing, packaging and distribution.

### Course 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.

### Assessment strategies

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Exam: 60% (1 x 2hr paper)

Course Title: <b>FOOD BIOTECHNOLOGY</b>	
<b>Course Code</b>	AFST 3692
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>Prerequisite</b>	
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
It introduces students to concepts and techniques of recombinant DNA technology and their application to food processing and preservation	
<b>Learning outcomes:</b>	
Upon completion of this Course, students should be able to:	
<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the importance, implications and current trends in food biotechnology</li> <li>2. Demonstrate an understanding of principles and applications of genetic engineering including recombinant DNA techniques ; action and use of restriction enzymes, DNA cloning, into various vectors including yeasts, plasmids and cosmids</li> <li>3. Demonstrate the understanding of gene transfer into microbial, mammalian and plant cells; cell transformation and transfection respectively..</li> <li>4. Discuss the techniques used in microbial synthesis and production techniques; including single cell protein, single cell oil, and antimicrobial substances and cloning.</li> <li>5. Demonstrate an understanding of immobilization, downstream processing, fermentations, and scale up techniques.</li> <li>6. Demonstrate an understanding of the Namibian biosafety legal framework.</li> </ol>	

### Course 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.

### Assessment Strategies

Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 3 hour paper)

### THIRD YEAR MODULES

<b>Course title:</b> FIELD ATTACHMENT 1	
<b>Course code</b>	AACA3701
<b>NQF level</b>	7
<b>Notional hours</b>	60
<b>NQF credits</b>	8
<b>Contact hours</b>	<b>None</b>
<b>Prerequisite</b>	None
<b>Compulsory/elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course Aims:</b> The course exposes students to practical realities in the food processing and food quality control industries.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: 1. Apply skills and techniques acquired from food industry to theories in solving problems once encountered. 2. Describe the demand of the work force in food industries and increase interaction with food industries and other related institutions.
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**Course 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.

**Assessment strategies:**

Final assessment 100% (Attachment report and oral presentation).

<b>Course Title: FOOD CHEMISTRY</b>	
<b>Course Code</b>	AFST 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>Prerequisite</b>	Biochemistry AASC 3612:
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> This course aims to provide students with the in-depth knowledge of the chemical composition of compounds found in food. The role of each component and trace minerals in human nutrition. Functional groups in foods and the effect that various processing methods on macromolecules and trace minerals.	

<b>Learning Outcomes/Specific Outcomes</b> Upon successful completion of this module, students should be able to: 1. Carry out food chemistry tests on foods: 2. Apply appropriate food processing and preservation methods to foods so as ensure food quality. 3. Describe the procedures used in demonstrating the compositional components of the food without using sophisticated modern equipment 4. Analysing for specific food borne pathogens. 5. Explain the roles and functions of water, carbohydrates, amino acids, proteins, lipids, minerals, vitamins
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**Course 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.

**Assessment strategies:**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Exam: 60% (1 x 2hr paper)

<b>Course Title: FOOD MICROBIOLOGY</b>	
<b>Course Code</b>	AFST 3791
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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 s
<b>Prerequisite</b>	General Microbiology AFST 3681:
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> The course raises awareness about the presence of, how to detect and control microorganisms in foods using various processing and preservation techniques	

<p><b>Learning Outcomes/Specific Outcomes</b>  <i>On completing the course students should be able to:</i></p> <ol style="list-style-type: none"> <li>1. Demonstrate understanding of rationale and competency in carrying out microbiological food quality analysis</li> <li>3. Demonstrate the ability to count isolate and identify microorganisms in food sample using both classical and modern methods.</li> <li>4. Demonstrate the ability to use various media to isolate microorganisms from food samples.</li> <li>5. Describe appropriate food processing and preservation methods used to foods ensure food quality.</li> <li>6. Describe the procedures used in demonstrating the general quality of the food without analyzing for specific food borne pathogens.</li> <li>7. Choose the right sampling plan for the particular specific food item.</li> </ol>
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**Course 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.

**Assessment strategies:**

Continuous Assessment: 40% (minimum 2 tests, 1 assignment and 3 practicals). Exam: 60% (1 x 2 hr paper)

<b>Course Title: PRODUCT DEVELOPMENT AND SENSORY EVALUATION</b>	
<b>Course 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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> The course imparts applied knowledge in the design and development of food products that meet discerning consumer requirements. The principles of food processing, food chemistry, nutrition, sensory analysis and product marketing are employed.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: <ol style="list-style-type: none"> <li>1. Discuss the process of new product development</li> <li>2. Apply problem diagnosis for product refinement</li> <li>3. Design and conduct a small consumer study</li> <li>4. Perform market evaluation and identify product market trends</li> <li>5. Evaluate the sensory characteristics, cost and nutritional content of the product.</li> <li>6. Draft product briefings</li> <li>7. Work in a team to apply food science and technology principles to develop a food product.</li> <li>8. Describe the physiological functions and organs involved that enable humans to sense food</li> <li>9. Evaluate how Sensory Evaluation relates to the typical product life cycle</li> <li>10. Plan the steps that need to take place prior administering Sensory Evaluation</li> <li>11. Prepare and deliver screening tests for sensory panel</li> </ol>
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**Course 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.

**Assessment strategies:**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)

<b>Course Title: FOOD PROCESSING TECHNOLOGY</b>	
<b>Course Code</b>	AFST 3791
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>Prerequisite</b>	AFST 3602 Food Technology
<b>Compulsory/Elective</b>	Compulsory

<b>Semester Offered</b>	1
<b>Course Aims</b> This course develops the students understanding of the principles and practices employed in food processing in particular the technologies employed in unit operations common to the food industry.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: 1. Discuss the importance of food processing and preservation; 2. Construct a process flow diagram for the preparation of a food product; 3. Appraise the different unit operations used in the production of food 4. Employ different techniques to increase the shelf life of foods. 5. Assess the quality of a food product
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**Course 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.

**Assessment Strategies:**

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

<b>Course Title: MEAT SCIENCE AND TECHNOLOGY</b>	
<b>Course Code</b>	AFSC 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>Prerequisite</b>	AFST 3602: Food Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> This course informs students about the structure and composition of meat, the effect of methods of handling of meat animals prior to slaughter, the importance of hygiene in the slaughter house, proper slaughter methods and the various products prepared from different parts of a carcass and by various methods of meat processing and preservation.	

<b>Learning Outcomes/Specific Outcomes</b> <i>Upon successful completion of this module, students should be able to:</i> 1. Emphasize on recent developments in the understanding of stress and physical injuries that occur before and during transport to slaughter, during handling at livestock markets, and at the time animals are put-up for slaughter within abattoirs. 2. Discuss factors influencing meat quality 3. Identify the wholesale cuts, retailing of fresh meat and kinds of meat packaging 4. Processing of meat products such as dried meat, cured meet, canned cured meat, uncured/cooked or uncooked/seasoned or unseasoned/ with or without additives 5. Identify all kinds of meat by-products.
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**Course 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.

**Assessment strategies:**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)

<b>COURSE TITLE: FOOD TOXICOLOGY</b>	
<b>Course Code</b>	AFST 3702
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<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>Prerequisite</b>	FST 3781 Food Chemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> This course develops students understanding on the types and methods of analyzing natural poisons occurring in foods.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: <ol style="list-style-type: none"> <li>1. Determine the lethal doses and NOEL for any substances regarded as toxic.</li> <li>2. Describe the application of the relative dose , lethal dose curves and LD50 concepts</li> <li>3. Describe the steps involved in intoxication process in a living body; absorption, translocation, storage, and excretion.</li> <li>4. Perform qualitative and quantitative toxicity tests of food samples</li> <li>5. Differentiate types of toxicity.</li> <li>6. Describe chemical reactions involved in detoxification in living tissues.</li> <li>7. Identify types of toxins associated with various food substances; animal toxins, plant associated toxins, and mycotoxins, heavy metals, pesticides, insecticides, food additives and chlorinated hydrocarbons.</li> <li>8. Discuss various biochemical mechanisms of toxicity.</li> <li>9. Discuss the possible toxic effects of different processing methods on various food items</li> </ol>
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**Course 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.

**Assessment Strategies:**

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

<b>Course Title: FOOD ANALYSIS AND INSTRUMENTATION</b>	
<b>Course Code</b>	AFST 3722
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>Prerequisite</b>	Food Chemistry AFST 3781
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> The course imparts knowledge on techniques, principles and recommended applications regarding sampling, proximate analysis and special analysis for the main components in foods, carbohydrate, protein and fats. It also includes biochemical and instrumental methods including chromatography, spectroscopy and thermal analysis. The principles of chemistry, biochemistry and food chemistry are employed.	
<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: 1. Differentiate between accuracy and precision 2. Describe key terms related to physical and chemical food analysis 3. Discuss the basic principles of food analysis analytical techniques 4. Explain the theory and operation of food analysis instrumentation 5. Evaluate appropriate instrumental procedures to solve a specific food analysis problems 6. Describe the advantages and disadvantages of methods used for food analysis	

**Course 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.

**Assessment strategies:**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)

<b>Course Title: PRINCIPLES OF FOOD ENGINEERING</b>	
<b>Course Code</b>	AFSC 3782
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact Hours</b>	<i>Three hours lectures per week for 14 weeks; 03 hours practical alternate week for 14 weeks.</i>
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> This course introduces the student to concepts of process engineering through the quantitative description of unit operations related to food processing operations.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the module students should be able to:
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1. Predict the input and output process streams of a processing plant using mass and energy balances.
2. Perform thermal process design as well as basic design of heat exchange equipment
3. Determine energy requirements in a fluid flow system
4. Evaluate the efficiency of driers
5. Design basic refrigeration systems using pressure- enthalpy diagrams.

**Course 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.

**Assessment Strategies:**

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

**FOURTH YEAR MODULES**

<b>Course Title: RESEARCH PROJECT</b>	
<b>Course Code</b>	AFST 3810
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Contact Hours</b>	Equivalent to 1 hour per week for 14 weeks.
<b>Prerequisite</b>	ACSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> This course develops the students' ability and skill to conduct a scientific research project in a current topic in the field of food science or processing and communicate the findings through a scientific report.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the module students should be able to: <ol style="list-style-type: none"> <li>1. Formulate a fully-fledged research proposal.</li> <li>2. Explain the rationale behind research, and important components in research</li> <li>3. Organize and undertake data collection</li> <li>4. Analyze the research data using appropriate techniques and interpret the results</li> <li>5. Write a scientific report</li> <li>6. Present the research proposal and research findings.</li> </ol>
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**Course 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.

**Assessment Strategies:**

Oral Presentations 20% (10% x 2 presentations) Project Write-up 80%

<b>Course Title: FIELD ATTACHMENT II</b>	
<b>Course Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>Notional Hours</b>	60
<b>NQF Credits</b>	6



<b>Contact hours</b>	None
<b>Prerequisite</b>	AACA3701: Field Attachment I
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> The course fortifies the practical experience gained the previous year with AFST 3708: Field Attachment I in the farming and agro-industry operations in Namibia.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the module students should be able to: 1. Apply theories to solving problems once encountered in the food industry 2. Describe the demand of the work force in food industries and increase interaction with food industries and other related institutions
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Course 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.

**Assessment strategies:**

Final assessment 100% (Attachment report, oral presentations, and confidential reports by field supervisors).

<b>Course Title: QUALITY MANAGEMENT SYSTEMS</b>	
<b>Course Code</b>	AFST 3841
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Contact hours</b>	Two lectures per week for 14 weeks
<b>Prerequisite</b>	AFST 3602: Food Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> The course develops critical thinking with regard to Quality Management Systems. It enables students to become familiar with international standards such as ISO 9001, ISO/IEC 17025, ISO 22000, Codex Alimentarius and OIE. It also teaches students how to develop quality assurance programmes such as HACCP and Risk assessment and/or analysis.	

<b>Learning Outcomes/Specific Outcomes</b> Upon successful completion of this module, students should be able to: 1. Identify practical elements to food industry staff worldwide for the continuous professional development. 2. Discuss improvements and communicate effectively with policy makers and with colleagues in multi-disciplinary teams. 3. Identify the general requirements for the competency to carry out tests including sampling 4. Select appropriate standards methods, non-standard methods or laboratory-developed methods and validate them before usage 5. Identify international standards for use by laboratories in developing their management systems for quality, administrative and technical operations 6. Compare the effectiveness of different Quality Management Systems for their testing and calibration activities, that includes the principles of ISO 9001, ISO 14000, HACCP, Codex Alimentarius, 7. Discuss Good Manufacturing Practices, personal and good hygiene practices, sanitation and sanitizers
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8. Explain how to develop a HACCP plan through all stages of HACCP plan development. Prompts, process flow diagrams, the principles of the HACCP system, the verification principle, providing examples and suggestions on how to improve on HACCP system

**Course 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.

**Assessment Strategies:**

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

<b>Course Title: DAIRY SCIENCE AND TECHNOLOGY</b>	
<b>Course Code</b>	AFST 3881
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<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>Prerequisite</b>	Food Processing Technology AFSC 3791; Food Microbiology AFST 3791:
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course introduces students to milk production, preservation, collection, transportation to the processing facilities, processing technologies and value addition including quality control and marketing.	

<b>Learning Outcomes/Specific Outcomes</b>
On completing the module students should be able to:
1. Appreciate milk synthesis from the udder of healthy animals, secretion and milk let down by oxytocin.
2. Discuss normal milk composition, colostrum and mastitis milk.
3. Milk preservation methods, collection and transportation to the processing facility.
4. Determine methods of accepting and rejecting low quality milk
5. Determine quality tests for accepting and rejecting milk at the farm and reception sites.
6. Determine methods of milk value addition into cream, butter, pasteurized, sterilized and UHT milks, toned/recombined/reconstituted milk, starter cultures, fermented milk products, cheeses, milk powder, condensed/evaporated milk and ice creams.
7. Determine methods of packaging, storage and distribution of quality products.
8. Discuss hygiene, sanitation, CIP and COP methods of cleaning, HACCP and ISO Standards.
9. Explain the role of milk and milk products in nutrition and diets
10. Formulates methods of processing and calculating ingredients needed for each type of products.
11. Describe basic methods of products processing and actual production of milk commodities.
12. Discuss methods of milk and milk products handling, storage and distribution.
13. Describe methods of products spoilage and causes and methods of controlling spoilages.

**Course 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.

**Assessment strategies:**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper).

<b>Course Title: APPLIED FOOD ENGINEERING</b>	
<b>Course Code</b>	AFST 3891
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Contact hours</b>	Three lectures per week for 14 weeks; 03 hrPractical every alternate week for 14 weeks.
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> This course develops the students understanding of the application of engineering to common food processing operations with specific reference to process and auxiliary equipment.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: 1. Select appropriate processing equipment for operations in food industry; 2. Predict process times for heating and cooling operations; 3. Evaluate suitability and performance of food processing equipment; 4. Appraise process control systems commonly employed in the food processing plants. 5 Discuss current trends of food engineering.
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#### Course 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.

#### Assessment Strategies:

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

<b>Course Title: FOOD PACKAGING, STORAGE AND DISTRIBUTION</b>	
<b>Course Code</b>	AFST 3861
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<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>Prerequisite</b>	AFST 3602 Food Technology; AFST 3791 Post Harvest Technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> The course aims to acquaint students with essentials and importance of packaging, functions of packaging, types of packaging and their chemical and physical effects on food. The course also covers the importance of packaging in preservation, transportation, labeling and marketing aspects.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: 1. Appreciate the meaning and importance of food packaging 2. Discuss their importance as containment of safe food products 3. Discuss the effects of packaging in food preservation 4. Discuss the types of packaging and methods of manufacturing them.
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5. Describe the characteristics of each type of packaging and their effects on food.
6. Discuss their ability to prevent permeability of water, air and microbes into food.
7. Discuss the role of new packaging technologies to prevent spoilage; aseptic, free-oxygen, oxygen absorbers, gas exchange, vacuum, alcohol generation packaging, labeling and distribution.
- 8 Explain the role of packaging in preservation, containment, marketing and distribution.
9. Identify packaging for different products to prevent physico-chemical effects on foods.
10. Compare each type of packaging and the food they contain for quality maintenance.
11. Discuss the importance of labeling in upholding the right of consumers and marketing.
12. Compare the cost involved in returnable containers versus non returnable's and their advantages and disadvantages.
13. Discuss the types of labeling needed for maximum marketing and consumer information about the products.

**Course 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.

**Assessment strategies**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practical). Examination: 60% (1 x 2hr paper).

<b>Course Title: SEA FOODS TECHNOLOGY</b>	
<b>Course Code</b>	AFST 3862
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<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>Prerequisite</b>	AFST 3602 Food technology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> The course provides students with in depth knowledge and comprehensive understanding of key issues in seafood technology.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the module students should be able to: <ol style="list-style-type: none"> <li>1. Describe the classification of fish and seafood;</li> <li>2. Explain the biological factors affecting processing;</li> <li>3. Discuss the nutritional composition of fish and seafood: protein, fats and oil content, minerals;</li> <li>4. Describe the post mortem changes in fish and seafood;</li> <li>5. Discuss the Microbiology and Microbial Spoilage/ Health Hazards for fish and seafood;</li> <li>6. Describe Quality Assurance, Quality Assessment / Food Safety for fish and seafood;</li> <li>6 .Discuss the harvesting and the handling of fish and seafood;</li> <li>7. Discuss Sanitation, Good Manufacturing practice, personal hygiene, housekeeping and pest control;</li> <li>8. Explain how to develop a HACCP plan through all stages of HACCP plan development. Prompts, process flow diagrams, the principles of the Hazard Analysis Critical Control Points system, the verification principle, providing examples and suggestions on how to design a HACCP verification system;</li> <li>9. Describe cooling mechanisms for fish and seafood and temperature danger zones.</li> </ol>
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**Course 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.

**Assessment strategies:**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2hr paper)

<b>Course Title: CEREAL SCIENCE AND TECHNOLOGY</b>	
<b>Course Code</b>	AFST 3882
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<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>Contact hours</b>	
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> The course provides students with a critical understanding of the science and technologies involved in processing of cereals.	

<p><b>Learning Outcomes/Specific Outcomes</b></p> <p>On completing the course students should be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the structure of cereals such as wheat, corn, rice, barley, sorghum, and pearl millet.</li> <li>2. Explain the characteristics of the starch granule and chemical composition of the starch granule, heating of starch in water, gelling and retrogradation, modified starches, conversion of starch to sweeteners.</li> <li>3. Discuss the structure and classification of protein in cereal, properties of the protein solubility groups, wheat proteins, and proteins in other cereals.</li> <li>4. Describe the minor constituents of cereals e.g. non starchy, polysaccharides, sugars and oligosaccharides, enzymes, vitamins and minerals.</li> <li>5. Explain the storage of cereals, basic types of storage, moisture for safe storage, drying of cereals, aeration, microflora and mycotoxins, insects and rodents.</li> <li>6. Discuss the dry milling of cereals, the milling process, grain cleaning, tempering or conditioning, roller milling, dry corn milling, decortication or attrition milling.</li> <li>7. Describe the malting and brewing processes, steeping, germination, kilning, brewing process: malt, adjuncts, hops, water, yeast, wort boiling, pitching and fermentation, storage and bottling.</li> <li>8. Explain the physical and thermal properties as well as the uses of gluten proteins.</li> <li>9. Discuss Rheology, the use of rheological measurements such as extensigraph and alveograph.</li> <li>10. Describe yeast-leavened products, bread-making systems, dough formation, mixing time, fermentation, moulding, proofing and baking.</li> <li>11. Explain the uses of soft versus hard wheat flours, chemical leavening, cookies, crackers and biscuits.</li> <li>12. Discuss the processing of pasta and noodles, the production process, flour for noodles and noodle-making.</li> <li>13. Describe the processing of breakfast cereals, cereals that require cooking, ready-to-eat cereals, cornflakes, and wheat flakes and puffed cereals.</li> <li>14. Explain the processing of snack foods such as popcorn, masa and its products, pretzels and bagels.</li> </ol>
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**Course 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.

**Assessment strategies**

Continuous Assessment: 40% (minimum 2 tests, 2 assignments and 5 x marked practicals). Examination: 60% (1 x 2 hr paper).

<b>Course Title:</b>	<b>EDIBLE FATS AND OILS TECHNOLOGY</b>
<b>Code:</b>	AFSC 3802
<b>NQF Level:</b>	8
<b>Notional hours</b>	80
<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>Prerequisite</b>	AFST 3781: Food Chemistry
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims:</b> This module develops the students understanding involved in lipid chemistry and the processing of oil crops into edible oil and oil products.	

**Learning Outcomes:**

Upon completion of this module, students should be able to:

1. Describe common sources of fats and oils and their composition;
2. Identify oil seeds and fat sources that are common in Namibia and the region;
3. Discuss the composition of oils derived from animals and common oil seeds;
4. Determine the feasibility of exploiting oil on a small scale basis;
5. Determine chemical, physical and functional properties of edible oil.
6. Articulate the common procedures followed in the production of fats and oils based products.
7. Identify common factors that lead to the deterioration of fats.
8. Assess the nutritional quality of fats and oils products.

**Course 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.

**Assessment Strategies**

Continuous assessment 40% (minimum 2 tests,1 assignment and 4 marked practicals) Examination 60% (1 x 2 hour paper)

<b>Course Title: PLANT EQUIPMENT AND MANAGEMENT</b>	
<b>Course Code</b>	FST 3822
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<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>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> This module develops students understanding, skills, and dispositions regarding issues that are cardinal to the efficient operation and management of processing plants.	

<b>Learning Outcomes/Specific Outcomes</b> On completing the course students should be able to: 1. Select site for food processing plant, design layout for equipment and put in place safety design; 2. Process potable and boiler water and treat waste effluent from the plant; 3. Install simple electrical gadgets and safety monitoring including single and three phases for processing; 4. Employ economical use of steam and refrigeration for food processing and preservation; 5. Design and uphold management structure for efficiency and for viable enterprise.
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**Course 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.

**Assessment Strategies:**

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

## I. B.S.C. FISHERIES AND AQUATIC SCIENCES (HONS) [17BSFA]

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by Faculty 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.

### 1.1 CURRICULUM

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	
SMAT 3512	Pre-calculus	5	16	C	
<b>Total credits Semester 2</b>					<b>64</b>
<b>TOTAL CREDITS YEAR 1</b>					<b>136</b>
<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
AFAS 3691	Aquatic Ecology	6	12	C	None
AFST 3681	General Microbiology	6	12	C	None
AFAS 3601	Ichthyology I	6	8	C	None
<b>Total Credits Semester 1</b>					<b>68</b>
<b>Year 2 Semester 2</b>					
AAEC 3682	Production Economics	6	12	C	None
AFAS 3682	Introduction to Aquaculture	6	12	C	None
ACSC 3692	Biostatistics	7	12	C	SMAT 3511 Basic Mathematics
AASC 3612	Biochemistry	6	16	C	None
AFAS 3692	Aquatic Chemistry	6	12	C	None
AFAN 3682	Natural Resource Economics	6	12	C	None
<b>Total credits Semester 2</b>					<b>76</b>
<b>TOTAL CREDITS YEAR 2</b>					<b>144</b>
<b>Year 3 Semester 1</b>					
AACA 3701	Field Attachment I	7	8	C	None
AFAP 3781	Physical Oceanography	6	12	C	None
AFAS 3781	Aquaculture and Fisheries products	7	12	C	None
AFAS 3791	Ichthyology II	7	12	C	AFAS 3682: Introduction to Aquaculture and AFAS 3602: Ichthyology I
AFAF 3781	Fisheries	7	12	C	AFAS 3602:



	Management I				Ichthyology I and AFAN 3682: Natural Resource Economics
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>					
AFAS 3782	Basic Aquaculture Engineering	7	12	C	AFAS 3682: Intro to Aquaculture, AFAS 3692: Aquatic Chemistry, AFAS 3691: Aquatic Ecology and AFAS 3602: Ichthyology I
AFAS 3792	Fisheries Management II	7	12	C	AFAS 3602: Ichthyology I and AFAN 3682: Natural Resource Economics
AFAS 3712	Integrated Coastal Zone Management	7	16	C	AFAS 3691: Aquatic Ecology
AFAA 3782	Aquaculture Nutrition and Feed Manufacturing	7	12	C	None
ACSC 3792	Research Methods	7	12	C	None
<b>Total credits Semester 2</b>					<b>64</b>
<b>TOTAL CREDITS YEAR 3</b>					<b>132</b>
<b>Year 4 Semester 1</b>					
AFAS 3810	Research Project	8	16	C	ACSC 3692: Biostatistics and ACSC 3792: Research Methods
AFAS 3811	Biological Oceanography	8	16	C	AFAS 3781 Physical Oceanography, and FAS 3692 Aquatic Chemistry
AACA 3801	Field Attachment II	8	8	C	None
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, AFAF 3781: Fisheries Management I and AFAF: 3782 Fisheries Management II
<b>Total Credits Semester 1</b>					<b>68</b>
<b>Year 4 Semester 2</b>					
AFAS 3810	Research Project	8	16	C	ACSC 3692: Biostatistics and ACSC 3792: Research Methods
AENE 3882	Environmental Impact Assessment	8	12	C	AFAS 3712: Integrated Coastal Zone Management
AFAS 3812	Fish Population	8	16	C	ACSC 3692:

	Dynamics				Biostatistics and 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
<b>Total credits Semester 2</b>					<b>60</b>
<b>TOTAL CREDITS YEAR 4</b>					<b>128</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>540</b>

## I.2 MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### 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 description:** 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.

**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

**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 description:** 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

**Module Title:** CONTEMPORARY SOCIAL ISSUES  
**Code:** CSI 3580  
**NQF:** 5  
**Credits:** 8

**Prerequisite:** None

**Module Description:**

*This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives. In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human*

**Aims of the Course:**

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability, sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership. Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

**Learning Outcomes:**

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

**Assessment Strategies:**

❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (100%), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

#### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

#### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

#### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

#### **Course Content:**

Following six (6) broad themes shall be covered:

#### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

#### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

#### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

#### **Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

#### **Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

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### **SBLG 3511: INTRODUCTION TO BIOLOGY**

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<b>Module title:</b>	<b>INTRODUCTION TO BIOLOGY</b>
<b>Code:</b>	SBLG 3511
<b>Course Equivalent:</b>	Biology 1A
<b>NQF level:</b>	4
<b>Contact hours:</b>	4 lectures/ week for 14 weeks and one 3-hour practical session per week.
<b>Credits:</b>	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.

**Prerequisites:** NSCC (Biology C or better)

**Module description (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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**Module title:** PHYSICS FOR LIFE SCIENCES I

**Code:** SPHY3501

**NQF level:** 4

**NPSC:** N/A

**Contact hours:** 28 Lectures and 14 Practical Sessions/Tutorials

**Credits:** 8

**Module assessment:** Continuous Assessment (50%) and 1 x 3-hour Exam Paper (50%). Continuous Assessment will consist of class tests, tutorial tests/assignments and practical reports.

**Pre-requisites:** None

**Module description (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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### H.5.1.6 SMAT 3511: BASIC MATHEMATICS

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**Module name:** BASIC MATHEMATICS

**Code:** SMAT 3511

**NQF level:** 5

**Contact hours:** 4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks

**Credits:** 16

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

**Prerequisite:** NSCC Mathematics

**Module description (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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### H.5.1.7 LEA3519 ENGLISH FOR ACADEMIC PURPOSES

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**Module title:** ENGLISH FOR ACADEMIC PURPOSES

**Code:** LEA3519

**NQF level:** 5

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

**Credits:** 16

**Module assessment:** Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral presentation

Examination (40%) : One three hour examination paper

**Prerequisites:** None

**Module description:** 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>	<b>CHEMISTRY FOR LIFE SCIENCES</b>
<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 Description:**

This module is designed for students that have insufficient background in chemistry and for non-chemistry majors. It is an introduction to topics in general and organic chemistry, and biochemistry. The following will be covered:

**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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**SBLG 3512: DIVERSITY OF LIFE**

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<b>Module title:</b>	<b>DIVERSITY OF LIFE</b>
<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 description (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.

**SMAT 3512: PRE-CALCULUS**

<b>Module name:</b>	<b>PRE-CALCULUS</b>
<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>Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

**Module description (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.)*

**SECOND YEAR MODULES**

<b>Course title: Principles of Microeconomics</b>	
<b>Code:</b>	AAEC 3681
<b>NQF level:</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs)
<b>Notional Hours:</b>	120
<b>NQF Credits:</b>	12
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered:</b>	1
<b>Course Aims:</b> This course exposes students to basic concepts and principles in microeconomics and provides an essential foundation for higher level agricultural economics courses such as Marketing Production Economics and Farm management.	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

1. Define basic microeconomics concepts
2. Explain the concept of resource scarcity
3. Explain concept of demand and supply
4. Explain the concept of consumer theory
5. Explain the concept of choice under uncertainty
6. Discuss the concept of theory of the firm
7. Differentiate between the market structures
8. Explain the concept of general equilibrium analysis
9. Explain externalities and public goods

**Course 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.

**Assessment Strategies**

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

<b>Course title: Rural Sociology</b>	
<b>Code</b>	AAEC 3691
<b>NQF level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs)
<b>Notional Hours</b>	120

<b>NQF Credits</b>	12
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course investigates the basic sociological concepts and their application to agricultural progress and rural development	

**Learning Outcomes:**

At the end of this course the student should be able to:

1. Define basic sociological concepts and theories
2. Analyze the significance of rural sociology to agricultural extension and rural development;
3. Compare rural and urban populations and their causes;
4. Analyze different cultures and measure its significance in society
5. Discuss role of social institutions in agriculture and rural development;
6. Discuss the social structural and origins of inequalities;
7. Analyze issues of rural urban migration and environment;

**Course 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.

**Assessment Strategies**

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

Course Title: Production Economics	
<b>Course Code</b>	AAEC 3682
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	Lectures: 3x 1hr/wk for 14 weeks (42hrs)
<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
<b>Course Aims</b>	
It introduces students to uses of economic principles in the process of decision making for optimal resource allocation and profit maximization in agricultural production	

**Learning outcomes:**

Upon completion of this Course, students should be able to:

7. Demonstrate an understanding of microeconomic concepts used in agricultural production economics.
8. Determine optimal allocation of resources, and profit maximization.
9. Analyze issues of risk in agriculture and basic production data and
10. Apply appropriate economic tools, concepts to make sound economic decisions.

**Course 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.

**Assessment Strategies**

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



<b>Course Title:</b> General Microbiology	
<b>Course Code</b>	AFST 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course provides students with basic concepts about the different groups of microorganisms; growing and controlling microorganisms, their effect to plant human and animal health as well as the environment.	

#### Learning Outcomes:

Upon successful completion of this module, students should be able to:

8. Name known groups of microorganisms and microscopic particles; and describe the diversity of microbial habitats and the factors that affect colonisation of a particular microbial niche by a particular group or subpopulation.
9. Describe methods of prokaryotic taxonomy.
10. Describe the traits used in the classical and numerical taxonomy of prokaryotes.
11. Explain the advantage of the numerical taxonomy over the classical approach.
12. Describe the tools and techniques used under the molecular biology approach.
13. Propagate and identify microorganism through:
14. Aseptic and pure culture techniques
15. Study by visualising microorganisms through microscopy and staining techniques.
16. Appreciate the need and be able to control the growth and survival of microorganisms in the environments and should be able to prepare laboratory media.
17. Describe the different biology and classification systems of fungi, algae, protozoa and viruses different groups of microorganisms..
18. Know important pathogens of plants and animals and how they affect the host.

#### Course 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.

#### Assessment Strategies

Continuous Assessment 40% (minimum 2 tests, 2 assignments and 4 practicals). Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b> Genetics	
<b>Course Code</b>	AASC 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
To present advanced genetic concepts with particular emphasis on molecular genetics. Examples are used from different species of eukaryotes and prokaryotes.	

**Learning outcomes:**

Upon successful completion of this module, students should be able to:

1. Explain the modified Mendelian ratio.
2. Discuss the structure, function and variations of chromosomes.
3. Describe the molecular structure of DNA.
4. Discuss the types of mutations, causes and detection methods.
5. Explain the significance of genetic variations.
6. Discuss sex determination in eukaryotic species.
7. Describe the basic aspects of the flow of genetic information from DNA to proteins and self-replication.
8. Explain basic molecular techniques such as DNA extraction, PCR and gene cloning.
9. Describe the applications of genetic engineering in agriculture.

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (2 assignments, 2 tests and at least 5 marked practicals). Examination: 60% (1 x2 hr paper).

<b>Course Title:</b> Biochemistry	
<b>Course Code</b>	AASC 3612
<b>NQF Level</b>	6
<b>Notional Hours</b>	160
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course is designed to help students gain key concepts of biochemistry of living cells so as to comprehend life process in both plant and animals.	

**Learning outcomes:** Upon completion of this course the student should be able to:

- Describe acids, bases, buffers and pH
- Describe the chemical structures and functions of carbohydrates, proteins, lipids, vitamins and coenzymes
- Explain the role of enzymes in biological systems and discuss the factors affecting enzyme activities.
- Describe the concepts of enzyme kinetics, enzyme inhibition and allosterism
- Distinguish between water soluble and fat soluble vitamins and describe the functions of vitamins in animal nutrition
- Discuss catabolic biochemical reactions such as glycolysis, TCA cycle, that take place in living tissues to provide energy in the form of ATP.
- Discuss anabolic biochemical processes such as pentose phosphate pathway and gluconeogenesis
- Describe the glyoxylate cycle in oily seeds
- Describe the more common laboratory tests for determining the presence of sugars, proteins and

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (minimum 2 assignments, 2 tests and at least 5 marked practicals). Examination: 60% (1 x3 hr paper)

<b>Course Title:</b> Aquatic Ecology	
<b>Course Code</b>	AFAS 3691
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
The course aim to equip students with application of knowledge in aquatic sciences in monitoring ecological process in the aquatic environment as well as understanding the interactions between aquatic animals and their environment.	

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Discuss the aquatic environment and define the ecological boundaries of any aquatic system in order to assess the state of ecological processes in that system.
2. Assess the critical biotic and abiotic factors affecting (directly/indirectly) any aquatic system.
3. To identify the various social structures in an aquatic system and be able to describe keystone species in an aquatic environment to monitor ecological processes.

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (minimum 2 assignments, 2 tests and at least 5x marked practicals). Examination: 60% (1 x2 hr paper)

<b>Course Title:</b> Introduction to Aquaculture	
<b>Course Code</b>	AFAS 3682
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	

The aim of this course is to equip students with the scientific and technical skills required for the operation of an aquaculture venture.

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Define the term Aquaculture and its applications to both aquatic fauna and flora.
2. Appraise and recognize the approaches to water re-use in an aquaculture system.
3. Design a protocol for the determination of water quality parameters in various aquaculture systems.
4. Prepare a feasibility report for the establishment of an aquaculture project.
5. Critically assess different scenarios and apply knowledge when designing a new aquaculture venture.

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, 1 marked assignment and 3 practicals); Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b> Ichthyology I	
<b>Course Code</b>	AFAS 3601
<b>NQF Level</b>	6
<b>Notional Hours</b>	80
<b>Contact hours</b>	Lectures: 2 x 1hr/wk for 14 weeks (28hrs); Practical's: 1 x 2hr alternate for 14 weeks (14hrs)
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course introduces students to the concepts of fish systematics and identification of major groups of Namibian fish resources.	

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Identify and classify the different fish resources of the Namibian aquatic environment.
2. Relate the different external features of fish to its identification and classification.
3. Perform detailed morphometric index of any fish species
4. Perform fish scale and fin count
5. Estimate the age of a fish using scale and Otolith.

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests and 3 marked assignments); Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b> Aquatic Chemistry	
<b>Course Code</b>	AFAS 3692
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2

**Course Aims**

The course introduces the students to the concepts of chemical reactions in the aquatic environment and the interactions between the various chemical constituents in the aquatic ecosystem as well as interactions between the biotic parameters and the nutrient recycling in oceans.

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Identify and quantify the major constituents characterizing a water body.
2. Assess the nutrient cycles in a given water body using relevant sampling techniques.
3. Address the interactions between pH, Oxygen, Carbon Dioxide, Ammonia, substance toxicity levels and temperature in a water body.
4. Apply knowledge to assess the chemical reactions taking place in a water body
5. Compare the productivity of the Benguela System to other current systems
6. Demonstrate an understanding of energy flow through marine and estuarine environments

**Course 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.

**Assessment Strategies**

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals);

Examination: 60% (1 x 2 hr paper).

<b>Course Title:</b>	<b>BIOSTATISTICS</b>
<b>Course Code</b>	ACSC 3692
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 lecture hours / week for 14 weeks; 3 tutorial / practical hours alternate weeks for 14
<b>NQF Credits</b>	12
<b>Prerequisite</b>	SMAT 3511 Basic Mathematics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module introduces students to concepts of statistics and experimentation. It prepares students to design, execute and analyse experiments and present findings in formats that are understandable to other researchers and the public	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>6. Perform calculations in basic statistics and probability</li> <li>7. Validate research hypothesis on the basis of statistical inference tools</li> <li>8. Demonstrate understanding scientific research methodology</li> <li>9. Design experiments, collect data, analyse and interpret</li> <li>10. Present statistical data in formats acceptable for scientific writing and public consumption</li> </ol>	

**Course 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.

**Assessment Strategies**

Continuous assessment (40%): at least three assessments; Examination (60%): 1 x 2 hr paper

<b>Course Title:</b>	Natural Resource Economics
<b>Course Code</b>	AFAN 3682
<b>NQF Level</b>	6
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
The course introduces students to the various concepts of natural resource economics with emphasis on sustainability of renewable and non-renewable resources.	

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Apply economics to natural resource management
2. Differentiate between contingent valuation, effect on production and surrogate market techniques to the valuation of natural resources
3. Demonstrate an understanding and ability to interpret the concept of discounting and its effect on harvesting and decision making in natural resource use
4. Appreciate the linkage between property rights and harvesting levels of natural resources
5. Differentiate between renewable and non-renewable natural resources

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests and 3 marked assignments); Examination: 60% (1 x 2 hr paper)

### Third Year

<b>Course Title:</b> Physical Oceanography	
<b>Course Code</b>	AFAP 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The aim of this course is to equip students with the scientific and technical skills required for the operation of an Oceanographic laboratory, data collection, analysis and interpretation, and scientific reporting. Relate the physics of oceans to the biology of oceans.	

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Appraise and recognize the different forces behind water movement in the world oceans e.g. waves, tides, and winds.
2. Design a protocol for the determination of marine water quality parameters.
3. Capable of using oceanographic instruments.
4. Critically assess different scenarios and apply knowledge when interpreting oceanographic data and report writing.

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, 1 assignment and 3 practicals); Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b> Aquaculture and Fisheries Products	
<b>Course Code</b>	AFAS 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120

<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 3682: Introduction to Aquaculture
<b>Compulsory/Elective</b>	
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course introduces students to the various concepts of fisheries products and customer quality assurance on wild captured and aquaculture produce. This course also aims to educate students on various hazards and customer safety during capture/production of various fisheries products.	

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Differentiate between freshness and quality.
2. Apply apt processing and preservation methods based on customer preferences.
3. Evaluate fish freshness through sensory, chemical, physical and microbial methods.
4. Interpret safety and quality concerns when preparing and preserving fish and other sea foods through various means.
5. Develop a HACCP plan and apply the (7) principles of HACCP as well as pre-requisite programs.
6. Provide advice on how to handle fish properly to maintain good quality and prevent loss due to damage/ spoilage.
7. Provide advice on quality assurance and safety of seafood through the implementation of proper control systems

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 practicals); Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b> Ichthyology II	
<b>Course Code</b>	AFAS 3791
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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 3682: Introduction to Aquaculture
<b>Compulsory/Elective</b>	
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course introduces students to the concepts of fish biology and adaption to the aquatic environment and life strategies.	

**Learning outcomes:** Upon completion of this course the student should be able to:

1. Describe the internal anatomy of the fish and relate each organ to the functions they perform.
2. Critically analyse the survival strategies use by fish to survive in its natural habitat.
3. Apply the principles of fish physiology in the management of an aquaculture enterprise.
4. Apply knowledge of the natural migration and behaviour of fish to management of fishery resources.

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b> Field Attachment I	
<b>Course Code</b>	ACA 3701
<b>NQF Level</b>	7
<b>Notional Hours</b>	80
<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 and 2
<b>Course Aims</b>	
The aim of this course is to expose students to practical know-how in the field under the supervision of a technical expert in the field in order for students to come to terms with technology and limitations under a working environment.	

#### Learning Outcomes

Upon successful completion of this module, students should be able to:

1. Relate to the working environment in various Fields/industries
2. Re-evaluate their choice of field and make proper decisions on paths to follow
3. Come up with realistic research projects according to their experience in the field.
4. Come to grips with the technology and limitations in the field

#### Course 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.

#### Assessment Strategies

40 % report presentation at a seminar; 60 % Field report. Subject to satisfactory attendance and good conduct during attachment.

<b>Course Title: Farm Planning and Management</b>	
<b>Course Code</b>	AAEC 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>Prerequisite</b>	AAEC 3682: Production Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course exposes students to essential functions of management (planning, implementation, and control) and skills which are essential to managing, advising, and/ or servicing farm enterprises and other agribusinesses.	

#### Learning outcomes:

Upon completion of this Course, students should be able to:

1. Discuss management principles and concepts to apply in managing a farm business successfully.
2. Formulate, compare and appraise farm financing plans.
3. Identify strategies for dealing with risk and uncertainty in the farm business.
4. Apply budgeting techniques and computer skills to analyze farm enterprise budgets and conduct whole farm planning.

#### Course 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.

#### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)



<b>Course Title:</b>	Fisheries Management I
<b>Course Code</b>	AFAF 3781
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>	FAS 3602: Ichthyology I, FAN 3682: Natural Resource Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The aim of this course is to provide students with a good theoretical background and understanding of fisheries management issues relevant for its development. To impart and sharing knowledge from other countries regarding fisheries and their management.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Link fisheries development to management
2. Apply co-management concepts to fisheries while understanding its various shortcomings
3. Apply policies on fisheries management
4. Apply fisheries management approach into gender equality, poverty alleviation and sustainable livelihoods issues
5. Discuss rationale for fisheries management
6. Explain lesson learned from other countries with regard to fisheries development and management

### Course 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)

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b>	Fisheries Management II
<b>Course Code</b>	AFAS 3792
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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 3602: Ichthyology I, AFAN 3682: Natural Resource Economics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
The aim of this course is to advance students understanding on relevant approaches pertaining to effective management of fisheries resources. Furthermore, to provide students with scientific knowledge necessary for competent fisheries management.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Forecast on future trends of a fishery.
2. Conduct socio-economic baseline surveys to collect fisheries data that can be used in management decision-making
3. Deal with mutually exclusive objectives in fisheries management
4. Demonstrate and understanding of methods and techniques used in managing fishery activities.
5. Explain lessons learned from other countries with regard to fisheries development and management

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper)

<b>Course Title:</b> Integrated Coastal Zone Management	
<b>Course Code</b>	AFAS 3712
<b>NQF Level</b>	7
<b>Notional Hours</b>	160
<b>Contact hours</b>	Lectures: 4x 1hr/wk for 14 weeks (56hrs); Practical's: 1 x 3hr for 14 weeks (42hrs)
<b>NQF Credits</b>	16
<b>Prerequisite</b>	AFAS 3691: Aquatic Ecology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b> The aim of this course is to broaden students' scientific knowledge of the impacts of climate change as well as human interference on the coastal environment.	

### Learning Outcomes

Upon successful completion of this module, students should be able to:

1. Critique the potential impacts of Climate Change on the coastal environment
2. Interpret anthropogenic interference on coastal environments
3. Justify the different guiding principles in ICZM
4. Demonstrate an understanding of the EIA process as accepted internationally
5. Apply the concepts of Sustainable Development

### Course content

Potential impacts by climate change and direct human interference on coastal systems. Impact assessment: scoping 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).

<b>Course Title:</b> Basic Aquaculture Engineering	
<b>Course Code</b>	AFAS 3782
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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 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
<b>Course Aims</b> The aim of the course is to provide students with a general overview of the technical engineering knowledge and principles used in aquaculture and biological production systems.	

### Learning Outcomes

Upon successful completion of this module, students should be able to:

1. Critically diagnose factors to be considered in site selection
2. Know the hydrological information for aquaculture system design, water transport dynamics, materials involved and the types of pumps used in aquaculture
3. Conceptualize water quality management and water treatment
4. Have a basic knowledge of fish Hatchery and live feed system design, recirculating and water re-use systems and raceways, cages and other flow-through systems in aquaculture
5. Express an understanding of the mechanization of fish farm operations

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).

<b>Course Title:</b>	Research Methods
<b>Course Code</b>	ACSC 3792
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>	ACSC 3692: Biostatistics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> This course enables the student to carry out statistical analysis of research data using scientific acceptable methods and procedures.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Perform calculations with non-parametric data and make statistical inferences
2. Design experiments, analyse, interpret and present results
3. Design field surveys, collect data, analyse and interpret results
4. Utilise computer software in controlled experiments and field survey data analysis
5. Evaluate critical results of experiments published in journal articles.

### Course 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

### Assessment Strategies

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

<b>Course Title:</b>	Aquaculture Nutrition and Feed Manufacturing
<b>Course Code</b>	AFAA 3782
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> The aim of this course is to broaden students' scientific knowledge on the nutritional requirements of fish kept in captivity as well as to equip students with necessary knowledge to formulate and manufacture artificial diets.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Identify potential sources of feed stuffs used in manufacturing diets.
2. Analyze dietary components
3. Analyze digestibility of different feeds
4. Evaluate feed formulation models and least cost production
5. Be able to independently manufacture artificial diets

### Course 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.

### Assessment Strategies

Continuous Assessment: 40% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 60% (1 x 2 hr paper).

### Fourth Year

<b>Course Title:</b>	Research Project
<b>Course Code</b>	AFAS 3810
<b>NQF Level</b>	8
<b>Notional Hours</b>	320
<b>Contact hours</b>	Consultation: 1 x 1hr/wk for 28 weeks (28 hrs)
<b>NQF Credits</b>	32
<b>Prerequisite</b>	ACSC 3692: Biostatistics and ACSC 3792: Research Methods
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2
<b>Course Aims</b> The aim of this course is to develop student's skills in initiating and executing a design scientific research in specific area of Fisheries and aquatic Sciences.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Develop a research project proposal.
2. Implement a research project; analyze/interpret data and write up
3. Enhanced communications skills: high quality presentations to a wide audience.
4. Carry out supervised scientific project with maturity and a degree of independence.

### Course 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.

<b>Course Title:</b>	Field Attachment II
<b>Course Code</b>	AACA 3801
<b>NQF Level</b>	8
<b>Notional Hours</b>	80
<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
<b>Course Aims</b> The aim of this course is to expose students to practical know-how in the field under the supervision of a technical expert in the field in order for students to come to terms with technology and limitations under a working environment.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Relate to the working environment in various Fields/industries

2. Re-evaluate their choice of field and make proper decisions on paths to follow
3. Come up with realistic research projects according to their experience in the field.
4. Come to grips with the technology and limitations in the field

### Course 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)

<b>Course Title:</b> Fisheries Economics	
<b>Course Code</b>	AFAS 3891
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<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, AFAS 3781: Fisheries Management I, AFAS 3792: Fisheries Management II
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The aim of this course is to equip students with the needed skills in the application of economic principles in fisheries management.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Interpret the role of economics in fisheries management
2. Comprehend the link between harvesting and fish populations.
3. Interpret and analyze scientific fishery models
4. scrutinize the linkage between species interaction and harvesting
5. Appraise economic instruments in regulating levels of fish harvesting.

### Course 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).

<b>Course Title:</b> Fish Pathology	
<b>Course Code</b>	FAS 3831
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<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
<b>Course Aims</b>	
The aim of the course is to provide students with in-depth knowledge and practical tools and skills necessary in the identification, diagnosis and treatment of diseases, parasites and fish in culture situations.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Have an understanding of disease, immune system of fish and general epizootology
2. Describe the causative agents of the major bacterial, viral and parasitic diseases of cultured and wild fishes
3. Differentiate between infectious and non-infectious diseases

4. Confidently recognize and evaluate the major factors that contribute to disease outbreaks in culture and the range of diseases encountered in aquaculture enterprises
5. Be conversant with the tools and techniques available to diagnostic and prophylactic methods to many common diseases.
6. Apply theories and principles of fish pathology to new areas and problems in new contexts
7. Integrate possibilities and limitations of fish pathology in new methodology for solving disease related problems.
8. Expand the applicability of the methods by including theories and methods also for new, complex and un-predictable situations
9. Predict health related aspects of fish production systems according to new situations under different abiotic and biotic conditions.
10. Develop quality and health management programs for aquaculture and fisheries establishments

### Course 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, platyhelminthes 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).

<b>Course Title:</b>	Environmental Impact Assessment
<b>Course Code</b>	AENE 3882
<b>NQF Level</b>	8
<b>Notional Hours</b>	120
<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
<b>Course Aims</b>	
To familiarize students with the process and techniques of Environmental Impact Assessment required for fulfillment of sustainable environmental development.	

### Learning Outcomes

*Upon successful completion of this module, students should be able to:*

1. Design an Environmental Impact Assessment process into a project plan
2. Apply policies in the context of monitoring and controlling project activities
3. Conduct Environmental Impact Assessment on existing and new projects, prepare EIA reports and recommend mitigation measures
4. Appraise available EIA techniques and methods and determine the best methods for assessing different projects and different prevailing circumstances

### Course 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).

<b>Course Title:</b>	Biological Oceanography
<b>Course Code</b>	FAS 3811
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<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
<b>Course Aims</b>	
The aim of this course is to equip students with the scientific and technical skills required for the operation of Biological Oceanography laboratory, data collection, analysis and interpretation, and scientific reporting.	

### Learning Outcomes

Upon successful completion of this module, students should be able to:

1. Demonstrate an understanding of what Biological Oceanography entails.
2. Appraise and recognize the different factors that support life in the sea through adaptations, life history traits, foodwebs and foodchains, and other biological interactions.
3. Recognize the role of algae and bacteria in oceans
4. Design a protocol for the determination of both micro and macro biological estimates, and identification.
5. Capable of using oceanographic instruments.
6. Critically assess different scenarios and apply knowledge when interpreting biological samples in relation to corresponding environmental variables.

### Course 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).

<b>Course Title:</b>	Fish Population Dynamics
<b>Course Code</b>	AFAS 3812
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<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
<b>Course Aims</b>	
The aim of this course is to equip students with the technological skills required in the fishing industry and the application of population dynamics in the marine environment.	

### Learning Outcomes

Upon successful completion of this module, students should be able to:

1. Scrutinize the difference between dependent and independent fishery data.
2. Identify crucial tools that are used in fish stock assessment.
3. Apply analytical and holistic models in fish stock assessment.
4. Design an appropriate sampling programme for a fish survey.
5. Collect and analyze biological data used in fish stock assessment.

### Course 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).

<b>Course Title:</b>	Aquaculture Management
<b>Course Code</b>	AFAS 3832
<b>NQF Level</b>	8
<b>Notional Hours</b>	160
<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
<b>Course Aims</b>	
This course aims to make students aware of general managerial practices in commercial aquaculture enterprises.	

**Learning Outcomes**

*Upon successful completion of this module, students should be able to:*

1. Manage broodstock and hatcheries
2. Apply knowledge in general aquaculture animal health management
3. Prescribe basic hygienic conditions on the farm
4. Maintain good measure and maintain good water quality
5. Demonstrate an understanding human resources, financial and labour skills required for successful aquaculture management

**Course 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).



## **J. B.SC. INTEGRATED ENVIRONMENTAL SCIENCE (HONS) {(Ogongo Campus)} [17BSIE]**

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by Faculty 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 CURRICULUM**

Course Title	Course Code	NQF Level	Credits	Compulsory	Elective	Pre-requisite
<b>Year 1</b>						
Computer Literacy	UCLC 3509	5	8	Yes	No	
English Communication and Study Skills	ULCE 3419	4	16	Yes	No	
Contemporary Social Issues	UCSI 3580	5	16	Yes	No	
Introduction to Biology	SBLG 3511	4	16	Yes	No	
Basic Mathematics	SMAT 3511	5	16	Yes	No	
English for Academic Purposes	ULEA 3519	5	16	Yes	No	
Chemistry for Life Sciences	SCHM 3532	5	16	Yes	No	
Diversity of Life	SBLG 3512	5	16	Yes	No	
Pre-calculus	SMAT 3512	5	16	Yes	No	
<b>Credits Year 1</b>			<b>136</b>			
<b>Year 2</b>						
Principles of Microeconomics	AAEC 3681	6	12	Yes	No	
Rural Sociology	AAEC 3691	6	12	Yes	No	None
Genetics	AASC 3681	6	12	Yes	No	None
Ecology	AIES 3681	6	12	Yes	No	None
Environmental Science	AIES 3691	6	12	Yes	No	None
General Microbiology	AFST 3681	6	12	Yes	No	None
Principles of Macroeconomics	AAEC 3692	6	12	Yes	No	None
Biochemistry	AASC 3612	6	16	Yes	No	CHM 3532 (Chemistry for Life Sciences)
Plant Physiology	AIES 3682	6	12	Yes	No	None
Soil Science for Crop Production	ACSS 3681	6	12	Yes	No	None
Climatology and Hydrology	AIES 3622	6	8	Yes	No	None
Natural Resource Economics	AFAN 3682	6	12	Yes	No	None
Biostatistics	ACSC 3692	6	12	Yes	No	None
<b>Credits Year 2</b>			<b>156</b>			
<b>Year 3</b>						
Field Attachment I*	AACA 3701	7	8	Yes	No	None
Dryland Plants	AIED 3781	7	12	Yes	No	None
Principles of Wildlife Management	AIEP 3781	7	12	Yes	No	None
Geo-informatics	AIES 3791	7	12	Yes	No	None
Agroforestry	AIEA 3781	7	12	Yes	No	None
Nature Conservation	AIEN 3792	7	12	Yes	No	None
Natural Resource Governance	AIEN3782	7	12	Yes	No	None
Community Based Resource Mgt.	AIES 3702	7	8	Yes	No	None
Research Methods	ACSC 3792	7	12	Yes	No	CSC 3692 (Biostatistics)
Agricultural Extension	AAEC 3712	7	16	Yes	No	AAEC 3791 (Rural Sociology)
<b>Credits Year 3</b>			<b>126</b>			None
<b>Year 4</b>						
<b>Forestry Option</b>						
Field Attachment II*	AACA 3801	8	8	Yes	No	ACA 3701 (Field Attachment I)
Research Project (Forestry)	AFOR 3810	8	32	Yes	No	ACSC 3792 (Research Methods)
Silviculture	AFOR 3881	8	12	Yes	No	AIES 3681 (Ecology) and

Course Title	Course Code	NQF Level	Credits	Compulsory	Elective	Pre-requisite
						AIES 3682 (Plant Physiology)
Forest Protection	AFOR 3891	8	12	Yes	No	None
Forest Mensuration	AFOF 3881	8	12	Yes	No	None
Forest Inventory	FOR 3882	8	12	Yes	No	None
Forest Economics & Marketing	AFOR 3812	8	16	Yes	No	None
Forest Management	AFOR 3892	8	12	Yes	No	None
Project Planning and Management	AAEC 3881	8	12	Yes	No	None
<b>Credits Year 4</b>			<b>126</b>			
<b>Total Credits</b>			<b>544</b>			
<b>Environmental Science Option</b>						
Field Attachment II	AACA 3801	8	8	Yes	No	ACA 3701 (Field Attachment I)
Research Project (Environmental Science)	AENV 3810	8	32	Yes	No	ACSC 3792 (Research Methods)
Environment & Development	AENV 3881	8	12	Yes	No	None
Environment Pollution Control	AENV 3891	8	12	Yes	No	None
Watershed Management	AENV 3801	8	8	Yes	No	None
Project Planning and Management	AAEC 3881	8	12	Yes	No	AAEC 3691 (Principles of Microeconomics)
Management of Arid and Semi-Arid Lands	AENV 3882	8	12	Yes	No	None
Environmental Planning and Management	AENP 3882	8	12	Yes	No	None
Environmental Impact Assessment	AENE 3882	8	12	Yes	No	AIES 3782 (Natural Resource Governance)
Environmental Education	AENE 3892	8	12	Yes	No	None
<b>Credits Year 4</b>			<b>130</b>			
<b>Total Credits</b>			<b>548</b>			

## J.2 MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### 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 description:** 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.

**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

**Module title:** ENGLISH COMMUNICATION AND STUDY SKILLS  
**Code:** LCE3419  
**NQF Level:** 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 description:** 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>	<b>CONTEMPORARY SOCIAL ISSUES</b>
<b>Code:</b>	<b>CSI 3580</b>
<b>NQF:</b>	5
<b>Credits:</b>	8
<b>Prerequisite:</b>	None

### Module Description:

*This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives.* In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership.

### Aims of the Course:

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability,

Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.

- ❖ Explore the dimensions of ethical and moral choices,
- ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
- ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
- ❖ Deepen understanding of the construct of citizenship,
- ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
- ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
- ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

### Learning Outcomes:

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,

- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

### **Assessment Strategies:**

#### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (100%), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

#### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

#### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

### **Course Content:**

Following six (6) broad themes shall be covered:

#### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

#### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

#### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

#### **Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

### Environment and Sustainability:

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

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### SBLG 3511: INTRODUCTION TO BIOLOGY

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**Module title:** INTRODUCTION TO BIOLOGY  
**Code:** SBLG 3511  
**Course Equivalent:** Biology 1A  
**NQF level:** 4  
**Contact hours:** 4 lectures/ week for 14 weeks and one 3-hour practical session per week.  
**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.

**Prerequisites:** NSSC (Biology C or better)

**Module description (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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### SMAT 3511: BASIC MATHEMATICS

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**Module name:** BASIC MATHEMATICS  
**Code:** SMAT 3511  
**NQF level:** 5  
**Contact hours:** 4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks  
**Credits:** 16  
**Module Assessment:** Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).  
**Prerequisite:** NSSC Mathematics

**Module description (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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**Module title:** ENGLISH FOR ACADEMIC PURPOSES  
**Code:** LEA3519  
**NQF level:** 5  
**Contact hours:** 4 periods per week for 14 weeks  
**Credits:** 16  
**Module assessment:** Continuous assessment (60%): 2 tests (reading and writing), 1 academic written essay, 1 oral presentation  
Examination (40%) : One three hour examination paper

**Prerequisites:** None

**Module description:** 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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**Module Title:** CHEMISTRY FOR LIFE SCIENCES  
**Code:** SCHM3532  
**NQF Level:** 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 Description:**

This module is designed for students that have insufficient background in chemistry and for non-chemistry majors. It is an introduction to topics in general and organic chemistry, and biochemistry. The following will be covered:

**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.

**SBLG 3512: DIVERSITY OF LIFE**

<b>Module title:</b>	<b>DIVERSITY OF LIFE</b>
<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 description (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.

**SMAT 3512: PRE-CALCULUS**

<b>Module name:</b>	<b>PRE-CALCULUS</b>
<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>Assessment:</b>	Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).
<b>Prerequisite:</b>	NSSC Mathematics

**Module description (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.)**

## SECOND YEAR MODULES

<b>Course title: Principles of Microeconomics</b>	
<b>Code:</b>	AAEC 3681
<b>NQF level:</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs)
<b>Notional Hours:</b>	120
<b>NQF Credits:</b>	12
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered:</b>	1

### Course Aims:

This course exposes students to basic concepts and principles in microeconomics and provides an essential foundation for higher level agricultural economics courses such as Marketing Production Economics and Farm management.

### Learning outcomes:

Upon completion of this course, the student should be able to:

1. Define basic microeconomics concepts
2. Explain the concept of resource scarcity
3. Explain concept of demand and supply
4. Explain the concept of consumer theory
5. Explain the concept of choice under uncertainty
6. Discuss the concept of theory of the firm
7. Differentiate between the market structures
8. Explain the concept of general equilibrium analysis
9. Explain externalities and public goods

### Course 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.

### Assessment Strategies

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

<b>Course title: Principles of Macroeconomics</b>	
<b>Code:</b>	AAEC 3682
<b>NQF level:</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs)
<b>Notional Hours:</b>	120
<b>NQF Credits:</b>	12
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered:</b>	2
<b>Course Aims:</b>	
The course introduces the students to basics concepts in macroeconomics and functioning of the economy in aggregate	

**Learning outcomes:**

Upon completion of this course, the student should be able to:

- Define macroeconomics concepts;
- Describe several macroeconomic variables;
- Explain the national accounting models;
- Explain the concept of aggregate demand and aggregate supply (IS and LM curves)
- Use macroeconomic theory to predict the movements of the key economic indicators;
- Evaluate the effectiveness of macroeconomic policy (fiscal and monetary policy)

**Course 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.

**Assessment Strategies**

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

<b>Course title:</b>	<b>Rural Sociology</b>
<b>Code</b>	AAEC 3691
<b>NQF level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Prerequisites:</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course investigates the basic sociological concepts and their application to agricultural progress and rural development	

**Learning Outcomes:**

At the end of this course the student should be able to:

8. Define basic sociological concepts and theories
9. Analyze the significance of rural sociology to agricultural extension and rural development;
10. Compare rural and urban populations and their causes;
11. Analyze different cultures and measure its significance in society
12. Discuss role of social institutions in agriculture and rural development;
13. Discuss the social structural and origins of inequalities;
14. Analyze issues of rural urban migration and environment;

**Course 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.

**Assessment Strategies**

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

<b>Course title</b>	<b>Genetics</b>
<b>Code</b>	AASC 3681
<b>NQF level</b>	6
<b>Contact hours</b>	Lectures: 3x 1hr L/wk for 14 weeks (42hrs); Practicals: 1 x 3hr Practical alternate wk for 14 weeks (21hrs)
<b>Notional hours</b>	120
<b>NQF Credits</b>	12



<b>Prerequisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course Aims</b>	
To present advanced genetic concepts with particular emphasis on molecular genetics. Examples are used from different species of eukaryotes and prokaryotes.	

#### Learning Outcomes:

Upon successful completion of this module, students should be able to:

- Explain the modified Mendelian ratio.
- Discuss the structure, function and variations of chromosomes.
- Describe the molecular structure of DNA.
- Discuss the types of mutations, causes and detection methods.
- Explain the significance of genetic variations.
- Discuss sex determination in eukaryotic species.
- Describe the basic aspects of the flow of genetic information from DNA to proteins and self-replication.
- Explain basic molecular techniques such as DNA extraction, PCR and gene cloning.
- Describe the applications of genetic engineering in agriculture.

#### Course 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.

#### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals).

Exam: 60% (1 x 2 hr paper).

COURSE TITLE		ECOLOGY
<b>Code</b>	AIES 3681	
<b>NQF level</b>	6	
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42 hrs); Practicals: 1 x 3 hrs alternate for 14 weeks (21 hrs)	
<b>Notional hours</b>	120	
<b>NQF Credits</b>	12	
<b>Prerequisites</b>	None	
<b>Compulsory/Elective</b>	Compulsory	
<b>Semester offered</b>	1	
<b>Course Aims</b>		
To present advanced genetic concepts with particular emphasis on molecular genetics. Examples are used from different species of eukaryotes and prokaryotes.		

#### Learning outcomes:

Upon completion of the course, students should be able to:

- Identify the key components of an ecosystem and demonstrate how the components relate to each other.
- Outline abiotic and biotic factors that influence plant and animal adaptations, distributions and abundances
- Compare the structure, composition, diversity and conservation significance of different plant and animal communities
- Apply succession models to analyze successional status of a given landscape

#### Course content

Ecological concepts. Physical, chemical and biological parameters of the environment. Population characteristics; Sex ratio, age distribution, growth rate, Population processes, growth models; density dependent and independent population regulation. Estimating population size, life-table analysis, survivorship. Ecosystem processes: Trophic levels,

Biomass, Nutrient cycling, Community ecology: Classification of communities (biogeoclimatic classification applied to Namibia), Diversity and its measurements. Conservation guilds (keystone, flagship and umbrella species). Habitat utilization. Dynamics (ecological succession) and stability.

### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3hr paper)

<b>COURSE TITLE ENVIRONMENTAL SCIENCE</b>	
<b>Code</b>	AIES 3691
<b>NQF level</b>	6
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42 hrs); Practicals: 1 x 3 hrs alternate for 14 weeks (21hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Prerequisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course introduces students to concepts of environment, natural resource, demography and land use. Major environmental concerns including pollution to soils and water, desertification, soil degradation, urbanization and waste management are also given attention.	

### Learning outcomes:

Upon completion of this course, the students should be able to:

- Recognize that most environmental problems are a result of human interactions with natural resources
- Differentiate between the various aspects of the environment (social, economic, historical, political, physical and biological issues, amongst others) and how they interact to form a holistic view/ approach to dealing with environmental concerns.
- Diagnose causes of specific environmental problems (e.g. desertification, pollution, soil degradation etc) in Namibia and recommend mitigations
- Evaluate resource management practices within the context of sound environmental management.

### Course content

The concepts of; environment, natural resources, demography and land use. Major environmental concerns including pollution, soil erosion and degradation in crop and livestock production systems (Namibian context). Effects of agrochemicals, desertification and methods of control, natural and man-made hazards. Effects of; human population growth, industrialization and urbanization on the environment. Energy sources and their environmental impacts. Waste management. Climate change and the environment.

### Assessment Strategies

Continuous assessment 40% (At least three assessments) Examination 60% (1 x 3 hour paper)

<b>Course Title: General Microbiology</b>	
<b>Course Code</b>	AFST 3681
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42 hrs); Practicals: 1 x 3 hrs alternate for 14 weeks (21hrs)
<b>Notional Hours</b>	80
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
The course provides students with basic concepts about the different groups of microorganisms; growing and controlling microorganisms, their effect to plant human and animal health as well as the environment.	

### Learning Outcomes:

Upon successful completion of this module, students should be able to:

- Name known groups of microorganisms and microscopic particles; and describe the diversity of microbial habitats and the factors that affect colonisation of a particular microbial niche by a particular group or subpopulation.
- Describe methods of prokaryotic taxonomy.

- Describe the traits used in the classical and numerical taxonomy of prokaryotes.
- Explain the advantage of the numerical taxonomy over the classical approach.
- Describe the tools and techniques used under the molecular biology approach.
- Propagate and identify microorganism through:
- Aseptic and pure culture techniques
- Study by visualising microorganisms through microscopy and staining techniques.
- Appreciate the need and be able to control the growth and survival of microorganisms in the environments and should be able to prepare laboratory media.
- 10. Describe the different biology and classification systems of fungi, algae, protozoa and viruses different groups of microorganisms..
- Know important pathogens of plants and animals and how they affect the host.

### Course 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.

### Assessment Strategies

Continuous Assessment 40% (minimum 2 tests, 2 assignments and 4 practicals). Examination: 60% (1 x 3 hr paper)

<b>Course Title:</b> Biochemistry	
<b>Course Code</b>	AASC 3612
<b>NQF Level</b>	6
<b>Contact hours</b>	Lectures: 4x 1hr L/wk for 14 weeks (56hrs); Practicals: 1 x 3hr Prac/wk for 14 weeks (42hrs)
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Prerequisite</b>	Chemistry for Life Sciences (CHM 3532)
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This course is designed to help students gain key concepts of biochemistry of living cells so as to comprehend life process in both plant and animals.	

**Learning outcomes:** Upon completion of this course the student should be able to:

- Describe acids, bases, buffers and P<sup>H</sup>
- Describe the chemical structures and functions of carbohydrates, proteins, lipids, vitamins and coenzymes
- List essential amino acids and explain why they are essential
- Explain the role of enzymes in biological systems and discuss the factors affecting enzyme activities.
- Describe the concepts of enzyme kinetics, enzyme inhibition and allosterism
- Distinguish between water soluble and fat soluble vitamins and describe the functions of vitamins in animal nutrition
- Discuss how living organisms acquire energy in the form of ATP
- Discuss catabolic biochemical reactions such as glycolysis, TCA cycle, that take place in living tissues to provide energy in the form of ATP.
- Discuss anabolic biochemical processes such as pentose phosphate pathway and gluconeogenesis
- Discuss photosynthesis and its significance.
- Describe the glyoxylate cycle in oily seeds
- Describe the more common laboratory tests for determining the presence of sugars, proteins and lipids.

### Course Content

Under this course the students will learn about Physical biochemistry including acids, bases, buffers and pH; Structural biochemistry - learning about the Structure and function of carbohydrates, proteins and lipids. Bioenergetics and Thermodynamics (Free energy, Laws of energy, Endergonic and exergonic reactions); Enzymology (Enzymes as organic catalysts Enzyme nomenclature Enzyme kinetics Factors affecting activities of enzymes The Michaelis-Menten equation The Lineweaver-Burk plot Enzyme inhibition Competitive inhibition Non competitive inhibition Enzyme activity regulation Allosterism Cofactors); Vitamins and coenzymes (Water-soluble vitamins Fat-soluble

vitamins); Metabolism (Anabolism and catabolism overview Carbohydrate catabolism Glycolysis Alcohol and lactic acid fermentation Cori cycle Gluconeogenesis Synthesis of the disaccharides lactose and sucrose Synthesis of polysaccharides starch and glycogen Regulation of carbohydrate metabolism Metabolic disorders in carbohydrate metabolism Pentose phosphate pathway Tricarboxylic acid cycle Glyoxylate cycle in oily seeds Photosynthesis Electron transport system and oxidative phosphorylation Fat metabolism Integration of carbohydrate and fat metabolism); Electrophoresis.

### Assessment Strategies

Continuous Assessment: 40% (2x assignments + 2 tests + at least 5x marked practicals). Exam: 60% (1 x 3 hr paper)

<b>COURSE TITLE CLIMATOLOGY AND HYDROLOGY</b>	
<b>Code</b>	AIES 3622
<b>NQF level</b>	6
<b>Contact hours</b>	Lectures: 2x 1hr/wk for 14 weeks (28hrs); Practicals: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Prerequisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This course introduces students to basic scientific concepts in climatology and hydrology with the aim of creating awareness and understanding of the different elements, factors and processes behind weather changes, climatic classifications and hydrologic parameters which influence man's activities and their importance in water resources utilization and management.	

### Learning outcomes:

Upon completion of this course, the students should be able to:

- Demonstrate an understanding of basic concepts of weather and weather forecasting, climate and classification of climates and hydrology
- Illustrate the hydrological cycle showing the interrelationships between the different components
- Describe basic techniques of measuring or estimating weather and hydrological parameters
- Demonstrate an in-depth understanding of factors that influence Namibia's weather conditions and their dynamism
- Differentiate the different types of ground water and evaluate their potential for development and utilization

### Course content

Introduction to Climatology concepts; weather, meteorology, climate, climatology and atmosphere. Weather systems and weather forecasting; weather parameters, world weather systems, Namibia weather conditions, weather forecasting. Climate; climatic data, climatic classifications, climatic zones of the world, climatic zones of Namibia, Climate change. Hydrology; parameters and their measurement. Hydrologic cycle; elements and their estimation. Groundwater hydrology-aquifers, water table and aquifer recharge.

### Assessment Strategies

Continuous Assessment: 40% (At least three assessments); Examination: 60% (1 x 2 hr paper)

<b>Course title: Natural Resource Economics</b>	
<b>Code</b>	AFAS 3682
<b>NQF level</b>	6
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 3hr alternate wk for 14 weeks (21hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Prerequisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
The course introduces students to the various concepts of natural resource economics with emphasis on sustainability of renewable and non-renewable resources.	

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<p><b>Learning outcomes:</b></p> <p>Upon completion of this course, the students be able to:</p> <ul style="list-style-type: none"> <li>▪ Understand the role of economics in natural resource management</li> <li>▪ Differentiate between contingent valuation, effect on production and surrogate market techniques to the valuation of natural resources</li> <li>▪ Understand discounting and its effect on harvesting decision making in natural resource use</li> <li>▪ Appreciate the linkage between property rights and harvesting levels of natural resources</li> <li>▪ Differentiate between renewable and non-renewable natural resources</li> </ul>
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**Course 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. Brundtlandreport. Market failures: public goods, externalities. Valuing natural resources: surrogate market techniques, travel time, contingency valuation methods, non-use values; opportunity costs.

**Assessment Strategies**  
 Continuous Assessment: 40% (at least three assessments); Examination: 60% (1 x 3 hr paper)

<b>COURSE TITLE</b>		<b>PLANT PHYSIOLOGY</b>
<b>Code</b>	AIES 3682	
<b>NQF level</b>	6	
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42 hrs); Practicals: 1 x 3 hrs alternate for 14 weeks (21 hrs)	
<b>Notional Hours</b>	120	
<b>NQF Credits</b>	12	
<b>Prerequisites</b>	None	
<b>Compulsory/Elective</b>	Compulsory	
<b>Semester offered</b>	2	
<b>Course Aims</b>		
To enhance the students understanding on functioning of plants with emphasis on water and nutrient requirements, transport systems and regulation of growth.		
<b>Learning outcomes:</b>		
Upon completion of the course, students should be able to:		
<ul style="list-style-type: none"> <li>▪ Differentiate between C3, C4 and CAM plants with respect with the way they function</li> <li>▪ Demonstrate basic understanding of plant physiological processes like respiration, photosynthesis, transport systems and regulation of growth</li> <li>▪ Describe simple experiments that demonstrate plant physiological processes like osmosis, photosynthesis, respiration etc.</li> <li>▪ Differentiate between various plant strategies to cope with stresses related to herbivory, nutrient deficiency and drought</li> </ul>		

**Course content**  
 Growth and development in plants; development of plant organs, growth hormones, flowering physiology, seed physiology and dormancy. Photosynthesis. Respiration. Plant water relations. Mineral absorption and utilization. Factors affecting plant growth and distribution. Stress physiology.

**Assessment strategies**  
 Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course Title:</b>	<b>SOIL SCIENCE FOR CROP PRODUCTION</b>
<b>Course Code</b>	ACSS 3681
<b>NQF Level</b>	6
<b>Notional Hours</b>	120

<b>Contact hours</b>	03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module aims to develop the student's understanding of soil as a medium for plant growth. Concepts covered enhance understanding of soil, land and crop management strategies	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
1. Describe the process of soil formation to appreciate the soil as a triphasic system	
2. Recognize and identify different soil texture	
3. Describe the basic interaction of soil fertility and plant nutrition	
4. Employ soil sampling methods	
5. Describe soil water and plant relationships	

### Course 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

### Assessment Strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

<b>COURSE TITLE: DRYLAND PLANTS</b>	
<b>Code</b>	AIED 3781
<b>NQF level</b>	7
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42 hrs); Practicals: 1 x 3 hr alternate for 14 weeks (21hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Prerequisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course Aims</b>	
The course aims at introducing students to the theory and practice of plant taxonomy and to carry out a survey of plants growing in Namibia emphasizing on their taxonomy, botanical characteristics and uses in Namibia and the SADC region.	

### Learning outcomes:

Upon completion of the course, students should be able to:

- Demonstrate an understanding of plant taxonomy concepts, principles and plant collection and preservation techniques
- Demonstrate vast knowledge of grasses, shrubs and trees found in Namibia and their taxonomy, key botanical features and uses in Namibia and the SADC region
- Search and access data bases to retrieve information on origin, taxonomy and uses of different plants among cultures in Namibia and the SADC region
- Design strategies for promoting harvesting of plant products from cultivated plants or from plants in the wild, processing and marketing of the products

### Course content

Introduction to plant taxonomy; scope of plant taxonomy, classification, nomenclature, identification and herbarium practice. Taxonomy, botanical characteristics and ecology of key exotic and indigenous plant species in Namibia including; timber and fuel-wood plants, fruit and food plants, fodder plants and medicinal plants (emphasis on grasses, shrubs and trees). Non-woody woodland products. Forest product development.

### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>COURSE TITLE:</b>	<b>PRINCIPLES OF WILDLIFE MANAGEMENT</b>
<b>Code</b>	AIEP 3781
<b>NQF level</b>	7
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 3hrs alternate for 14 weeks (21hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Prerequisites</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course Aims</b>	
This course is designed to give students a broad understanding of principles and practices of wildlife management with emphasis to practices in the Southern African Development Community (SADC) countries. This course also aims to develop the students' understanding, skills and attitudes regarding habitat (ranch) management, concept of the carrying capacity and determination of carrying capacity of Namibian range types.	

#### Learning outcomes:

Upon completion of the course, students should be able to:

- Recognize the value of wildlife to human existence.
- Analyze the influence of biophysical and human factors in shaping wildlife populations
- Demonstrate the ability to estimate wildlife numbers using laid down standard scientific methods and procedures, and to assess range conditions, initiate and utilize range condition monitoring practices in routine range management and evaluate range management practices
- Apply various range improvement techniques like fodder diversification and introduction of cultivated pasture appropriately under diverse range conditions and circumstances

#### Course content

An introduction to basic principles used in the management of wildlife populations, their habitats and their human users. General concepts in: ecological processes; population dynamics and structure; sampling in wildlife; life history patterns, biotic and abiotic factors structuring wildlife populations and endangered species. Home range and territoriality; coloniality; mating systems; hierarchy. Response of wildlife to humans. Plant-herbivore system. Herbivore-carnivore system. Predation of domestic animals by wild animals. Nutritional ecology (anatomy and physiology; feeding ecology; diet composition and analysis; nutritional value of plants; plant chemicals and toxins; management of toxic plants and affected game; grazing and browsing capacity; mineral deficiencies and supplementary feeding; nutrition in captivity). Animals and their characteristics. Management techniques of wildlife. Ranch (habitat) management. Genetic management. Wildlife management and rural development.

#### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course Title:</b> Field Attachment I	
<b>Course Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>Contact hours</b>	Six weeks of Field Attachment
<b>Notional Hours</b>	60
<b>NQF Credits</b>	6
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2
<b>Course Aims</b>	
The aim of this course is to expose students to practical know-how in the field under the supervision of a technical expert in order for students to come to terms with technology and limitations under a working environment.	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Apply theoretical knowledge to analyse situations and execute appropriate actions in a work environment relevant to their training
- Conduct administrative duties at the office including permit issue, report writing, budgeting and planning, under supervision
- Display some degree of teamwork and leadership abilities
- Identify researchable field problems and areas of specialization in their field of study
- Appraise operations of their institution of attachment and other related institutions and present findings

**Course content**

Six weeks of field attachment; at the end of the second year, students will be attached to industries and institutions dealing with environmental/natural resource management selected to ensure that the objectives of on-site training are attained. An attachment report and oral presentation will constitute the total assessment mark. Students will be visited during their attachment on-site to check on the efficiency of attachment.

**Assessment strategies:** 50 % report presentation at a seminar; 50 % Field report. Subject to satisfactory attendance and good conduct during attachment.

<b>Course title:</b>	<b>Agroforestry</b>
<b>Code</b>	AIEA 3781
<b>NQF level</b>	7
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 3hrs alternate for 14 weeks (21hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
To introduce students to the different agroforestry systems and technologies used for sustainable land use and the ecological-economic interactions in agroforestry.	

**Learning outcomes**

Upon completion of this course students should be able to:

- Demonstrate an understanding of agroforestry as a land use option
- Diagnose land management problems and design agroforestry interventions appropriately
- Appraise appropriateness of agroforestry projects in addressing environmental, food security, poverty and other socio-economic problems
- Initiate and manage agroforestry projects with minimum supervision
- Conduct guided or unguided research on an agroforestry topic and disseminate findings to an audience

**Course Content**

Introduction to agroforestry; definition and principles of agroforestry, integrated land-use system, need for agroforestry, causes and consequences of deforestation. Land-use systems and possible agroforestry intervention. Multi-purpose tree species and their uses. Agroforestry systems and practices including apiculture. Agroforestry demonstration plots. Ecological and economic interactions. Agroforestry development in Namibia and the SADC region – case studies.

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)



<b>Course Title:</b>	<b>BIOSTATISTICS</b>
<b>Course Code</b>	ACSC 3692
<b>NQF Level</b>	
<b>Notional Hours</b>	120
<b>Contact hours</b>	3 lecture hours / week for 14 weeks; 3 tutorial / practical hours alternate weeks for 14
<b>NQF Credits</b>	12
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1
<b>Course Aims</b>	
This module introduces students to concepts of statistics and experimentation. It prepares students to design, execute and analyse experiments and present findings in formats that are understandable to other researchers and the public	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
<ol style="list-style-type: none"> <li>11. Perform calculations in basic statistics and probability</li> <li>12. Validate research hypothesis on the basis of statistical inference tools</li> <li>13. Demonstrate understanding scientific research methodology</li> <li>14. Design experiments, collect data, analyse and interpret</li> <li>15. Present statistical data in formats acceptable for scientific writing and public consumption</li> </ol>	

### Course 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.

### Assessment Strategies

Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 02 hour examination paper

<b>Course title:</b>	<b>Nature Conservation</b>
<b>Code</b>	AIEN 3792
<b>NQF level</b>	7
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42 hrs); Practicals: 1 x 3 hr/wk alternate for 14 weeks (21 hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
The course is designed to give students basic knowledge on threats to species and their habitats, and to introduce main concepts and methods of nature conservation. This course also aims to familiarize students with the process and techniques of Environmental Impact Assessment required for fulfillment of sustainable environmental development.	

### Learning outcomes:

Upon completion of the course, students should be able to:

- Demonstrate knowledge of aims and purposes of nature conservation
- Identify and valorize areas for nature conservation
- Apply various methods in nature conservation
- Design an Environmental Impact Assessment process into a project plan
- Conduct Environmental Impact Assessment on existing and new projects, prepare EIA reports and recommend mitigation measures

### Course content

Concepts of nature conservation.Values and ethics of conservation.Species conservation.Extinction and Endangered Species.Key and Charismatic Species.Conservation Strategies.Conservation and Sustainable

Development.Genetic conservation.Introductions and re-introductions.Nature Conservation in Urbanized and Agricultural Ecosystems.Environmental Impact Assessment (environmental impact of human activities on natural resources; environmental consideration in physical planning; impact identification, monitoring and mitigation; formal environmental assessment).Environmental Education. The economics of conservation.

#### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Geo-informatics
<b>Code</b>	AIES 3791
<b>NQF level</b>	7
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
To introduce students to the use of GIS and remote sensing programs in monitoring and management of natural resource populations and habitats as well as in solving problems related to management of natural resources	

#### Learning outcomes:

Upon completion of the course, students should be able to:

- Define the role of Geographic Information Systems (GIS) and Remote sensing in natural resource management
- Describe different GIS data formats, and their use and application to various GIS applications and identify appropriate processing and analysis techniques to solve specific GIS related problems
- Use GIS software to assist with a decision making process; examine and interpret aerial photographs and satellite images, capture data using a hand-held GPS receiver, and build spatial datasets
- Appreciate the uses and limitations of GIS and Remote sensing for natural resource management and value the importance of high quality digital spatial data in natural resource management

#### Course Content:

Basic concepts, GIS data structures, processing and analysis techniques, basic cartography, map projections, introduction to GPS, basic aerial photograph interpretation. Use of GIS software. Use of GPS receiver. Display and manipulation of image files. Remote sensing for land use/land cover identification and vegetation monitoring.

#### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>NQF level</b>	7
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
To introduce students to the process of formulating national and international environmental policy, laws and conventions and their application in management of natural resources in Namibia	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Demonstrate knowledge of natural resources laws, statutes and policies in Namibia
- Identify the different policy alternatives applicable for natural resource governance and the way they shape people's behavior toward management of natural resources
- Examine and understand how environmental policies are created and upheld through institutions
- Understand the basic foundations of international law (*history, sources, relevance*) and its implication to the development of Namibia environmental policy and law.
- Evaluate progress made by Namibia in implementing UNCBD, UNFCCC, UNCCD, CITES and Ramsar Convention.

**Course content**

Principles of law with particular reference to environment, forestry and wildlife resources. Legal process governing environment and industrial pollution. Specific environmental acts and statutes dealing with environment, forestry and wildlife. Introduction to International environmental law and International Conventions; Policies: design, implementation, evaluation of policy impacts. Law enforcement in management of natural resources

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	<b>Community-based Natural Resource Management</b>
<b>Code</b>	AIES 3702
<b>NQF level</b>	7
<b>Contact hours</b>	Lectures: 2 x 1hr/wk for 14 weeks (28hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
The course enhances the students understanding of community based natural resource management systems including institutional arrangements, conflict resolution, participatory resource monitoring and management of common resources	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Demonstrate a broad but deep understanding of rural livelihoods, community based natural resources management's institutions, power, responsibility and benefit sharing arrangements and challenges involved
- Apply appropriate skills to monitor health and exploitation of a variety of natural resources under community based natural resource management arrangements
- Analyze simple natural resource management conflicts and recommend solutions
- Conduct evaluation of community based natural resource projects using existing or self generated data or information

**Course content**

Rural development and livelihoods: concepts and principles. Principles of devolution, proprietorship, incentives, authority and responsibility over natural resources. Rural livelihood strategies. Local institutions for CBNRM; community forestry and conservancies: definition and approaches, aims and objectives, history, policy and strategies relevant to community forestry and conservancies. Technical and management alternatives to integrated forest management. Case studies on community forestry and conservancies. The role of governance, participation, communication and community capacity building on CBNRM. Natural resources monitoring and adaptive utilization. Enterprise development and benefit sharing. Management of conflicts over natural resources. Indigenous knowledge on conservation of natural resources

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 2 hr paper)

<b>Course Title:</b> Agricultural Extension	
<b>Course Code</b>	AAEC 3712
<b>NQF Level</b>	7
<b>Contact hours</b>	Lectures: 4 x 1hrL/W for 14 weeks (56hrs); Practicals: 1 x 1hr Prac/W for 14 weeks(14 hrs)
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Prerequisite</b>	AAEC 3691 Rural Sociology
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
The course exposes students to concepts of extension, principles and theories of extension, their role and application in agricultural extension and sustainable agricultural development.	

**Learning outcomes:**

Upon completion of this Course, students should be able to:

- Explain the extension concepts, principles, philosophies and origins of agriculture extension.
- Assess and evaluate the need for extension and its role in sustainable agricultural development.
- Analyze the various methods and approaches to agricultural extension
- Identify workable and effective extension strategies.
- Understanding the elements of diffusion and innovations
- Design effective participatory extension services
- Plan and implement an extension activity/service

**Course Content:**

The course explore 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.

**Assessment Strategies**

Continuous assessment 40% (minimum 2 tests and 1 assignment) Examination 60% (1 x 3 hour paper)

<b>Course Title:</b>	<b>RESEARCH METHODS</b>
<b>Course Code</b>	ACSC 3792
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<b>Contact hours</b>	03 lecture hours / week for 14 weeks; 3 tutorial hours / practical hours alternate weeks for 14 weeks
<b>NQF Credits</b>	12
<b>Co-requisite</b>	ACSC 3692: BIOSTATISTICS
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b>	
This module further develops the student's understanding of research concepts that were not covered in Biostatistics and to design, execute, analyse and present research findings.	
<b>Learning Outcomes/Specific Outcomes</b>	
Upon completion of this course, the student should be able to:	
6. Perform calculations with non-parametric data and make statistical inferences	
7. Design experiments, analyse, interpret and present results	
8. Design field surveys, collect data, analyse and interpret results	
9. Utilise computer software in controlled experiments and field survey data analysis	
10. Evaluate critical results of experiments published in journal articles	

**Course 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

### Assessment strategies

Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 02 hours paper)

## FOURTH YEAR COURSES: FORESTRY SPECIALISATION

<b>Course title:</b>	Research Project (Forestry)
<b>Code</b>	AFOR 3810
<b>NQF level</b>	8
<b>Contact hours</b>	Consultation: 1 x 1hr/wk for 28 weeks (28 hrs)
<b>Notional Hours</b>	320
<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
<b>Course aims</b>	
To equip students with skills needed to carry out independent research in the field of forestry including planning, designing, methodology, data analysis and result interpretation, discussion and dissemination of findings.	

### Learning outcomes:

Upon completion of the course, students should be able to:

- Identify researchable problems and develop research project proposal with minimum assistance
- Implement a research project; analyze data statistically, interpret results and write up, independently or with little supervision
- Demonstrate ability to make high quality presentations to a wide audience using well formulated arguments to express and support research findings

### Course content

Senior undergraduate 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% (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>Course title:</b>	Silviculture
<b>Code</b>	AFOR 3881
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	<b>AIES 3681: Ecology; AIES 3682: Plant Physiology</b>
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
Equip students with knowledge and skills required for cultivation of trees from seedling to a mature tree for a specific purpose and scientific management of forest ecosystems	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Apply ecosystem approach to the utilization and management of forest resources, maintaining essential ecological processes
- Apply silvicultural practices and skills to enhance the health of forest ecosystems including maintenance of biodiversity and health soil conditions
- Design forest management strategies that utilize fundamental principles of tree ecophysiology and husbandry as the basis for silvicultural prescriptions
- Evaluate and recommend silvicultural systems from the stand point of the end products required, socio-economic and ecological factors

**Course content**

Definitions and relations with other disciplines. Forest stand dynamics.. Forest plantations: plantation forestry in Southern Africa: justification and historical perspective. Planning of plantation: site selection, choice of species and provenances. Nursery practice. Seed collection, processing, storage and treatment. Forest establishment: site preparation, establishment methods: natural regeneration, coppicing, planting – direct seeding and transplanting. Forest tree maintenance: post planting problems, fertilization, irrigation, weed control, protection, pruning and thinning. Applicable silvicultural systems. Silviculture of selected indigenous and exotic species. Theory and practice of tree improvements

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Forest Protection
<b>Code</b>	AFOR 3891
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
To introduce students to the common diseases, infections and insects affecting plants of economic importance in Namibia and equip them with skills to identify best strategies for their control. Management of forest fires is also covered	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Demonstrate a deep understanding of infection, establishment, spread and control of common forest diseases and pests in Namibia and the southern Africa region
- Detect, investigate and quantify seriousness of disease and pest outbreaks and recommend immediate control measures
- Equip, train, mobilize and coordinate fire control teams in fighting less serious forest fires

**Course content**

The concept of disease, biotic and abiotic causes of plant diseases: Introduction to plant pathogenic organisms with special reference to forest pathogens; Principles of plant infection, disease establishment and spread; Major plant pathogens in Southern Africa, their etiologies and methods of control; Plant quarantine procedures in Southern Africa. Biology, ecology and control (cultural, chemical and biological) of major forest insect pests and stem/wood borers; Useful forest insects. Forest Fire Management: causes, prevention and suppression.

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Forest Mensuration
<b>Code</b>	AFOR 3881
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
Equip students with the different techniques of vegetation measurements and data display which enable decision making regarding forest management.	

#### Learning outcomes:

Upon completion of the course, students should be able to:

- Demonstrate knowledge of mensuration systems, concepts and models
- Demonstrate skill in using mensuration instruments to determine tree parameters such as basal area, canopy cover, and stand volume.
- Utilize forest mensuration data to determine sustainable harvesting, taking into account recruitment rate and growth increment

#### Course content

Introduction; importance of forest mensuration, scientific basis of measurement, Measurement scales. Precision, Accuracy and biases in measurements. Measurements of tree parameters: diameter, height, tree form/taper/stem analysis and bark thickness. Tree age and growth determination. Volume calculation estimations. Wood weight estimates, density and moisture content. Estimation of stand parameters; basal area, volume, stocking, species diversity, structure and composition. Stand growth and increment: CAI, PAI, MAI. Site quality assessment.

#### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course Title:</b> Field Attachment II	
<b>Course Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>Contact hours</b>	Six weeks of Field Attachment
<b>Notional Hours</b>	60
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2
<b>Course Aims</b>	
The aim of this course is to expose students to practical know-how in the field under the supervision of a technical expert in order for students to come to terms with technology and limitations under a working environment.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Apply theoretical knowledge to analyse situations and execute appropriate actions in a work environment relevant to their training
- Execute more administrative duties at the office including permit issue, report writing, budgeting and planning, under less supervision than given in Attachment I
- Display increased ability to take more responsibility and supervise basic operations in the institution of attachment
- Initiate research programs to address problems noted during attachment
- Appraise operations of their institution of attachment and other related institutions and present findings

#### Course content

Six weeks of field attachment; at the end of the third year first semester, students will be attached to industries and institutions dealing with environmental/natural resource management selected to ensure that the objectives of off-site training are attained. An attachment report and oral presentation will constitute the total assessment mark. Students will be visited during their attachment on-site to check on the efficiency of attachment.

**Assessment strategies:** 50 % report presentation at a seminar; 50 % Field report. Subject to satisfactory attendance and conduct during attachment.

<b>Course title:</b>	<b>Project Planning and Management</b>
<b>Code</b>	AGEC 3881
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3x 1hr/W for 14 weeks (42hrs); Practicals: 1 x 1hr Prac/W for 14 weeks (14 hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	AAEC 3691 Principles of Microeconomics
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
The course exposes students to principles and applications of project planning and management in agriculture.	

**Learning outcomes:**

Upon completion of this Course, the student should be able to:

1. Describe the project cycle and management concepts
2. Identify and formulate plans of sound agricultural projects among alternative development opportunities which are likely to accelerate economic development most rapidly;
3. Identify project benefits and target groups and weaknesses and risks and provide remedial measures
4. Identify various types and sources of data (technical) required in project planning and management.
5. Use economic and financial analysis techniques to evaluate projects.
6. Manage and monitor agricultural projects.
7. Use best practices in agricultural project planning and management in order to improve project sustainability.

**Course 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

**Assessment Strategies**

Continuous assessment 60% (minimum 2 tests and 1 assignment) Examination 40% (1 x 3 hour paper)

<b>Course title:</b>	Forest Inventory
<b>Code</b>	AFOR 3882
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	AFOF 3881: Forest Mensuration
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
Equip students with knowledge and skills of forest inventory and application of forest inventory in management of forest resources.	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Demonstrate knowledge of theory and techniques of forest inventory
- Demonstrate skill in using inventory techniques to determine quantities and value of forest resources
- Design and conduct forest inventories with little or no supervision, compile inventory reports, and utilize inventory data in forest planning and management



### Course content

Introduction to forest inventory. Purpose and planning of forest inventory. Sampling and samplings design; simple random sampling, systematic sampling, stratified sampling, cluster sampling, regression estimators, double and two stage sampling, point sampling. Types of forest inventory. Volume estimation of selected indigenous species. Assessment of other forest values. Data recording and processing in forest inventory. Recent developments in forest resource assessment. Introduction to remote sensing and its application in forest inventory. Interpretation of aerial photographs and forest classification.

### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Forest Economics and Marketing
<b>Code</b>	AFOR 3812
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 4 x 1hr/wk for 14 weeks (56hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)
<b>Notional Hours</b>	160
<b>NQF Credits</b>	16
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
To introduce students to the principles of forest economics including land valuation, input and output costs as well as wood marketing mechanisms.	

### Learning outcomes:

Upon completion of the course, students should be able to:

- Demonstrate substantial understanding of economic concepts and economics of resource conservation
- Apply methods to calculate input costs, private benefits versus social costs/benefits of forest harvesting
- Estimate values (pricing) of forest resources
- Compare cost-benefit analysis of small, medium and large scale forestry operations;
- Carry out market research; design a marketing strategy and promotion of products

### Course content

Forest economic concepts, economics of resource conservation. Peculiarities of forestry: production period, interest rates. Costing of forest operations and their analysis. Methods of input costing – private versus social costs and private versus social benefits. Depreciation methods and determination of maintenance costs. Techniques of appraising forest investments: NPV, IRR, CBR, Subsidies, taxes, interest rates, risks and uncertainties. Economics of forestry operation: choice of species, spacing, economics of pruning, thinning, extraction.. Forest valuation: stumpage appraisal, valuation of forest land, forest rotation. Principles of shadow pricing, economies and diseconomies of scale in forestry operations. Maximum sustainable yield and maximum economic yield. Work-study procedures... Economics of forest conservation. Techniques of evaluating protected areas: recreation sites, national parks, community forests, conservancies, etc. Principles of marketing, market research and promotion.

### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Forest Management
<b>Code</b>	AFOR 3892
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 4 x 1hr/wk for 14 weeks (56hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
To introduce students to the principles and strategies for sustainable management of forests and woodlands, the different harvesting operations, equipments and techniques used in harvesting wood from natural woodlands in developing countries and planning and administration of forest estates.	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Demonstrate in depth understanding of forest management and forest harvesting practices
- Plan, design a logging operations taking into account costs of operations
- Compare and contrast different harvesting systems and evaluate their relevance to Namibian ecological conditions
- Develop management plans for forests and woodlands in Namibia
- Demonstrate basic understanding of organization and administration of forest enterprises in Namibia

**Course content**

Scope of forest management. Theory and practice of normal forest. Estimation of growth and yield: growing site index equations, yield models, current yield and future yields. Sustained yield. Rotation, allowable cut, cutting cycle. Sustainable exploitation of woodlands (community forests, concession areas, private woodlands (private farms). Transportation of wood materials, Ergonomics and work safety. Forest management plans; development, implementation, monitoring and evaluation. Forest organisation in Namibia. Administration of forest enterprises; records, personnel management, programs of work.

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

**FOURTH YEAR COURSES: ENVIRONMENTAL SCIENCE SPECIALIZATION**

<b>Course title:</b>	Research Project (Environmental Science)
<b>Code</b>	AENV 3810
<b>NQF level</b>	8
<b>Contact hours</b>	Consultation: 1 x 1hr/wk for 28 weeks (28 hrs)
<b>Notional Hours</b>	320
<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
<b>Course aims</b>	
To equip students with skills needed to carry out independent research in the field of environmental science including planning, designing, methodology, data analysis and result interpretation, discussion and dissemination of findings.	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Identify researchable problems and develop research project proposals with minimum assistance
- Implement a research project; analyze data statistically, interpret results and write up, independently or with little supervision
- Demonstrate ability to make high quality presentations to a wide audience using well formulated arguments to express and support research findings

**Course content**

Senior undergraduate 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% (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>Course Title:</b>	Field Attachment II
<b>Course Code</b>	AACA 3701
<b>NQF Level</b>	7
<b>Contact hours</b>	Six weeks of Field attachment
<b>Notional Hours</b>	60
<b>NQF Credits</b>	8
<b>Prerequisite</b>	None

<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	1 and 2
<b>Course Aims</b>	
The aim of this course is to expose students to practical know-how in the field under the supervision of a technical expert in order for students to come to terms with technology and limitations under a working environment.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Apply theoretical knowledge to analyze situations and execute appropriate actions in a work environment relevant to their training
- Execute more administrative duties at the office including permit issue, report writing, budgeting and planning, under less supervision than given in Attachment I
- Display increased ability to take more responsibility and supervise basic operations in the institution of attachment
- Initiate research programs to address problems noted during attachment
- Appraise operations of their institution of attachment and other related institutions and present findings

#### Course content

Six weeks of field attachment; at the end of the third year, semester 1, students will be attached to industries and institutions dealing with environmental/natural resource management selected to ensure that the objectives of off-site training are attained. An attachment report and oral presentation will constitute the total assessment mark. Students will be visited during their attachment on-site to check on the efficiency of attachment.

**Assessment strategies:** 50 % report presentation at a seminar; 50 % Field report. Subject to satisfactory attendance and conduct during attachment.

<b>Course title:</b>	Environment and Development
<b>Code</b>	AENV 3881
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
The course aims to equip students with knowledge that enables them to develop conservation approaches that focus on causes of environmental problems and not the symptoms and elaborate on the link between Conservation and development and the objectives of Multilateral Environmental Agreements	

#### Learning outcomes:

Upon completion of the course, students should be able to:

- Demonstrate substantial knowledge of the place of environment in sustainable development, approaches to environmental conservation, national policies and strategies of environmental conservation and international convention on environmental conservation
- Use case-studies to analyze development projects' compliance to sustainable development principles and advice on future projects.
- Conduct environmental impact assessment of existing and new development projects and report findings
- Appraise environment conservation policies, conventions and strategies usefulness in addressing environmental concerns in Namibia and the globe at large

#### Course content

Concepts of development and underdevelopment. Measurements of development. Links between environment and development. Sustainable development; concepts, principles(Triple bottom line) and approaches. National approaches and tools for sustainable development; EIA, state of the environment reporting, national strategy.

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Environmental Pollution and Control
<b>Code</b>	AENV 3891
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr alternate for 14 weeks (14hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
Equip students with knowledge required to identify, measure and quantify pollution in different ecosystems (aquatic, terrestrial and atmosphere) and devise mitigation strategies to reduce the pollution	

**Learning outcomes:**

Upon completion of the course, students should be able to:

- Identify pollutants that possess potential danger to the environment, their origin and possible transmission mechanisms
- Demonstrate skills and knowledge of techniques for quantifying pollution levels and/or wide variety of pollutants in differing components of the environment (atmosphere, water, soil etc)
- Evaluate operations of mining, agricultural projects and a wide variety of industries and recommend strategies of guarding against or mitigating environmental pollution

**Course content**

The environment as a source and sink of resources and wastes. The concept of environmental degradation and pollution. The state of environmental pollution in Namibia. Classification of pollutants. Types of urban pollution. Measurement, dispersion and transportation of urban pollutants. Impact of urban pollution. Control strategies. Domestic/industrial water pollution; measurement, treatment and control. Agricultural pollutants and ecosystems. Use of environmentally friendly agrochemicals and fertilizers and alternative methods of pest control (biotechnology).

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Watershed Management
<b>Code</b>	AENV 3801
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 2 x 1hr/wk for 14 weeks (28hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)
<b>Notional Hours</b>	80
<b>NQF Credits</b>	8
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	1
<b>Course aims</b>	
The course aims at introducing the concept of watershed approach to resource-oriented planning and development, and as a unit of land and water management emphasizing on land use systems and water resources in Namibia	

<p><b>Learning outcomes:</b></p> <p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>▪ Demonstrate a deep understanding of physical features of a watershed and how they are impacted by land-uses and in-turn determine hydrological characteristics of the watershed</li> <li>▪ Apply suitable hydrological analysis techniques for collection of field data and information on hydrological processes and land management at a watershed level</li> <li>▪ Critically evaluate the impact of different land-uses on quality and water delivery characteristics of a watershed and advice on appropriate land-uses and land management practices under various ecological and socio-economic scenarios</li> <li>▪ Apply holistic, ecosystem approach to watershed management and planning</li> </ul>
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**Course content**

The watershed as a unit of resource-oriented planning and development. Principles and objectives of watershed management. Physical description of watersheds. Relationships between land use conditions and water delivery characteristics of watersheds. Management and development of water sources in Namibia; perennial and ephemeral rivers, underground water, role of river basin authorities. Water harvesting. Watershed analysis including; techniques, collection of field data and sources of information.

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Management of Arid and Semi-arid Lands
<b>Code</b>	AENV 3882
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
The course aims at enhancing the students understanding of characteristics of arid and semi-arid lands, their management challenges and potential economic exploitation options	

<p><b>Learning outcomes:</b></p> <p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>▪ Demonstrate substantial knowledge of the dynamics / variability of arid and semi-arid lands in Namibia in terms of primary productivity, climate and water resources availability and use</li> <li>▪ Evaluate impacts of human use on arid and semi-arid lands' productivity/health giving special attention to factors causing desertification/degradation of ASALS</li> <li>▪ Apply various techniques to restore, reclaim degraded arid and semi-arid lands</li> <li>▪ Develop strategies for enhancing sustainable economic exploitation of arid and semi-arid lands under different ecological and socio-economic scenarios</li> </ul>
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**Course content**

Characteristics of arid and semi-arid lands; concept of aridity, categories of drylands, characteristics of drylands, changes in drylands. Land use practices; traditional land use practices, crop production, pastoralism, game ranching, tourism and wildlife. Environmental management issues; desertification, land degradation, and prevention of land degradation. Types and methods of Interventions in management of drylands and their impacts. Reclamation and sustainable development of ASALS. Case studies in Namibia and the SADC region.

**Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Environmental Planning and Management
<b>Code</b>	AENP 3882
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)

<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
The course aims at equipping students with knowledge and skills of planning for natural resource management.	

#### Learning outcomes:

Upon completion of the course, students should be able to:

- Demonstrate an deep understanding of the environmental planning elements and processes
- Conduct surveys to collect data relevant to environmental planning
- Develop and implement environmental management plans

#### Course content

Concepts of planning and management.Planning tools and processes: physical, human and institutional resources.Basic methods in planning and management of the environment. Environmental management plans: types, development, implementation, monitoring and evaluation.

#### Assessment strategies

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Environmental Impact Assessment
<b>Code</b>	AENE 3882
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	AIES 3782: Natural Resource Governance
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
To familiarize students with the process and techniques of Environmental Impact Assessment required for fulfillment of sustainable environmental development	

#### Learning outcomes:

Upon completion of the course, students should be able to:

- Design an Environmental Impact Assessment process into a project plan
- Apply policies in the context of monitoring and controlling project activities
- Conduct Environmental Impact Assessment on existing and new projects, prepare EIA reports and recommend mitigation measures
- Appraise available EIA techniques and methods and determine the best methods for assessing different projects and different prevailing circumstances

#### Course 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% (At least three assessments); Exam: 60% (1 x 3 hr paper)

<b>Course title:</b>	Environmental Education
<b>Code</b>	AENE 3892
<b>NQF level</b>	8
<b>Contact hours</b>	Lectures: 3 x 1hr/wk for 14 weeks (42hrs); Practicals: 1 x 2hr/wk for 14 weeks (28hrs)
<b>Notional Hours</b>	120
<b>NQF Credits</b>	12
<b>Pre requisite</b>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester offered</b>	2
<b>Course aims</b>	
The aim of this course is to discuss the significance of and methods applied in environmental education at national, regional and global level	

#### **Learning outcomes:**

Upon completion of the course, students should be able to:

- Demonstrate a profound understanding of the genesis, evolution and principles of environmental education
- Demonstrate comprehension of the inter-linkages between different conservation institutions and their roles in environmental education
- Develop and implement basic environmental education programmes
- Identify and evaluate national, regional and global strategies for environmental education

#### **Course Content**

General principles of environmental education. Environmental awareness and ethics. Environmental educational institutions: nature history museums, herbaria, zoos and botanical gardens, national parks, reserves. Methods of environmental education. Publicizing and advertising environmental issues. Environmental education in primary and secondary schools in Namibia. Environmental education in media. Environmental education at regional and global level

#### **Assessment strategies**

Continuous assessment: 40% (At least three assessments); Exam: 60% (1 x 3hr paper)

## K. B.SC. WILDLIFE MANAGEMENT & ECOTOURISM (HONS) [17BSWL]

All modules listed below, except English Communication and Study Skills, English for Academic Purposes and Contemporary Social Issues, will be offered by Faculty 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.

### K.1 CURRICULUM

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	
SBLG 3511	Introduction to Biology	4	16	C	
HGHE 3581	Fundamentals of Physical Geography	5	12	C	
SMAT 3511	Basic Mathematics	5	16	C	
<b>Total Credits Semester 1</b>					<b>68</b>
<b>Year 1 Semester 2</b>					
ULEA 3519	English for Academic Purposes	5	16	C	
UCSI 3580	Contemporary Social Issues	5	8	C	
SCHM 3532	Chemistry for Life Sciences	5	16	C	
SBLG 3512	Diversity of Life	5	16	C	
HGHE 3582	Fundamentals of Human Geography	5	12	C	
<b>Total credits Semester 2</b>					<b>68</b>
<b>TOTAL CREDITS YEAR 1</b>					<b>136</b>
<b>Year 2 Semester 1</b>					
AWLM 3611	Wildlife Ecology	6	16	C	
AWLM 3601	Wildlife Management	6	8	C	
AWLM 3631	Ecotourism	6	16	C	
AWLM 3671	Wildlife Nutrition	6	8	C	
AWLM 3651	Systematic Botany	6	16	C	
AWLM 3681	Freshwater Ecology	6	12	C	
<b>Total Credits Semester 1</b>					<b>76</b>
<b>Year 2 Semester 2</b>					
AWLM 3682	Ornithology	6	12	C	
AWLM 3602	Mammalogy	6	8	C	
AWLM 3642	Wildlife Diseases	6	8	C	
AWLM 3612	Ecology of African Ecosystems	6	16	C	
AWLM 3662	Geo-informatics for Wildlife Management	6	8	C	CLC 3509: Computer Literacy
AWLE 3602	Ethnobotany	6	8	C	
ACSC 3692	Biostatistics	7	12	C	None
<b>Total credits Semester 2</b>					<b>72</b>
<b>TOTAL CREDITS YEAR 2</b>					<b>148</b>
<b>Year 3 Semester 1</b>					
AWLM 3701	Governance of Wildlife Resources	7	8	C	AWLM 3601: Wildlife Management
AWLM 3781	Wildlife Conservation	7	12	C	HGHE 3582: Fund. Phys. Geography
AWLM 3721	Ecological Methods in Wildlife Studies	7	8	C	AWLM 3611: Wildlife Ecology



AWLM 3741	National Parks & Game Reserves	7	8	C	AWLM 3781: Wildlife Conservation
AWLM 3712	Animal Behaviour	7	16	C	AWLM 3682: Ornithology; AWLM 3602: Mammalogy
AACA 3701	Field Attachment I	7	8	C	
<b>Total Credits Semester 1</b>					<b>60</b>
<b>Year 3 Semester 2</b>					
AWLM 3702	Genetic Conservation	7	8	C	AWLM 3781: Wildlife Conservation
AWLM 3722	Wildlife Survey & Monitoring Techniques	7	8	C	
AWLM 3742	Habitat Management	7	8	C	AWLM 3781: Wildlife Conservation; AWLM 3601: Wildlife Management
AWLM 3732	Systematic of Birds and Mammals	7	16	C	AWLM 3682: Ornithology; AWLM 3602: Mammalogy
AWLM 3782	Herpetology & Terrarium	7	12	C	AWLM 3611: Wildlife Ecology
CSC 3792	Research Methods	7	12	C	CSC 3692: Biostatistics
<b>Total credits Semester 2</b>					<b>64</b>
<b>TOTAL CREDITS YEAR 3</b>					<b>124</b>
<b>Year 4 Semester 1</b>					
AWLM 3801	Freshwater Ichthyology & Aquaculture	8	8	C	AWLM 3681: Freshwater Ecology
AWLM 3811	Entomology	8	16	C	SBLG 3512: Diversity of Life
AWLM 3821	Economics of Wildlife Resources	8	8	C	AWLM 3601: Wildlife Management
AWLM 3881	Environmental Impact Analysis	8	12	C	AWLM 3611: Wildlife Ecology
ACA 3801	Field Attachment II	8	8	C	
AWLM 3810	Research Project	8	16	C	CSC 3782: Research Methods
<b>Total Credits Semester 1</b>					<b>66</b>
<b>Year 4 Semester 2</b>					
AWLM 3802	Ecotourism Marketing and Travel Plan Development	8	8	C	
AWLM 3822	Wildlife in Agriculture Ecosystems	8	8	C	
AWLM 3882	Biogeography	8	12	C	AWLM 3662: Geo-Informatics for WLM
AWLM 3841	Digital Wildlife Photography	8	8	C	
AWLM 3842	Environmental & Ecotourism Education	8	8	C	CSI 3529: Contemporary Social Issues
AWLM 3810	Research Project	8	16	C	CSC 3782: Research Methods
<b>Total credits Semester 2</b>					<b>60</b>
<b>TOTAL CREDITS YEAR 4</b>					<b>126</b>
<b>TOTAL CREDITS FOR THE PROGRAMME</b>					<b>534</b>

## K.2 MODULE DESCRIPTORS

### FIRST YEAR MODULES

#### 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 description:** 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.

**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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**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 description:** 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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#### SBLG 3511: INTRODUCTION TO BIOLOGY

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**Module title:** INTRODUCTION TO BIOLOGY  
**Code:** SBLG 3511  
**Course Equivalent:** Biology 1A  
**NQF level:** 4  
**Contact hours:** 4 lectures/ week for 14 weeks and one 3-hour practical session per week.  
**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.  
**Prerequisites:** NSCC (Biology C or better)

**Module description (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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#### HGHE 3581: FUNDAMENTALS OF PHYSICAL GEOGRAPHY

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##### HGHE 3581 Fundamentals of Physical Geography

**Proposed NQF Level:** 5      **Credits:** 12      **Contact Hours:** 3 hours/week over 14 weeks = 42 contact hours

**Content:** Students acquaint themselves with the essential foundations of Physical Geography, including common links to auxiliary disciplines and fields of study. The course presents structures, functions, processes and distributional patterns inherent in phenomena of "natural" environments, relating to climate, geomorphology, hydrology, soils and vegetation. The content focuses on the interrelationship of geo-ecosystems, including the human factor. With particular reference to Namibian conditions, the course offers fundamental applications of concepts inherent in the functioning of the atmo-, litho-, hydro- and biosphere.

**Assessment:** Continuous assessment 60% : Examination 40% (1 x 3 hour examination paper)

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#### SMAT 3511: BASIC MATHEMATICS

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**Module name:** BASIC MATHEMATICS  
**Code:** SMAT 3511  
**NQF level:** 5  
**Contact hours:** 4 lectures per week for 14 weeks; 2 tutorials per week for 14 weeks

**Credits:** 16  
**Module Assessment:** Continuous assessment 50% (at least 3 tests), examination 50% (3 hours examination paper).  
**Prerequisite:** NSSC Mathematics

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

**Module description:** 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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### CSI 3580 CONTEMPORARY SOCIAL ISSUES

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**Module Title:** CONTEMPORARY SOCIAL ISSUES  
**Code:** CSI 3580  
**NQF:** 5  
**Credits:** 8  
**Prerequisite:** None

**Module Description:**

*This course, Contemporary Social Issues (CSI), encourages behavioural change among UNAM students, with special reference to their sexual behaviour and to inculcate the primacy of moral reasoning in their social relations and their academic lives. In achieving the above aim, the following values and approaches will inform the CSI: Material will be presented on an integrative basis, stressing the interconnections amongst ethics, moral reasoning, citizenship, leadership, and values and approaches that direct to responsible social behaviour. Special emphasis will be placed on the construct of citizenship and its relation to democracy and the common good. Critical transformative theory will under gird the content of CSI. After completion of the CSI students will be empowered in the domains of human*

**Aims of the Course:**

- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
  - ❖ Present/Offer on an integrative and inter-disciplinary basis the six broad themes on learning strategies and approaches; norms, rules, and human conduct; leadership, citizenship, democracy, and common good; ethics; health and human sexuality, and environment and sustainability, sexuality, reproductive health, democracy, the environment, sustainable development, and responsible leadership. Flexible modes of assessment may be harnessed and students are required to sign the class attendance list each time after a class session. Compulsory attendance required.
- ❖ Explore the dimensions of ethical and moral choices,
  - ❖ Introduce students to the values, norms, rules and conduct of moral reasoning,
  - ❖ Identify and reflect upon some of the key CSI from the perspectives of contextual social ethics,
  - ❖ Deepen understanding of the construct of citizenship,
  - ❖ Apply/utilize/evoke critical theory that is transformative and empowering,
  - ❖ Broaden the student's scope and understanding of the environment and sustainability of the ecosystem services and how humans influence these, and
  - ❖ Educating the whole person and thereby prepare undergraduates to enjoy productive, meaningful careers and lives that benefit a society that increasingly resembles a global community.

### **Learning Outcomes:**

This course, CSI, is built upon learning outcomes. For that reason each unit or theme starts with its own learning outcomes. The focus on learning outcomes not only serves to demarcate the contents for each unit or theme. It also is the basis of the assessment of the programme as well as the evaluation of the students. Therefore,

On completing the course, students should be able to:

- ❖ Practice ethical reasoning,
- ❖ Demonstrate knowledge to make informed decisions as responsible citizens,
- ❖ Empower students to responsible behaviour changes and to transform high risk behaviour to the common good and responsible citizenship and give back such values to the community, nation, and world,
- ❖ Sensitise towards the meaning of values and morals and how they affect the attitudes of individuals and groups toward population issues,
- ❖ Recognise the need of balance between freedom and responsible behaviour,
- ❖ Discuss stewardship/custodianship of the environment and sustainability of ecosystem services, and
- ❖ Explain how human activities affect the environment and the sustainability of ecosystem services.

### **Assessment Strategies:**

#### ❖ **Continuous flexible modes of assessment (100%).**

The purpose of this evaluation is to assess whether the teaching of the course has resulted in the accomplishment of the aims of the course in each student. This evaluation is therefore focused on assessing the impact of the course in individual students. Various methods can be used: written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, essays, or reflections upon a theme or topic. Students should be graded based on continuous flexible modes of assessment (100%), and the Course Coordinator in consultations with the lecturers shall select the same written tests, multiple choice quizzes, assignments or brief reports, case analyses, presentations, etc. that shall be given to the students throughout the year.

#### ❖ **Profile or Student's File:**

It is required from each lecturer to keep proper profile or student's file where all the written assignments shall be kept. The student has the right of access to her/his profile during the Academic Year. At the end of the Academic Year the average percentage shall be work out based on the continuous flexible modes of assessment.

#### ❖ **Evaluation of the lecturer:**

After completion of the course the teaching should be evaluated. Students shall be invited to provide feedback on the teaching of lecturer/lecturers. The purpose of this evaluation is to identify how the course and the teaching can be improved.

### **Resources and Literature:**

This course, CSI, is built upon various learning resources. For that reason each unit or theme shall include its own relevant literature or resources for further consultations.

### **Course Content:**

Following six (6) broad themes shall be covered:

#### **Learning Strategies and Approaches:**

Accountability and Responsibility, including plagiarism; Facilitative Learning; Reflective practice when dealing with and discussion of case studies, and value of knowledge to make informed decision.

#### **Norms, Rules, and Human Conduct:**

Values, responsibilities, rights and conduct as a choice for or against good and evil actions and to know the difference between right and wrong.

#### **Leadership, Citizenship, Democracy and Common Good:**

People want to make sure that leadership adopt and implement ethical codes of conduct, avoid corruption practices, provide job security, support the needs and concerns of the nation as the whole. This means that responsible leadership is expected to play a proactive role and contribute to build a sustainable and humane society.

What is citizenship and why does it matter? Complex citizenships: rights-based conceptions of citizenship and the construct of membership as entitlements (focusing on the formal prerequisites for political participation); substantive citizenship and its accompanying responsibilities granted to individuals (rather than groups) by the state. The construct of rights granted to citizens; liberty of the person, freedom of thought and faith and the right to justice. Democracy as a historical and social construct; rights and obligations under democracy; social democracy and empowerment; from rights-based constructs of democracy to social democracy and the common good.

**Ethics:** Global Ethic as a minimal fundamental consensus concerning binding values, irrevocable standards, and fundamental moral attitudes, and Ethics in Context from African Perspectives, especially with reference to the concept of a connected humanity (Ubuntu), self-worth (personhood), etc.

**Health and Human Sexuality:**

Health and sexually-related challenges and theoretical approaches and strategies on health, health disparities, ethical issues in medical research, sexuality-related challenging issues such as sexual orientation, HIV and AIDS, substance abuse and non-communicable diseases, etc., concepts of gender, in particularly gender based violence and power relations.

**Environment and Sustainability:**

Awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, environmental protection and bio-diversity. Contemporary issues such as sustainable development, environmental sustainability, globalisation, include climate change, the global food crisis and on-going financial and economic crisis. The responsible citizens towards the environment, and the issues related the right to a healthy and clean environment and the responsibilities of citizens to make sure that it is sustainable. From responsible leadership it is demanding that business and industry behave responsibly and contribute to develop a sustainable society.

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**SCHM 3532: CHEMISTRY FOR LIFE SCIENCES**

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<b>Module Title:</b>	<b>CHEMISTRY FOR LIFE SCIENCES</b>
<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 Description:**

This module is designed for students that have insufficient background in chemistry and for non-chemistry majors. It is an introduction to topics in general and organic chemistry, and biochemistry. The following will be covered:

**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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**SBLG 3512: DIVERSITY OF LIFE**

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<b>Module title:</b>	<b>DIVERSITY OF LIFE</b>
<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 description (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.)***

## SECOND YEAR MODULES

### PART B: COURSE SPECIFICATION

#### COURSE TITLE: WILDLIFE ECOLOGY

**COURSE CODE** AWML 3611

**NQF LEVEL** 6

**CONTACT HOURS** LECTURES: 4 X 1HR/WK FOR 14 WEEKS (56HRS); PRACTICALS: 3 HR/WEEK FOR 14 WEEKS (42HRS)

**NATIONAL HOURS** 160

**NQF CREDITS** 16

**PREREQUISITE** NONE

**COMPULSORY/ELECTIVE** COMPULSORY

**SEMESTER OFFERED** 1

#### COURSE AIMS

The course introduces students to the structure and function of ecosystems and how the physical and chemical characteristics of an ecosystem shape animal communities and influence the process of succession. This course is also designed to equip students with necessary understanding of population structure and dynamics, theory and techniques of population analysis, population growth models and factors controlling population growth.

#### Learning outcomes

Upon completion of the course, students should be able to:

- Identify the key components of an ecosystem and demonstrate how the components relate to each other.
- Identify abiotic and biotic factors that influence animal adaptations, distributions and abundances
- Compare the structure, composition, diversity and conservation significance of different animal communities
- Apply succession models to analyze succession stage of a given landscape
- Apply the concepts of habitat utilization, essential processes and ecological systems to population studies
- Demonstrate ability to utilize different analytical techniques to quantify and analyze simple and complex characteristics and processes of animal communities
- Compare effectiveness of different models in presentation of ecological phenomena
- Carry out guided field studies to validate simple population theories and hypotheses

#### Course content

Concept of ecology. Organism and its environment (adaptation, water and thermal balance, light, soil). Ecosystem ecology: energy flow, biomass, trophic levels, biogeochemical cycles. Major ecosystems of southern Africa, with special reference to Namibia. Community ecology: structure, stability, disturbance, diversity, patterns. Ecological succession. Properties of populations: distribution, densities, age and sex structure, mortality and natality, survival, migration and immigration. Population regulation. Interspecific relationships: competition, predation, commensalism, amensalism, mutualism. Feeding niche. Life histories patters

#### Assessment strategies

Continuous assessment: 50% (at least 2 tests, practical assessments); Exam: 50% (1 x 3 hr paper).

<b>COURSE TITLE: WILDLIFE MANAGEMENT</b>	
<b>COURSE CODE</b>	AWLM 3601
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
This course is designed to give students a broad understanding of principles and practices of wildlife management with emphasis to practices in Namibia and other SADC countries.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Value wildlife to human existence.
- Analyze the influence of biophysical and human factors in shaping wildlife populations
- Apply basic scientific principles in solving simple wildlife management problems
- Develop a management plan for game ranch
- Evaluate wildlife trophies

#### Course content

An introduction to basic principles used in the management of wildlife populations, their habitats and their human users. General concepts in ecological processes; population dynamics and structure; life history patterns, biotic and abiotic factors structuring wildlife populations and endangered species. Response of wildlife to human. Plant-herbivore system. Herbivore-carnivore system. Predation of domestic animals and by domestic animals. Wildlife species and their characteristics: antelope and other smaller herbivores, large herbivores, predators, ostriches, combining wild and domestic herbivores. Game ranch planning: fences, water holes, roads. Wildlife management techniques. Harvesting, hunting and capturing wild animals. Handling and measuring trophies. Wildlife management and rural development.

#### Assessment strategies

Continuous assessment: 40% (at least three assessments); Exam: 60% (1 x 2 hr paper)

<b>COURSE TITLE: ECOTOURISM</b>	
<b>COURSE CODE</b>	AWLM 3631
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 4 X 1HR/WK FOR 14 WEEKS (56HRS); PRACTICALS: 3 HR/WEEK FOR 14 WEEKS (42HRS)
<b>NATIONAL HOURS</b>	160
<b>NQF CREDITS</b>	16
<b>PREREQUISITE</b>	HGHE3511: Fundamentals of Physical Geography
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
This course is designed to give students basic knowledge on the wildlife tourism. It aims to familiarize students with main form of ecotourism and develop abilities for ecotourism planning and guiding.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Apply ecotourism principles for nature conservation
- Analyze the positive and negative influence of ecotourism on wildlife management and conservation
- Demonstrate the ability for ecotourism field guiding and marketing.
- Create a conducive environment for ecotourism development
- Develop management plans for ecotourism travel

#### Course content

Major goals of ecotourism; tourism and wildlife habituation; negative impact of wildlife tourism; field guiding practice; forms of ecotourism: angling, trophy-hunting, bird-watching, marine and coastline tourism, primitive camping; ecotourism internship; hospitality and ecotourism development.

#### Assessment strategies

Continuous assessment: 40% (at least three assessments, practical assessments); Exam: 60% (1 x 3 hr paper)

<b>COURSE TITLE: SYSTEMATIC BOTANY</b>	
<b>COURSE CODE</b>	AWLM 3651
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 4 X 1HR/WK FOR 14 WEEKS (56HRS); PRACTICALS: 3 HR/WEEK FOR 14 WEEKS (42HRS)
<b>NATIONAL HOURS</b>	160
<b>NQF CREDITS</b>	16
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
The course introduces students to morphology, anatomy and systematic of plant species, with special reference to southern African flora.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate a deep knowledge on plant classification system
- Identify plant species down to species or genus level, especially trees, shrubs and grasses of importance to the wildlife
- Develop a local herbarium
- Conduct a thorough analysis of plant communities for site evaluation for nature conservation

#### Course content

Introduction to plant taxonomy. Plant anatomy and morphology. Taxonomic concepts, plant classification, nomenclature. Trees, shrubs, grass and herbs identification. Botanical keys: types and use. Specimen collection. Major plant families in southern Africa, with special reference to Namibia.

#### Assessment strategies

Continuous assessment: 50% (at least three tests, practical assessments); Exam: 50% (1 x 3 hr paper)

<b>COURSE TITLE: FRESHWATER ECOLOGY</b>	
<b>COURSE CODE</b>	AWLM 3681
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 3 X 1HR/WK FOR 14 WEEKS (42HRS); PRACTICALS: 1 X 3HR ALTERNATE FOR 14 WEEKS (21HRS)
<b>NATIONAL HOURS</b>	120
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
This course equip students with knowledge on the structure and function of aquatic ecosystems in Namibia and other SADC countries, and their management and potential economic exploitation options	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate a knowledge on aquatic ecosystems in Namibia and other SADC countries
- Analyze ecological structure and function of aquatic habitats
- Evaluate aquatic habitats for wildlife management
- Recognize threats to aquatic habitats and develop appropriate conservation plan

#### Course content

Abiotic parameters influencing productivity of aquatic ecosystems. Diversity, structure and functioning of various community structures: phytoplankton, zooplankton and benthos. Direct and indirect interactions between the biotic and abiotic components of the aquatic ecosystems. Interspecific relationships. Reproduction tactics, growth, survival and fecundity of producers and consumers. Aquatic ecosystems of Namibia and other SADC countries. Management and conservation of aquatic habitats

#### Assessment strategies

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 3 hr paper)



<b>COURSE TITLE: ORNITHOLOGY</b>	
<b>COURSE CODE</b>	AWLM 3682
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	120
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course introduces students to biology of birds, their ecology and evolution. Additionally it addresses the human threats to birds and their habitats.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate a deep understanding of the biology of birds and mammals, with an emphasis on their ecology, and evolution
- Identify threats to the existence of birds and design scientifically sound management plans/strategies for their conservation.

#### Course content

Ornithology as science. Anatomy and morphology. Eco-physiology. Distribution, demography and habitat selection. Territoriality versus coloniality. Avian communities. Reproductive biology and ecology. Breeding strategies (mating systems, brood parasitism, co-operative breeding). Feeding ecology. Biogeography. Migration. Bird conservation.

#### Assessment strategies

Continuous assessment: 40% (at least three assessments); Exam: 60% (1 x 3 hr paper)

<b>COURSE TITLE: MAMMALOLOGY</b>	
<b>COURSE CODE</b>	AWLM 3602
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course introduces students to biology of mammals, their ecology and evolution. Additionally it addresses the human threats to mammals and their habitats	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate a deep understanding of the biology of mammals, with an emphasis on their ecology, and evolution
- Identify threats to the existence of mammals and design scientifically sound management plans/strategies for their conservation.

#### Course content

Comparative anatomy and physiology. Distribution, numbers and habitat selection. Reproductive biology and ecology. Feeding ecology. Communication, orientation and echolocation. Life cycles. Climatic adaptations. Natural and human threats to habitats of mammal. Conservation strategies.

#### Assessment strategies

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: WILDLIFE NUTRITION</b>	
<b>COURSE CODE</b>	AWLM 3622
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course is designed to give students knowledge on feeding requirements of wildlife species, their food composition. It also aims to familiarize students with plant chemicals, toxins affecting herbivores and mineral deficiencies	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Analyze food composition of wildlife animals
- Evaluate food quality consumed by wildlife animals
- Recognize toxic plants in the ranch and develop plan to eradicate them
- Calculate grazing and browsing capacity

#### Course content

Anatomy and physiology of digestive system; digestion in herbivores; feeding ecology of wildlife species; diet composition and analysis; nutritional value of plants; plant chemicals and toxins; management of toxic plants and affected game; water quality and water requirements; mineral deficiencies and supplementary feeding; nutrition in captivity.

#### Assessment strategies

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: WILDLIFE DISEASE</b>	
<b>COURSE CODE</b>	AWLM 3642
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
This course aim to impart an understanding of the concepts of disease transmission, etiology and clinical signs of common diseases affecting wildlife in Namibia and other the SADC countries, with emphasis on applicable methods to control, prevent, treat diseases and prevent their transmission to domestic animals.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate substantial knowledge of disease transmission, etiology and clinical signs and common diseases affecting African wildlife and related disease occurrence to wildlife population densities and human influences
- Apply techniques of basic necropsy review for collecting field samples and other methods used in study of wildlife diseases
- Analyze and conduct investigations into simple and complex disease relationships between wildlife, livestock and humans utilizing case-studies in the SADC region

#### Course content

General principles. Recent advances of immunology. Viral, bacterial and protozoan diseases; ecto- and endoparasites (pathology, diagnosis, treatment and control). Epizootia and enzootia. Wildlife diseases investigation, preventive medicine. Physical and chemical restraint and anesthesia. Aspects of wildlife surgery.

#### Assessment strategies

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: ECOLOGY OF AFRICAN ECOSYSTEMS</b>	
<b>COURSE CODE</b>	AWLS 3612
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 4 X 1HR/WK FOR 14 WEEKS (56HRS); PRACTICALS: 3 HR/WEEK FOR 14 WEEKS (42HRS)
<b>NATIONAL HOURS</b>	160
<b>NQF CREDITS</b>	16
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course introduces students with a basic knowledge on the structure and function of savanna biome and semi-arid lands, their management and potential economic exploitation options.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Analyze the structure and functioning main southern African biomes.
- Evaluate potentials of various southern African biomes for wildlife management and ecotourism
- Demonstrate substantial knowledge of the dynamics / variability of main biomes in Namibia in terms of primary productivity, climate and water resources availability and use
- Evaluate human impacts arid and semi-arid lands' productivity/health giving special attention to factors causing desertification/degradation of marginal lands
- Apply various techniques to restore, reclaim degraded arid, semi-arid and savanna lands
- Develop strategies for enhancing biodiversity conservation and sustainable economic exploitation of arid and semi-arid lands under different ecological and socio-economic scenarios

#### Course content

Distribution of savanna biomes in Africa. Determinants of savanna structure and function: water, soil, nutrients, fire, herbivory. Vegetation of savanna: rich versus poor savanna. Energy flow and food web. Biodiversity of savanna. Tree-grass and predator-prey interactions. Competition and mutualistic relationships. Population models. Managing savanna. Distribution of desert and semidesert biomes in Africa. Determinants of desert and semidesert structure and function: water, soil, nutrients, herbivory. Animal adaptations to live in desert. Vegetation of desert and semidesert. Energy flow and food web. Biodiversity of desert and semidesert. Interspecific relationships. Population models. Managing desert and semidesert.

#### Assessment strategies

Continuous assessment: 40% (at least three assessments); Exam: 60% (1 x 3 hr paper)

<b>COURSE TITLE: GEO-INFORMATICS FOR WILDLIFE MANAGEMENT</b>	
<b>COURSE CODE</b>	AWLM 3662
<b>NQF LEVEL</b>	6
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	UCLC3409: COMPUTER LITERACY; HGHE3511: FUNDAMENTALS OF PHYSICAL GEOGRAPHY
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
To introduce students to the use of GIS and remote sensing programmes in monitoring animal populations and habitats as well as in solving problems related to wildlife management.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Define the role of Geographic Information Systems (GIS) and Remote sensing in natural resource management
- Describe different GIS data formats, and their use and application to various GIS applications and identify appropriate processing and analysis techniques to solve specific GIS related problems
- Use GIS software to assist with a decision making process; examine and interpret aerial photographs and satellite images, capture data using a hand-held GPS receiver, and build spatial datasets
- Appreciate the uses and limitations of GIS and Remote sensing for natural resource management and value the importance of high quality digital spatial data in natural resource management

### Course content

Basic concepts, GIS data structures, processing and analysis techniques, basic cartography, map projections, introduction to GPS, basic aerial photograph interpretation. Use of GIS software. Use of GPS receiver. Display and manipulation of image files. Remote sensing for wildlife management, rangeland and vegetation monitoring.

### Assessment strategies

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>Course Title:</b>	<b>BIOSTATISTICS</b>
<b>Course Code</b>	ACSC 3692
<b>NQF Level</b>	7
<b>Notional Hours</b>	120
<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>	None
<b>Compulsory/Elective</b>	Compulsory
<b>Semester Offered</b>	2
<b>Course Aims</b> This course equips the student with the knowledge on research methods, the types design, analysis and presentation.	

### Learning Outcomes

Upon successful completion of this module, students should be able to:

1. Formulate and identify areas of research
2. Distinguish between different types of data and the appropriate analysis tools
3. Design and implement a research project
4. Collect meaningful data, analyse the data appropriately, interpret and present the results

### Assessment Strategies

Continuous Assessment: 50% (minimum of 2 tests, a marked assignment and 5 marked practicals); Examination: 50% (1 x 2 hr paper).

<b>COURSE TITLE: ETHNOBOTANY</b>	
<b>COURSE CODE</b>	AWLE 3602
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b> The course aims at enhancing the students knowledge on practice of ethnobotany, plant products and derivatives used as food, medicine and industrial raw materials, emphasizing on useful exotic and indigenous plant species in Namibia.	

### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate vast knowledge of the contribution of biological diversity to human welfare with respect to plant products and derivatives, useful to man
- Search and access data bases to retrieve information on origin, taxonomy and uses of different plants among cultures in Namibia
- Evaluate pattern of plants use in the SADC region in terms of diversity of products, processing, marketing and limitations to utilization
- Design strategies for promoting sustainable harvesting of plant products

### Course content

USEFUL AND TOXIC PLANTS, THEIR ORIGIN AND HISTORY OF PLANT USE. PLANT PRODUCTS AND DERIVATIVES USED IN NUTRITION, MEDICINE, BUILDING-CONSTRUCTION, CLOTHING. POTENTIALS FOR NEW CROP SPECIES. UTILIZATION INDIGENOUS VERSUS EXOTIC PLANTS.

**Assessment strategies**

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: GOVERNANCE OF WILDLIFE RESOURCES</b>	
<b>COURSE CODE</b>	AWML 3701
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	AWLM 3601: : WILDLIFE MANAGEMENT;
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
It introduces students to the process of formulating national and international environmental policy, laws and conventions on wildlife management and wildlife conservation.	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Demonstrate knowledge of natural resources laws, statutes and policies in Namibia
- Critique formulation process of national policies and international conventions
- Evaluate the relevance of key international conventions such as UNCBD, UNFCCC, UNCCD, CITES and RAMSAR to conservation efforts of individual governments
- Appraise progress made by national governments in implementing national and international laws, policies and conventions

**Course content**

Philosophy and law; law and policies concerning regulation of commerce in wildlife; wildlife conservation and management within the legal and policy frameworks governing management of private, communal and state lands; regulation of human-wildlife interactions; tenure regimes and policy framework; constraints to wildlife conservations among resource-poor rural populations.

**Assessment strategies:**

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: WILDLIFE CONSERVATION</b>	
<b>COURSE CODE</b>	AWLM 3781
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 3 X 1HR/WK FOR 14 WEEKS (42HRS); PRACTICALS: 1 X 3HR ALTERNATE FOR 14 WEEKS (21HRS)
<b>NATIONAL HOURS</b>	120
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
The course is design to give students basic knowledge on threats to species and their habitats, and to introduce main concepts and methods of nature conservation.	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Demonstrate knowledge on aims and purposes of nature conservation
- Identify and valorize areas for nature conservation
- Apply various methods in nature conservation
- Apply nature conservation legislation

**Course content**

Concepts of wildlife nature conservation. Values and ethics of wildlife conservation. Species conservation. Extinction and endangered species. Key and charismatic species. National and international forms of area protection for wildlife. Conservation strategies. In situ and ex situ wildlife conservation. Wildlife Conservation and sustainable development. Wildlife conservation in urbanized and agricultural ecosystems. The economics of wildlife conservation. National and international legislation on nature wildlife conservation

**Assessment strategies**

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 3 hr paper)

<b>COURSE TITLE: ECOLOGICAL METHODS IN WILDLIFE STUDIES</b>	
<b>COURSE CODE</b>	AWLM 3721
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	AWLM3611: WILDLIFE ECOLOGY
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
This course is aimed to equip students with an array of modern methods in ecological studies of wildlife species and the knowledge on their application.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Apply a wide array of methods to study various aspects of wildlife ecology
- Evaluate various methods in relation to wildlife species and habitat
- Develop a research proposal

#### Course content

Measuring species diversity, community similarities and niche width and overlap. Quantifying habitat selection. Determining diet composition, prey size and prey quality. Measuring the reproductive success. Determination of proximate causes of breeding failure. Measuring timing of reproduction and annual productivity. Methods of catching wildlife species: cage traps, nets, drugs; sexing, ageing, measuring and determining physical condition. Ringing and radio-tagging.

#### Methods of facilitation of learning

Lectures, written assignments, field work, class discussions and presentations.

#### Assessment strategies

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

#### Quality assurance arrangements

- internal and external moderation of exam papers and scripts,
- peer review of course outlines and teaching
- student evaluation
- regular review of course content
- effective and efficient supervision and monitoring assignment, tests and exams

<b>COURSE TITLE: NATIONAL PARKS &amp; GAME RESERVES</b>	
<b>COURSE CODE</b>	AWLM 3741
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>CO-REQUISITE</b>	AWLM3781: WILDLIFE CONSERVATION
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
The course is aimed to familiarize students with national parks and game reserves established in Namibia and other SADC countries. It equips students with the knowledge on evaluation of parks and game for ecotourism.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate a deep knowledge on the location, landscape, plant and wildlife peculiarities of national parks, game and nature reserves in Namibia and other SADC counties
- Develop a plan for park and reserve management
- Evaluate the role of national parks and game reserve in wildlife conservation
- Apply the knowledge on national parks and game reserves for ecotourism development

#### Course content

Role of national parks and game reserves. Principles of management in national parks and game reserves. A review of southern African national parks and game reserves, with special reference to Namibia.

**Assessment strategies**

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: ANIMAL BEHAVIOUR</b>	
<b>COURSE CODE</b>	AWLM 3712
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 3 X 1HR/WK FOR 14 WEEKS (42HRS); PRACTICALS: 1 X 3HR ALTERNATE FOR 14 WEEKS (21HRS)
<b>NATIONAL HOURS</b>	160
<b>NQF CREDITS</b>	16
<b>PREREQUISITE</b>	AWLM3682: ORNITHOLOGY; AWLM3602: MAMMALOLOGY
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
Introduce students to sources and types of different animal behavior including social behavior, and population interaction behavior and how knowledge of animal behavior is utilized in wildlife management.	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Describe different types of wildlife behavior
- Develop a management plan on the basis of wildlife behaviour
- Demonstrate a deep understanding of animal behaviour including simplex and complex behavior and the biological foundation of animal behavior theories
- Analyze sign-stimuli responses, factors driving motivation and aggression in wild animals
- Conduct literature based or field investigations on various types of animal behaviour (mating, hunting, etc.) following standard or self designed techniques or procedures

**Course content**

Simple and complex behaviour. Sign-stimuli, motivation. Conflict behaviour, orientation, learning, genes and behaviour. Anti-predator behavior. Instinct. Behavioural ecology. Feeding behaviour; Social and non-social behaviour; Aggression; Sexual behavior. Effects of environment on breeding. Ungulate and carnivore behavior.

**Assessment strategies**

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 3 hr paper)

<b>COURSE TITLE: GENETIC CONSERVATION</b>	
<b>COURSE CODE</b>	AWLM 3702
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>CO-REQUISITE</b>	AWLM3781: WILDLIFE CONSERVATION
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
This course is designed to equip students with knowledge on population genetic and genetic diversity of species. It also aims to familiarize students with methods of genetic management of small and endangered populations	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Measure loss of genetic diversity and inbreeding depression in populations
- Demonstrate ability for genetic management of endangered species
- Resolving taxonomic uncertainties and defining management units through genetic analysis
- Conduct a research on genetic structure of a population

**Course content**

Introduction to genetic conservation. Genetics and extinction. Characterizing genetic diversity in single loci and by quantitative variation. Evolution in large population: natural selection and adaptation; mutation, migration and their interactions with selection. Evolution in small populations. Maintenance of genetic diversity. Effect of population size reduction: loss of genetic diversity in small populations, inbreeding depression, population fragmentation, genetically viable populations. Resolving taxonomic uncertainties and defining management units. Genetically modified food. Genetic management of wild and captive populations.

**Assessment strategies**

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: WILDLIFE SURVEY &amp; MONITORING TECHNIQUES</b>	
<b>COURSE CODE</b>	AWLM 3722
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
Equip students with knowledge and skills of different techniques of wildlife quantitative survey and their suitability under different environmental and management conditions	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate substantial understanding of various techniques involved in carrying out surveillance on wildlife and monitoring of wildlife behavior and movement.
- Compare suitability of different wildlife survey techniques under differing environmental conditions and purposes of the survey.
- Plan, analyze and manage a wildlife surveillance project and be able to make suitable recommendations regarding the management of wildlife.

#### Course content

General principles of surveys and monitoring; the purpose of surveying and monitoring; an outline of basic techniques; Bird survey and monitoring techniques (census, atlas studies, territory mapping, line transects, point counts, mist netting, capture-mark-release-recapture, response to playback, timed species count, counting nests in colonies, leks, roosts and flocks, counting different groups of birds); mammal survey and monitoring techniques (census, atlas studies, mark-recapture methods, strip and line transects, counting dung, feeding signs, footprints, calls, breeding sites, hair tubes and hair catches, bat roosts, seal colonies; accuracy and precision of counts (sources of error and bias, environmental variables).

#### Assessment strategies

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: HABITAT MANAGEMENT</b>	
<b>COURSE CODE</b>	AWLM 3742
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	AWLM3611: WILDLIFE CONSERVATION; AWLM3601: WILDLIFE MANAGEMENT
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
This course aims to develop the students' understanding, skills and attitudes regarding range and pasture management through analysis of characteristics of various Namibian range types. Concept of the carrying capacity and determination of carrying capacity of Namibian range types is also given attention.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate a deep knowledge of nature and extent of rangelands in Namibia, their management challenges and their contribution to the national economy
- Analyze range ecology, succession and retrogression in the context of equilibrium and non-equilibrium environments
- Demonstrate capacity to assess range conditions, initiate and utilize range condition monitoring practices in routine range management and evaluate range management practices
- Apply various range improvement techniques like fodder diversification and introduction of cultivated pasture appropriately under diverse range conditions and circumstances

#### Course content

Habitat characteristic; habitat diversity, fragmentation, arrangement; changes to habitat (physical, biological, pollution); classification of plant communities; calculation plant biomass; assessing veld conditions; grazing management; bush encroachment; desertification; fire as ecological factor; determining carrying capacity (ecological, grazing and browsing); habitat enrichment and restoration



**Assessment strategies**

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: SYSTEMATICS OF BIRDS &amp; MAMMALS</b>	
<b>COURSE CODE</b>	AWLM 3732
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 4 X 1HR/WK FOR 14 WEEKS (56HRS); PRACTICALS: 3 HR/WEEK FOR 14 WEEKS (42HRS)
<b>NATIONAL HOURS</b>	160
<b>NQF CREDITS</b>	16
<b>PREREQUISITE</b>	AWLM3682: ORNITHOLOGY; AWLM3602: MAMMALOLOGY
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course aims to familiarize students with systematic of birds and mammals, with a special reference to southern African fauna. This course equip students with the knowledge of evaluating birds and mammals species for ecotourism, management and conservation	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Identify southern African birds and mammals down to species level
- Demonstrate ability to identify bird and mammals spurs, nests, eggs, feeding signs etc.
- Apply knowledge on biology and ecology of bird and mammals species for their management and conservation
- Evaluate bird and mammals species for trophy hunting and ecotourism
- Develop a local collection of bird skins, feathers and skeletons

**Course content**

General taxonomy and nomenclature of birds and mammals. Phylogeny and origin of birds and mammals. Characteristic of avian and mammalian orders and families. Review of bird and mammals species, with special reference to southern African fauna: identification, biology and ecology of selected mammal species.

**Assessment strategies**

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 3 hr paper)

<b>COURSE TITLE: HERPETOLOGY &amp; TERRARIUM</b>	
<b>COURSE CODE</b>	AWLM 3782
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 3 X 1HR/WK FOR 14 WEEKS (42HRS); PRACTICALS: 1 X 3HR ALTERNATE FOR 14 WEEKS (21HRS)
<b>NATIONAL HOURS</b>	120
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	AWLM3611: WILDLIFE ECOLOGY
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course introduces students to biology of reptiles and amphibians, their ecology and evolution. I also addresses the human threats to reptiles and frogs and their habitats, and snake threats to human. It is designed to equip students with a sound knowledge on southern African herpetofauna and terrarium.	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Identify southern African reptile and frog species down to species or genus level
- Recognize threats to frogs and reptiles and apply adequate conservation measurers
- Demonstrate ability to deal with snake bites and to avoid the bites
- Apply knowledge to breed reptiles and frogs in captivity and to develop terrarium

**Course content**

Morphology and anatomy; ecophysiology; movements and orientation. Anuran vocal communication; communication and social behaviour. Mating systems and sexual selection. Reproduction and parental care. Life cycles. Snake bites. Phylogeny and origin of amphibians and reptiles. Characteristic of amphibian and reptile orders and families. Review of amphibian and reptile species, with special reference to southern African fauna: identification, biology and ecology of selected mammal species. Conservation of amphibians and reptiles. Terrarium: obtaining specimens, transporting and handling, enclosures, feeding, captive breeding.

**Assessment strategies**

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 3 hr paper)

<b>COURSE TITLE: RESERACH METHODS</b>	
<b>COURSE CODE</b>	ACSC 3792
<b>NQF LEVEL</b>	7
<b>CONTACT HOURS</b>	LECTURES: 3X1H FOR 14 WEEKS (42 HRS); PRACTICALS: 1X3 HR ALTERNATE WK FOR 14 WEEKS (21 HRS)
<b>NATIONAL HOURS</b>	120
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	ACSC 3692: BIOSTATISTICS
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
This course equips students with the knowledge on research methods, the types design, analysis and presentation.	

**Learning outcomes**

Upon successful completion of the course, students should be able to:

- Understand the concept and rationale of statistical tests, e.g. Chi-square test, regression analysis and multivariate methods
- Identify when to apply the various statistical tests, compute and interpret the results
- Perform and interpret the results of the various tests (both by hand and using statistical software packages)

**Course content**

INTRODUCTION/REVIEW OF BASIC STATISTICAL METHODS. COMPARISON BETWEEN NON-PARAMETRIC AND PARAMETRIC STATISTICS. NON-PARAMETRIC STATISTICS: GOODNESS OF FIT TEST, TEST OF ASSOCIATION, CHI-SQUARE TEST, PAIRED COMPARISON, WILCOXON'S TEST, RANK CORRELATION. REGRESSION AND CORRELATION. MULTIVARIATE METHODS: MULTIPLE REGRESSION, DISCRIMINANT ANALYSIS, CANONICAL ANALYSIS, MULTIDIMENSIONAL SCALING, PRINCIPAL COMPONENT ANALYSIS. INTRODUCTION TO STATISTICAL COMPUTER PACKAGES.

**Assessment strategies**

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: FRESHWATER ICHTHYOLOGY &amp; AQUACULTURE</b>	
<b>COURSE CODE</b>	AWLM 3801
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	AWLM3681: FRESHWATER ECOLOGY
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
The course aims to familiarize students with biology and ecology of fish. It is designed to equip students with a sound knowledge on southern African ichthyofauna and small-scaled aquaculture under southern African conditions.	

**Learning outcomes**

Upon completion of the course, students should be able to:

- Identify all southern African fish species down to species level
- Analyze environmental factors affecting fish distribution, abundance and reproductive rate
- Conduct research on fish diversity, dominance structure and biomass
- Develop a small-scale fish farming
- Recognize threats to fish and apply conservation measurers

**Course content**

Morphology, anatomy and physiology. Factors affecting fish distribution. Fish behaviour. Feeding. Reproduction and growth. Migration and movements. Parasites and diseases. Traditional fishing, angling, subsistence fisheries, aquarium and ponds. Aquaculture: biological, engineering and economic factors involved in the establishment and operations of different freshwater aquaculture systems; systems and practices of aquaculture; impact of aquaculture on environment; nutrition, brood-stock management and larval.

**Assessment strategies**

Continuous assessment: 40% (at least two tests, practical assessments); Exam: 60% (1 x 2 hr paper)

<b>COURSE TITLE: ENTOMOLOGY</b>	
<b>COURSE CODE</b>	AWLM 3811
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 4 X 1HR/WK FOR 14 WEEKS (56HRS); PRACTICALS: 3 HR/WEEK FOR 14 WEEKS (42HRS)
<b>NATIONAL HOURS</b>	160
<b>NQF CREDITS</b>	16
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
The course introduces students to biology, ecology and systematic of insects and arachnids, with special reference to southern African fauna. It also aims to equip students with knowledge on the ecological and economic role of insects and the methods of insect control	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Identify insects and arachnids down to family level and ecologically and economically important to genera and species levels
- Evaluate the positive and negative role of insects and arachnids in the nature, agriculture, forestry etc.
- Develop a reference collection of arachnids and insects
- Recognize insect developmental stages, their sounds and constructions
- Apply the knowledge in insect control

#### Course content

Morphology and functional anatomy of insects and arachnids. Movements and locomotion (gait, jumping, swimming, burrowing, flying). Reproduction and metamorphosis. Camouflage and disruptive forms of illusion. Vocalisation: sound structure, sound function, sound structure). Insect constructions (tunnels, leaf mines, galls, paper and cotton nests, wax and silk, etc.). Insect migration. Insect societies (termites, ants, bees, wasps, etc.). Insect ecology. Role of insects and arachnids: agriculture, forestry, medicine, veterinary, food production. Pest control. Systematic of insects and arachnids, with special reference to Namibian fauna.

#### Assessment strategies

Continuous assessment: 50% (at least three tests, practical assessments); Exam: 50% (1 x 3 hr paper)

<b>COURSE TITLE: ECONOMIC OF WILDLIFE RESOURCES</b>	
<b>COURSE CODE</b>	AWLM 3821
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	AWLM3601: WILDLIFE MANAGEMENT
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
The course enhances the students understanding of community based natural resource management systems including institutional arrangements, conflict resolution, participatory resource monitoring and management of common resources.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate a broad but deep understanding of rural livelihoods, community based natural resources management's institutions, power, responsibility and benefit sharing arrangements and challenges involved
- Apply appropriate skills to monitor health and exploitation of a variety of natural resources under community based natural resource management arrangements
- Analyze simple natural resource management conflicts and recommend solutions
- Conduct evaluation of community based natural resource projects using existing or self generated data or information

#### Course content

Typology of wildlife resources. Exploitation rates renewable resources, with emphasis on wildlife cropping. The concept of common property and free access resources. Wildlife on private and public lands. The economic of

wildlife ranching. Wildlife species valuation in relation to tourists revenues; wildlife option values. Wildlife versus alternative land uses, e.g. agriculture, forestry and mining. Direct economic value of wildlife.

#### Assessment strategies

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: ENVIRONMENTAL IMPACT ANALYSIS</b>	
<b>COURSE CODE</b>	AENE 3881
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 3 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	AWLM3611: WILDLIFE ECOLOGY
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
To familiarize students with the process and techniques of Environmental Impact Assessment required for fulfillment of sustainable environmental development.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Design an Environmental Impact Assessment process into a project plan
- Apply policies in the context of monitoring and controlling project activities
- Conduct Environmental Impact Assessment on existing and new projects, prepare EIA reports and recommend mitigation measures
- Appraise available EIA techniques and methods and determine the best methods for assessing different projects and different prevailing circumstances

#### Course content

Definitions: impact assessment, environmental studies, environmental impact of human activities on natural resources. Impact on atmosphere, water bodies, vegetation and wildlife. Environmental considerations in physical planning. Impact identification, monitoring and mitigation. Methods of identifying impacts, monitoring environmental impacts, and types of mitigation actions. Formal Environmental Impact Assessment. Policy and framework in Namibia.

#### Assessment strategies

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: FIELD ATTACHMENT II</b>	
<b>COURSE CODE</b>	ACA 3801
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	6 WEEKS
<b>NATIONAL HOURS</b>	60
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	1
<b>COURSE AIMS</b>	
The aim of this course is to expose students to practical know-how in the field under the supervision of a technical expert in order for students to come to terms with technology and limitations under a working environment.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Apply theoretical knowledge to analyze situations and execute appropriate actions in a work environment relevant to their training
- Execute more administrative duties at the office including permit issue, report writing, budgeting and planning, under less supervision than given in Attachment I
- Display increased ability to take more responsibility and supervise basic operations in the institution of attachment
- Initiate research programs to address problems noted during attachment
- Appraise operations of their institution of attachment and other related institutions and present findings

### Course content

Students will be attached to national parks, game reserves, conservancies and other wildlife agencies and tourist boards. An attachment report and oral presentation will constitute the total assessment mark.

**Assessment strategies** 50% report presentation at a seminar; 50% field report. Subject to satisfactory attendance and conduct during attachment.

<b>COURSE TITLE: ECOTOURISM MARKETING AND TRAVEL PAN DEVELOPMENT</b>	
<b>COURSE CODE</b>	AWLM 3802
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course introduces students to the economy of ecotourism and familiarize students with travel pan development	

### Learning outcomes

Upon completion of the course, students should be able to:

- Develop a ecotourism travel pan
- Evaluate the impact of ecotourism on rural livelihood and poverty

### Course content

Ecotourism marketing. Ecotourism Travel Pan Development. Ecotourism internship; impact of ecotourism on rural livelihood and poverty; enclave tourism and ecotourism.

### Assessment strategies

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: WILDLIFE IN AGRICULTURAL ECOSYSTEMS</b>	
<b>COURSE CODE</b>	AWLM 3822
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course aims at enhancing the students understanding of relationships between wildlife management and agriculture.	

### Learning outcomes

Upon completion of the course, students should be able to:

- Identify major wildlife problem animals in Namibia
- Evaluate wildlife damage
- Develop appropriate methods of controlling damages from different wildlife animals
- Develop a plan to reconcile wildlife management with agriculture

### Course content

Pressures facing both farmers and wildlife in agricultural ecosystems; trade-offs between food production and wildlife conservation. Wildlife in agriculture ecosystems and rural sociology.

### Assessment strategies

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: BIOGEOGRAPHY</b>	
<b>COURSE CODE</b>	AWLM 3882
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 3 X 1HR/WK FOR 14 WEEKS (42HRS); PRACTICALS: 1 X 3HR ALTERNATE FOR 14 WEEKS (21HRS)
<b>NATIONAL HOURS</b>	120
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	AWLM3662: GEO-INFORMATICS FOR WM
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course introduces students to biogeography, with special reference to the Afrotropical region	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Demonstrate knowledge on characteristic faunal elements of all biogeographical regions
- Compare Afrotropical region with other biogeographical regions of the world
- Apply main biogeographical rules in Namibia and other SADC countries
- Understand climatic adaptations of wildlife species

#### Course content

Main concepts and rules of biogeography. Main biomes of the world, with special reference to Africa. Faunal regions and subregions of the world, with special reference to Africa. Dynamic biogeography. Geographical barriers and island biogeography. Climatic adaptations. Patterns of distributions.

#### Assessment strategies

Continuous assessment: 50% (at least three assessments); Exam: 50% (1 x 3 hr paper)

<b>COURSE TITLE: DIGITAL WILDLIFE PHOTOGRAPHY</b>	
<b>COURSE CODE</b>	AWLM 3841
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 2 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	8
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course aims to introduce students to the techniques of digital wildlife photography and software picture preparation	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Recognize the role of wildlife photography in ecotourism
- Demonstrate ability for artistic wildlife photography
- Conduct software picture preparation
- Plan a wildlife photography exhibition

#### Course content

Equipment. Ethics and safety in wildlife photography. Flashing, shading and colouring. Macrophotography: insects, flowers. Underwater photography. Photography in zoological and botanical gardens. Composing pictures. Tonal ranges. Panoramic pictures. Focusing and scanning. Software picture preparations.

#### Assessment strategies

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: ENVIRONMENTAL &amp; ECOTOURISM EDUCATION</b>	
<b>COURSE CODE</b>	AENE 3842
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	LECTURES: 3 X 1HR/WK FOR 14 WEEKS (28HRS); PRACTICALS: 1 X 2HR ALTERNATE FOR 14 WEEKS (14HRS)
<b>NATIONAL HOURS</b>	80
<b>NQF CREDITS</b>	12
<b>PREREQUISITE</b>	NONE
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
The course is designed to equip students with environmental education methods. It also aims to familiarize them with environmental awareness and ethics	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Apply knowledge on wildlife ecology and management in primary and secondary education
- Motivate people for environmental, nature and wildlife conservation
- Conduct environmental education in media
- Plan environmental education in nature history museums, zoological gardens, national parks etc.
- Advertise issues related to wildlife conservation
- Organize environmental education for public

#### Course content

General principals of environmental education. Environmental awareness and ethics. Environmental educational institutions: nature history museums, zoological gardens, national parks, reserves. Methods of environmental education. Publicizing and advertizing environmental issues. Environmental education in primary and secondary schools. Environmental education in media.

#### Assessment strategies

Continuous assessment: 50% (at least two tests, practical assessments); Exam: 50% (1 x 2 hr paper)

<b>COURSE TITLE: RESEARCH PROJECT</b>	
<b>COURSE CODE</b>	AWLM 3810
<b>NQF LEVEL</b>	8
<b>CONTACT HOURS</b>	INDIVIDUAL STUDENT CONSULTATION FOR 28 WEEKS: EQUIVALENT TO 1 HR/WEEK
<b>NATIONAL HOURS</b>	160+160
<b>NQF CREDITS</b>	16+16
<b>PREREQUISITE</b>	ACSC 3792: RESEARCH METHODS
<b>COMPULSORY/ELECTIVE</b>	COMPULSORY
<b>SEMESTER OFFERED</b>	2
<b>COURSE AIMS</b>	
To equip students with skills needed to carry out independent research in the field of forestry including planning, designing, methodology, data analysis and result interpretation, discussion and dissemination of findings.	

#### Learning outcomes

Upon completion of the course, students should be able to:

- Identify researchable problems and develop research project proposal with minimum assistance
- Implement a research project; analyze data statistically, interpret results and write up, independently or with little supervision
- Demonstrate ability to make high quality presentations to a wide audience using well formulated arguments to express and support research findings

#### Course content

Senior undergraduate students carry out independent study of a current topic in wildlife ecology. The course include participation in meetings organized by the coordinator, work with a faculty advisor to develop a research project, formulate hypothesis, design and carry out preliminary experiments and collect data and test the hypotheses. Students will carry out independent literature 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 the Guide for Scientific Writing.

#### Assessment strategies

Continuous assessment: 100% (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).

## **L. BACHELOR OF VETERINARY MEDICINE (17BVET) – Six-year Programme**

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### **L.1 ADMISSION**

The minimum admission requirements into the Bachelor of Veterinary Medicine programme are as follows:

- L.1.1 A Namibian Senior Secondary Certificate (NSSC) at NSSC-O (ordinary) or NSSC-H (higher level) with a minimum of 30 points in five subjects on the UNAM Evaluation Scale; or a recognized equivalent qualification.

In addition to the above, the following subjects and grades will be required:

- i) English with a minimum B symbol or better at NSSC Ordinary Level, or a score of 3 or better at NSSC Higher level;
  - ii) Biology (or Life Science) with a minimum B symbol or better at NSSC Ordinary Level, or a score of 3 or better at NSSC Higher Level;
  - iii) Mathematics with a minimum B symbol or better at NSSC Ordinary Level, or score of 3 or better on NSSC Higher level;
  - iv) Physical Science or Chemistry with a minimum B symbol or better at NSSC Ordinary Level, or a score of 3 or better at NSSC Higher Level;
  - v) Students with a score of C in English at NSSC Ordinary level and a minimum of 32 points on the UNAM Evaluation Scale will also be considered. Such students will be required to register for Communication and Study Skills (LCE3419) during the first semester of their first year of study.
- L.1.2 Candidates with a three-year Diploma in Animal Health or Higher Diploma in Agriculture or related field with a combined average pass of 70% or higher from a recognized and accredited institution may also be granted admission to the Bachelor of Veterinary Medicine degree programme at the discretion of the Faculty of Agriculture and Natural Resources (FANR).
- L.1.3 Candidates may also be admitted into the BVM programme through Mature Age provision if they meet the following conditions:
- i) They should be at least 25 years old on the first day of the academic year in which admission is sought;
  - ii) They should have passed senior secondary school education;
  - iii) They should have proof of at least five years veterinary relevant work experience;
  - iv) They should pass all papers of the prescribed Mature Age Entry tests with a minimum of 60%.
- L.1.4 Candidates who have successfully completed the entire first year of the BSc curriculum may also be admitted into the first year of the BVM programme if they have passed all basic science modules (i.e. Biology, Mathematics, Physical Science and Chemistry) with a minimum score of 60% in each of these modules. These students will be exempted from those first year modules already passed.

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 Faculty reserves the right to interview candidates before admission.

### **L.2 DURATION**

The programme shall be completed in a minimum period of six (6) years and a maximum period of eight (8) years.

### **L.3 MINIMUM REQUIREMENTS FOR RE-ADMISSION INTO THE PROGRAMME**

A student will not be re-admitted into the **BVM programme** if she/he has not passed at least:

96 credits by the end of the 1st year  
200 credits by the end of the 2nd year  
304 credits at the end of the 3rd year  
384 credits at the end of the 4th year  
480 credits at the end of the 5th year  
576 credits at the end of the 6th year



676 credits at the end of the 7th year

Students who are not re-admitted into the BVM programme, may apply for transfer into other programmes in the Faculty of Agriculture and Natural Resources, provided that they meet the following minimum requirements for re-admission into the Faculty:

A student will not be re-admitted into the Faculty if she/he has not passed at least:

48 credits by the end of the 1st year of which 16 must be non-UNAM core

120 credits by the end of the 2nd year

224 credits at the end of the 3rd year

328 credits at the end of the 4th year

432 credits at the end of the 5th year 5

#### **L.4 ACADEMIC ADVANCEMENT AND PROGRESSION REGULATIONS**

L.4.1 To advance to the second year of the BVM programme a student must have passed at least 120 credits.

A student who has passed at least 96 (but less than 120) first year credits, will be allowed to register for a maximum of 48 second year credits (in addition to the failed modules) provided that the relevant pre-requisites have been passed.

L.4.2 To advance to the third year of the BVM programme a student must have passed all first year modules as well as at least 128 second year credits.

A student who has passed all first year modules and at least 64 (but less than 128) second year credits, will be allowed to register for a maximum of 48 third year credits (in addition to the failed modules) provided that the relevant pre-requisites have been passed.

L.4.3 To advance to the fourth year of the BVM programme a student must have passed all first, second and third year modules.

A student who did not pass all first and second year modules and / or passed less than 112 third year credits, will have to repeat all failed modules and will not be allowed to enroll for any fourth year modules.

If a student has passed all first and second year modules as well as at least 112 third year credits, such a student will be allowed to enroll for a maximum of 40 fourth year credits (in addition to the failed modules), excluding all clinical studies modules, provided that the relevant pre-requisites have been passed.

L.4.4 To advance to the fifth year of the BVM programme a student must have passed all first, second, third and fourth year modules.

A student who did not pass all first, second and third year modules and / or passed less than 96 fourth year credits, will have to repeat all failed modules and will not be allowed to enroll for any fifth year modules.

If a student has passed all first, second and third year modules as well as at least 96 fourth year credits, such a student will be allowed to enroll for a maximum of 20 fifth year credits (in addition to the failed modules), excluding clinical studies modules, provided that the relevant pre-requisites have been passed.

L.4.5 To advance to the final year of the BVM programme a student must have passed all first, second, third, fourth and fifth year modules. A student will not be allowed to carry any modules over to the sixth year of study as this involves clinical rotations.

L.4.6 A student will not be allowed to repeat the sixth year of study more than once.

L.4.7 No student will be allowed to register for a module for which the approved pre-requisite was not met.

## L.5 CURRICULUM

### YEAR 1 (136 CREDITS)

#### Semester 1

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
PHY 3501	Physics for Life Science	5	02/28	21	8		
LEA 3519	English for Academic Purposes	5	04/56		16		
CSI 3580	Contemporary Social Issues	5	01/14		4		
BLG3511	Introduction to Biology	5	04/56	42	16		
MAT3511	Basic Mathematics	5	04/56	28	16		
BVM 3501	Veterinary Anatomy, Histology and Embryology I	5	05/70		8		
Total Semester 1 credits:					68		

#### Semester 2

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
BVM 3552	Veterinary Physiology I	5	04/56	42	16		
BVM 3572	Veterinary Anatomy, Histology and Embryology II	5	07/98		16		
CLC 3509	Computer Literacy	5	02/28		8		
BVB 3512	Veterinary Biochemistry	5	04/56	21	16		
BVM 3542	Veterinary Genetics	5	02/28	21	8		
CSI 3580	Contemporary Social Issues	5	01/14		4		
Total Semester 2 credits:					68		

## YEAR 2 (144 CREDITS)

### Semester 1

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
BVM 3671	Animal Ethology, Welfare and Health	6	04/56	42	16		
BVM 3601	Introduction to Veterinary Microbiology	6	02/28	21	8	BLG 3511	
BVM 3631	Applied Comparative Anatomy I	6	07/98		16	BVM 3501, BVM 3572	
BVM 3611	Veterinary Physiology II	6	04/56	42	16	BVM 3552	
BVM 3651	Veterinary Parasitology I	6	04/56	42	16	BLG 3511	
Total Semester 1 credits:					72		

### Semester 2

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
BVM 3602	Veterinary Immunology and Vaccinology	6	02/28	21	8		BVM 3601
BVM 3632	Applied Comparative Anatomy II	6	7/98		16	BVM 3501, BVM 3572	
BVM 3652	Veterinary Parasitology II	6	04/56	42	16	BLG 3511	
BVM 3612	Animal Nutrition and Pasture Science	6	04/56	21	16	BVB 3512	
BVM 3622	Animal Production	6	02/28	21	8		
BVM 3642	Biometry	6	02/28	14	8	MAT 3511	
BVM 3609	Field Attachment I: Production Animal Farm	6	3 weeks				
Total Semester 2 credits:					72		

## YEAR 3 (144 CREDITS)

### Semester 1

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES	
BVM 3701	Clinical Diagnostics	7	02/28	21	8	BVM 3611, BVM 3501, BVM 3572		
BVM 3721	Herd Health Management and Economics	7	02/28	21	8	BVM 3671, BVM 3622, BVM 3602		
BVM 3711	Infectious Diseases and Microbiology I	7	04/56	42	16	BVM 3601		
BVM 3731	Veterinary Pharmacology and Toxicology I	7	04/56	21	16	BVM 3651, BVM 3652, BVM 3611 BVB 3512		
BVM 3741	Ethno-Veterinary Medicine	7	02/28	21	8			
BVM 3751	Veterinary Epidemiology I	7	04/56	28	16	BVM 3642		
Total Semester 1 credits:					72			

### Semester 2

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES	
BVM 3772	General Surgery, Anaesthesiology & Diagnostic Imaging	7	04/56	42	16	BVM 3611, BVM 3501, BVM 3572	BVM 3701 BVM 3731	
BVM 3752	General Pathology	7	04/56	42	16	BVM 3501, BVM 3572, BVM 3651 BVM 3652, BVM3602	BVM 3701	
BVM 3732	Veterinary Pharmacology and Toxicology II	7	04/56	21	16	BVM 3651, BVM 3652, BVM 3611 BVB 3512	BVM 3731	
BVM 3712	Infectious Diseases and Microbiology II	7	04/56	42	16	BVM 3601	BVM 3711	
BVM 3762	Veterinary Epidemiology II	7	02/28	21	8	BVM 3642	BVM 3751	
BVM 3709	Field Attachment II: Laboratory/Game Reserves	7	3 weeks					
Total Semester 2 credits:					72			

## YEAR 4 (120CREDITS)

### Semester 1

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES	
BVC 3801	Fish and Bee Medicine	8	02/28	21	8			
BVC 3841	Systemic Pathology I	8	02/28	21	8	BVM 3752		
BVC 3821	Wildlife Clinical Studies	8	02/28	21	8			
BVM 3811	Veterinary Public Health I	8	04/56	21	16	BVM 3752, BVM 3651, BVM 3652 BVM 3711, BVM 3712		
BVC 3831	Porcine & Poultry Clinical Studies, Health and Production	8	07/98		16			
BVM 3880	Veterinary Professional Skills	8	01/14	0	4			
Total Semester 1 credits:					60			

### Semester 2

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES	
BVM 3812	Veterinary Public Health II	8	04/56	42	16	BVM 3752, BVM 3651, BVM 3652 BVM 3711, BVM 3712	BVM 3811	
BVC 3812	Small Animal Clinical Studies I	8	7/98		16			
BVM 3802	Systemic Pathology II	8	02/28	21	8	BVM 3752		
BVC 3832	Ruminant Clinical Studies, Health and Production I	8	07/98		16			
BVM 3880	Veterinary Professional Skills	8	01/14	0	4			
BVM 3809	Field Attachment III: Private/State Vet Clinic	8	3 weeks					
Total Semester 2 credits:					60			

**YEAR 5 (132CREDITS)****Semester 1**

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
BVC 3811	Small Animal Clinical Studies II	8	7/98		16		
BVC 3831	Ruminant Clinical Studies, Health and Production II	8	7/98		16		
BVC 3851	Equine Clinical Studies	8	7/98		16		
BVC 3871	Theriogenology, Gynaecology and Obstetrics I	8	7/98		16		
Total Semester 1 credits:					64		

**Semester 2**

MODULE CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS	PRE-REQUISITES	CO-REQUISITES
BVM 3822	Policy, Legislation and Jurisprudence	8	02/28		8		
BVC 3812	Ruminant Clinical Studies, Health & Prod. III	8	7/98		16		BVC 3831
BVC 3832	Small Animal Clinical Studies III	8	7/98		16		BVC 3811
BVC 3852	Theriogenology, Gynaecology & Obstetrics II	8	7/98		16		
BVM 3882	Research Methodology	8	03/42		12	BVM 3751, BVM 3762	
Total Semester 2 credits:					68		

**YEAR 6 (120 CREDITS)****Semesters 1 & 2**

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	PRE-REQUISITES
BVC 3890	CLINICAL ROTATION	8	88	
BVM 3880	RESEARCH PROJECT	8	32	BVM 3882

The Sixth year of this programme will entail an intensive clinical rotation for 45 weeks where each student will be exposed to hands on experiential process under supervision of trained registered professional veterinarians and other experts in their fields to develop their practical skills and attain their "Day One Competencies" as recommended by the OIE and NVC. The Rotation will commence on the 1<sup>st</sup> of December of each year after successful completion of the fifth year and end on the 15<sup>th</sup> of November of the following year.

**TOTAL PROGRAMME CREDITS: 796**

## **M. M. SC. RANGELAND RESOURCES AND MANAGEMENT [17MSRR]**

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### **M.1 ADMISSION**

- M.1.1 The University of Namibia general regulations regarding admission of students to Masters Degree programmes shall apply.
- M.1.2 Notwithstanding the above, students wishing to enroll 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.

### **M.2 ASSESSMENT**

The following were adopted to ensure high standards and competitive degree quality:

- M.2.1 A 3-hour theory examination at the end of each module;
- M.2.2 A pass mark of 60% for all modules, including the thesis;
- M.2.3 A weighting of 50:50 for continuous assessment (CA) and the final examination;
- M.2.4 At least 3 different continuous assessments for each module for core modules and 5 for generic modules;
- M.2.5 Only students with an attendance record of 80% of all module activities (excluding continuous assessment activities) and a minimum continuous assessment grade of 40% can write the final examination;
- M.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 First Opportunity Examinations. A student who fails to get the required passing marks after the supplementary examination will have to repeat the failed module in the subsequent year.
- M.2.7 A student can remain registered for a maximum of 4 years.
- M.2.8 Student will only be awarded M.Sc. degree in Range Resource Management upon completion of all required modules with a pass mark of 60% or higher, including the thesis component.

### **M.3 DEGREE STRUCTURE**

The following will be the structure of the degree.

- M.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.
- M.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.
- M.3.3 Course work will be covered over two semesters in the first year while research and thesis work will be done in the second year.
- M.3.4 There will be a maximum of 15 students per intake (minimum 5 students; see page 3) and new intakes will be done once in two years.
- M.3.5 The degree course work will comprise of: 8 compulsory core modules, 2 (out of 7) elective core modules and 2 compulsory generic modules. Graduation requires the completion of minimum 240 credits in lines with NQA guidelines.
- M.3.6 Core modules, 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.
- M.3.7 Each core module will run over a 4-week block, while the generic modules will run over 28 weeks, across the two semesters.
- M.3.8 Six core modules will be taught each semester with a week's break between the core teaching blocks.
- M.3.9 Core module examinations will be written immediately after the module, during the inter-block break.
- M.3.10 To counter the anticipated time-tabling problem regarding the 7 elective modules, there will be restricted possible module combinations and sequencing in the student's degree plan.



## M.4 TEACHING MODE

This will include; lectures, field work, discussion seminars, case studies, group projects etc.

## M.5 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 theses must be externally examined.

## M.6 PROGRAMME SCHEDULE

### M.SC. IN RANGELAND RESOURCES MANAGEMENT (M SC RR & M) [17MSRR]

#### M.6.1 FIRST YEAR

MODULE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
AASC	5900	Research/ Exp Design & Analysis	9	2	0.3	8
AASC	5920	Geographic Info Systems & Remote Sensing	9	1.1	1.2	8
AASC	5981	Intro Integrated Resource Management	9	7/w	3/w	12
AASC	5991	Rangeland Ecosystem Structure & Function	9	7/w	3/w	12
AASD	5981	Soil Dynamics	9	7/w	3/w	12
AASW	5981	Water Dynamics	9	7/w	3/w	12
AASE	5981	Environmental Physiology	9	7/w	3/w	12
AASL	5981	Land Use Planning	9	7/w	3/w	12
AASF	5981	Fodder Flow	9	7/w	3/w	12
AASR	5981	Rangeland Management	9	7/w	3/w	12
UAE	5819	Academic Writing for Postgraduate Students	8	04/56	0	16

**TOTAL SEMESTER 1 CREDITS 128**

#### Semester 2

AASC	5900	Research/ Exp Design & Analysis	9	2	0.3	8
AASC	5920	Geographic Info Systems & Remote Sensing	9	1.1	1.2	8
AASC	5982	Wildlife Ecology & Management	9	7/w	3/w	12
AASC	5992	Rangeland Degradation and Its Mitigation	9	7/w	3/w	12
AASN	5982	Nutrition of Foraging Animals	9	7/w	3/w	12
AASS	5982	Sustainable Livelihoods	9	7/w	3/w	12
AASR	5982	Range Biodiversity and Conservation	9	7/w	3/w	12
AASE	5982	Natural Resource Economics	9	7/w	3/w	12
AASP	5982	Natural Resource Policies	9	7/w	3/w	12
UAE	5819	Academic Writing for Postgraduate Students	8	04/56	0	16

**TOTAL SEMESTER 2 CREDITS 116**

**TOTAL FIRST YEAR CREDITS 244**

#### N.6.2 SECOND YEAR

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
AASC	6910	Research Project / Thesis	9			

#### Semester 2

AASC	6910	Research Project / Thesis	9			
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**TOTALS 128 340**

### COMPULSORY AND ELECTIVE MODULES

YR 1	Semester 1	
	Subject	Comment
	ASC 5900: Research / Exp Design & Analysis	Compulsory
	ASC 5920: Geog Info Systems & Remote Sensing	Compulsory
	ASC 5981: Intro Integrated Resources Management	Compulsory
	*ASR5981: Rangeland Management	Compulsory

	ASC 5991: Rangeland Ecosystem Structure & Function	Compulsory
	ASD 5981: Soil Dynamics	Elective
	AWD5981: Water Dynamics	Elective
	AEP 5981: Environmental Physiology	Elective
	ALU 5981: Land Use Planning	Elective
	AFF 5981: Fodder Flow	Compulsory
	UAE 5819: Academic Writing for Postgraduate Students	Compulsory (first or second semester)
<b>Semester 2</b>		
	ASC 5900: Research / Exp Design & Analysis	Compulsory
	ASC 5920: Geo Info Systems & Remote Sensing	Compulsory
	ASC 5982: Wildlife Ecology & Management	Elective
	ASC 5992: Rangeland Degradation & Its Mitigation	Compulsory
	ANF 5982: Nutrition of Foraging Animals	Compulsory
	AST 5982: Sustainable Livelihoods	Compulsory
	ARB 5982: Range Biodiversity & Conservation	Compulsory
	ASE 5982: Natural Resources Economics	Elective
	ASP 5982: Natural Resource Policies	Elective
<b>YR 2</b>	<b>Semester 1</b>	
	<b>Subject</b>	<b>Comment</b>
	ASC 6910: Research Project/Thesis	Compulsory
	<b>Semester 2</b>	
	ASC 6910: Research Project/Thesis	Compulsory

## M.7 MODULE DESCRIPTORS: RANGELAND RESOURCES MANAGEMENT

### FIRST YEAR MODULES

#### AASC 5900: RESEARCH / EXPERIMENTAL DESIGN AND ANALYSIS

**Module Title** RESEARCH / EXPERIMENTAL DESIGN AND ANALYSIS

**Code** AASC 5900

**NQA Level** 9

**National Professional**

**Standards Competencies** N/A

**Contact Hours:**

**Lecturers /week:**

**Practicals/week:** 28 weeks (64 Contact Hours) compulsory

**Credits** 16

**Modules Assessment:** Assessment: CA [50%] at least 5 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.

**CA:** 50%

**Exam:** 50%

**Prerequisites**

**Module Description (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, NMMDS, DECORANA) and demonstrates how they are used.

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#### **AASC 5920: GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING**

<b>Module Title:</b>	<b>GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING</b>
<b>Code</b>	AASC5920
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	28 weeks (64 Contact Hours) compulsory
<b>Lecturers /week:</b>	
<b>Practicals/week:</b>	
<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 Description (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>	<b>INTRODUCTION TO INTERGRATED RESOURCES MANAGEMENT</b>
<b>Code</b>	AASC5981
<b>NQA Level</b>	9
<b>National Professional</b>	

**Standards Competencies**N/A**Contact Hours:****Lecturers /week:** 40 (4 weeks) compulsory**Practicals/week:****Credits** 12**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.**CA:** 50%**Exam:** 50%**Prerequisites** None**Module Description (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.

**AASC 5991: RANGELAND ECOSYSTEM STRUCTURE AND FUNCTION****Module Title** RANGELAND ECOSYSTEM STRUCTURE AND FUNCTION**Code** AASC5991**NQA Level** 9**National Professional****Standards Competencies**N/A**Contact Hours:** 4 weeks (40 Contact Hours) compulsory**Lecturers /week:****Practicals/week:****Credits** 12**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.**CA:** 50%**Exam:** 50%**Prerequisites** none**Module Description (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****Module Title** SOIL DYNAMICS**Code** AASD5981**NQA Level** 9

**National Professional****Standards Competencies**N/A**Contact Hours:** 4 weeks (40 Contact Hours) elective**Lecturers /week:****Practicals/week:****Credits** 12**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.**CA:** 50%**Exam:** 50%**Prerequisites** none**Module Description (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.

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**AASW 5981: WATER DYNAMICS**

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**Module Title** WATER DYNAMICS**Code** AASW 5981**NQA Level** 9**National Professional****Standards Competencies**N/A**Contact Hours:** 4 weeks (40 Contact Hours) elective**Lecturers /week:****Practicals/week:****Credits** 12**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.**CA:** 50%**Exam:** 50%**Prerequisites** none**Module Description (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.

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**AASE 5981: ENVIRONMENTAL PHYSIOLOGY**

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**Module Title** ENVIRONMENTAL PHYSIOLOGY**Code** AASE 5981**NQA Level** 9**National Professional****Standards Competencies**N/A**Contact Hours:** 4 weeks (40 Contact Hours) elective**Lecturers /week:****Practicals/week:****Credits** 12**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.**CA:** 50%

**Exam:** 50%  
**Prerequisites** none

**Module Description (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.

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**AASL 5981: LAND USE PLANNING**

**Module Title** LAND USE PLANNING

**Code** AASL 5981

**NQA Level** 9

**National Professional**

**Standards Competencies** N/A

**Contact Hours:** 4 weeks (40 Contact Hours) elective

**Lecturers /week:**

**Practicals/week:**

**Credits** 12

**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.

**CA:** 50%

**Exam:** 50%

**Prerequisites** none

**Module Description (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.

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**AASF 5981: FODDER FLOW**

**Module Title** FODDER FLOW

**Code** AASF5981

**NQA Level** 9

**National Professional**

**Standards Competencies** N/A

**Contact Hours:** 4 weeks (40 Contact Hours) compulsory

**Lecturers /week:**

**Practicals/week:**

**Credits** 12

**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.

**CA:** 50%

**Exam:** 50%

**Prerequisites** none

**Module Description (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.

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#### **AASR 5981: RANGELAND MANAGEMENT**

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**Module Title:** RANGELAND MANAGEMENT

**Code:** AASR 5981

**NQF Level:** 9

**National Professional Standards**

**Competencies:** N/A

**Contact Hours:** 4 weeks (40 Contact Hours) Compulsory

**Credits:** 12

**Module Assessment:** 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 description (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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**Module Title** WILDLIFE ECOLOGY AND MANAGEMENT

**Code** AASC 5982

**NQA Level** 9

**National Professional Standards**

**Competencies** N/A

**Contact Hours:** 40 contact hours (4 weeks) elective

**Lecturers /week:**

**Practicals/week:**

**Credits** 12

**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.

**CA:** 50%

**Exam:** 50%

**Prerequisites** none

**Module Description (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>	<b>RANGELAND DEGRADATION AND ITS MITIGATION</b>
<b>Code</b>	AASC 5992
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Lecturers /week:</b>	
<b>Practicals/week:</b>	
<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
<b>Module Description (content)</b>	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>	<b>NUTRITION OF FORAGING ANIMALS</b>
<b>Code</b>	AASN 5982
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) compulsory
<b>Lecturers /week:</b>	
<b>Practicals/week:</b>	
<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
<b>Module Description (content)</b>	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.

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>	<b>SUSTAINABLE LIVELIHOODS</b>
<b>Code</b>	AASS 5982
<b>NQA Level</b>	9



**National Professional Standards Competencies** N/A  
**Contact Hours:** 4 weeks (40 Contact Hours) compulsory  
**Lecturers /week:**  
**Practicals/week:**  
**Credits** 12  
**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.  
**CA:** 50%  
**Exam:** 50%  
**Prerequisites**

### Module Description (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

**Module Title** RANGE BIODIVERSITY AND CONSERVATION  
**Code** AASR 5982  
**NQA Level** 9  
**National Professional Standards Competencies** N/A  
**Contact Hours:** 4 weeks (40 Contact Hours) compulsory  
**Lecturers /week:**  
**Practicals/week:**  
**Credits** 12  
**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.  
**CA:** 50%  
**Exam:** 50%  
**Prerequisites** none

### Module Description (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

**Module Title** NATURAL RESOURCE ECONOMICS  
**Code** AASE5982  
**NQA Level** 9  
**National Professional Standards Competencies** N/A  
**Contact Hours:**  
**Lecturers /week:** 4 weeks (40 Contact Hours) elective  
**Practicals/week:**  
**Credits** 12  
**Modules Assessment:** Assessment: CA [50%] at least 3 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.  
**CA:** 50%  
**Exam:** 50%  
**Prerequisites** none

### Module Description (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**

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<b>Module Title</b>	<b>NATURAL RESOURCE POLICIES</b>
<b>Code</b>	AASP5982
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	
<b>Lecturers /week:</b>	4 weeks (40 contact hours) elective
<b>Practicals/week:</b>	
<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 Description (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**

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<b>Module Title:</b>	<b>ACADEMIC WRITING FOR POST GRADUATE STUDENTS</b>
<b>Code:</b>	<b>UAE5819</b>
<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.

#### **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.

### **SECOND YEAR: THESIS COMPONENT**

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### **AASC 6910: RESEARCH PROJECT / THESIS**

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<b>Module Title</b>	<b>RESEARCH PROJECT/THESIS</b>
<b>Code</b>	AASC 6210
<b>NQA Level</b>	9

**National Professional**

**Standards Competencies** N/A  
**Contact Hours:** Second Year; compulsory  
**Lecturers /week:**  
**Practicals/week:**  
**Credits** 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 theses must be externally examined.

**Prerequisites** A pass in all coursework modules

**Module Description (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 Namibia.

## APPENDIX 1: Articulation of the New Diploma Curriculum into the Degree Programme

TABLE 1

ARTICULATION					B.Sc. Degree Structure for Diploma Students having completed the new curriculum and joining FANR Degree Programme as of 2012:	
FANR B.Sc. Degree Programme (Agriculture)			New Diploma Agriculture (Neudamm and Ogongo Campus)			
Course Code	Title		Course Code	Title	Course Code	Title
1st Year			1st Year		1st Year	
1st Semester			1st Semester		1st Semester through CES	
UCLC 3509	Computer Literacy	Exemption through:	UCLC 3509	Computer Literacy		
ULCE 3419	English Communication and Study Skills	Exemption through:	ULEG 2410	English for General Communication		
UCSI 3529	Contemporary Social Issues	Exemption through:	UCSI 3529	Contemporary Social Issues		
ULEA 3519	English for Academic Purposes				ULEA 3519	English for Academic Purposes
SBLG 3411	Introduction to Biology	Exemption through:	AASC 2401	Biology		
SPHY 3401	Physics for Life Sciences I	Exemption through:	AASC2411	Physical Science		
SMAT 3511	Basic Mathematics				SMAT 3511	Basic Mathematics
2nd Semester			2nd Semester		2nd Semester through CES	
SCHM 3532	Chemistry for Life Sciences	Exemption through:	ACSC 2512	Soil Science and		
			ACSC 2601	Water Management + Soil Conservation		
SPHY 3412	Physics for Life Sciences II				SPHY 3412	Physics for Life Sciences II
SBLG 3512	Diversity of Life	Exemption through:	AASC 2401	Biology		
			ACSC 2412	Principles of Crop Production		
			AASC 2502	Applied Animal Breeding		
			AASC 2411	Physical Science		

ARTICULATION							
					B.Sc. Degree Structure for Diploma Students having completed the new curriculum and joining FANR Degree Programme as of 2012:		
FANR B.Sc. Degree Programme (Agriculture)			New Diploma Agriculture (Neudamm and Ogongo Campus)				
Course Code	Title		Course Code	Title	Course Code	Title	
SMAT 3512	Precalculus				SMAT 3512	Precalculus	
SSTS 3522	Introduction to Statistics				SSTS 3522	Introduction to Statistics	
<b>2nd Year</b>			<b>2nd Year</b>			<b>2nd Year</b>	
<b>1st Semester</b>			<b>1st Semester</b>			<b>1st Semester</b>	
AGEC 3681	Principles of Microeconomics				AGEC 3681	Principles of Microeconomics	
AGEC 3691	Rural Sociology	Exemption through:	AGEC 2422	Communication Information Systems +			
			AGEC 2521	Introduction to Rural Sociology			
			AGEC 2601	Extension Methods			
AASC 3601	Genetics				AASC 3601	Genetics	
ACSC 3681	Plant Science	Exemption through:	ACSC 2602	Crop Production and			
			ACSC 2611	Vegetable + Fruit Production			
AFST 3601	Human Nutrition				AFST 3601	Human Nutrition	
AFST 3621	General Microbiology				AFST 3621	General Microbiology	
<b>2nd Semester</b>			<b>2nd Semester</b>			<b>2nd Semester</b>	
AAEN 3602	Agricultural Engineering	Exemption through:	ACSC 2502	Farm Technology I and			
			ACSC 2612	Farm Technology II			
AGEC 3682	Production Economics				AGEC 3682	Production Economics	
AGEC 3692	Principles of Macroeconomics				AGEC 3692	Principles of Macroeconomics	
AASC 3612	Biochemistry				AASC 3612	Biochemistry	
AASC 3602	Livestock Production Systems	Exemption through:	AASC 2502	Applied Animal Breeding and			

ARTICULATION					B.Sc. Degree Structure for Diploma Students having completed the new curriculum and joining FANR Degree Programme as of 2012:	
FANR B.Sc. Degree Programme (Agriculture)			New Diploma Agriculture (Neudamm and Ogongo Campus)			
Course Code	Title		Course Code	Title	Course Code	Title
			AASC 2611	Intensive Production and Animal		
			AASC 2612	Extensive Production Animal		
ACSC 3682	Agronomy	Exemption through:	ACSC 2602	Crop Production and		
			ACSC 2611	Vegetable + Fruit Production		
AFST 3602	Food Technology				<b>AFST 3602</b>	<b>Food Technology</b>

TABLE 2

ARTICULATION						
						<b>B.Sc Degree Structure for Diploma Students</b>
						having completed the new curriculum and
						joining the FANR Degree Programme as of 2012:
<b>FANR B.Sc. Degree Programme (Natural Resources)</b>			<b>New Diploma in Natural Resource Management (Ogongo Campus)</b>			
<b>Course Code</b>	<b>Title</b>		<b>Course Code</b>	<b>Title</b>	<b>Course Code</b>	<b>Title</b>
<b>1st Year</b>			<b>1st Year</b>		<b>1st Year</b>	
<b>1st Semester</b>			<b>1st Semester</b>		<b>1st Semester through CES</b>	
UCLC 3409	Computer Literacy	Exemption through:	UCLC 3409	Computer Literacy		
ULCE 3419	English Communication and Study Skills	Exemption through:	ULEG 2410	English for General Communication		
UCSI 3429	Contemporary Social Issues	Exemption through:	UCSI 3429	Contemporary Social Issues		
ULEA 3419	English for Academic Purposes				<b>ULEA 3419</b>	<b>English for Academic Purposes</b>
SBLG 3411	Introduction to Biology	Exemption through:	AASC 2401	Biology		
SPHY 3401	Physics for Life Sciences I	Exemption through:	AASC2411	Physical Science		
SMAT 3511	Basic Mathematics				<b>SMAT 3511</b>	<b>Basic Mathematics</b>
<b>2nd Semester</b>			<b>2nd Semester</b>		<b>2nd Semester through CES</b>	
SCHM 3532	Chemistry for Life Sciences	Exemption through:	ACSC 2512	Soil Science and		
			ACSC 2601	Water Manag. + Soil Conservation		
SPHY 3412	Physics for Life Sciences II				<b>SPHY 3412</b>	<b>Physics for Life Sciences II</b>
SBLG 3512	Diversity of Life	Exemption through:	AASC 2401	Biology		
			AASC 2411	Physical Science		
			AIES 2511	Plant Entomology and Pathology		

ARTICULATION						
						<b>B.Sc Degree Structure for Diploma Students</b>  <b>having completed the new curriculum and</b>  <b>joining the FANR Degree Programme as of 2012:</b>
<b>FANR B.Sc. Degree Programme (Natural Resources)</b>			<b>New Diploma in Natural Resource Management (Ogongo Campus)</b>			
<b>Course Code</b>	<b>Title</b>		<b>Course Code</b>	<b>Title</b>	<b>Course Code</b>	<b>Title</b>
			AIES 2532	Silviculture		
			AIES 2532	Introduction to Agroforestry		
SMAT 3512	Precalculus				<b>SMAT 3512</b>	<b>Precalculus</b>
SSTS 3522	Introduction to Statistics				<b>SSTS 3522</b>	<b>Introduction to Statistics</b>
<b>2nd Year</b>			<b>2nd Year</b>		<b>2nd Year</b>	
<b>1st Semester</b>			<b>1st Semester</b>		<b>1st Semester</b>	
AGEC 3681	Principles of Microeconomics				<b>AGEC 3681</b>	<b>Principles of Microeconomics</b>
AGEC 3691	Rural Sociology	Exemption through:	AGEC 2422	Communication Information Systems +		
			AGEC 2521	Introduction to Rural Sociology		
			AGEC 2601	Extension Methods		
AASC 3601	Genetics				<b>AASC 3601</b>	<b>Genetics</b>
AIES	Ecology				<b>AIES</b>	<b>Ecology</b>
AIES 3621	Principles of Wildlife Management				<b>AIES 3621</b>	<b>Principles of Wildlife Management</b>
ANRE 3601	Environmental Science	Exemption through:	AIES 2622	Nat. Resource Policies+Administration		
			AIES 2612	Integr. Nat. Resource Mgt.+Planning		
AFST 3621	General Microbiology				<b>AFST 3621</b>	<b>General Microbiology</b>
<b>2nd Semester</b>			<b>2nd Semester</b>		<b>2nd Semester</b>	<b>through CES</b>
AGEC 3692	Principles of				<b>AGEC 3692</b>	<b>Principles of</b>



ARTICULATION						
						<b>B.Sc Degree Structure for Diploma Students</b>  having completed the new curriculum and  joining the FANR Degree Programme as of 2012:
<b>FANR B.Sc. Degree Programme (Natural Resources)</b>			<b>New Diploma in Natural Resource Management (Ogongo Campus)</b>			
<b>Course Code</b>	<b>Title</b>		<b>Course Code</b>	<b>Title</b>	<b>Course Code</b>	<b>Title</b>
	Macroeconomics					Macroeconomics
AASC 3612	Biochemistry				AASC 3612	Biochemistry
AIES 3682	Plant Physiology				AIES 3682	Plant Physiology
AIES 3602	General Soil Science	Exemption through:	ACSC 2512	Soil Science		
			ACSC 2601	Water Management & Soil Conservation		
ANRE 3602	Climatology and Hydrology				ANRE 3602	Climatology and Hydrology
ANRF 3692	Natural Resource Economics	Exemption through:	AIES 2602	Intro. to Natural Resource Economics		

## APPENDIX 2: MODULE EQUIVALENTS (Diploma and Degree programmes)

MODULE EQUIVALENTS	
OLD GRN CURRICULUM	NEW UNAM CURRICULUM
<b>1 st YEAR</b>	
<b>Module Code + Title</b>	
ACA 2100 Farm Duties	AACA 2400 Farm Duties
ACB 2111 Computer Skills	UCLC 3409 Computer Literacy

<b>MODULE EQUIVALENTS</b>	
<b>OLD GRN CURRICULUM</b>	<b>NEW UNAM CURRICULUM</b>
ACB 2121 Mathematics	AGEC 2411 Mathematics + Basic Statistics
ACB 2131 Biology	AASC 2401 Biology
ACB 2141 Chemistry	AASC 2411 Physical Science
ACB 2151 English + Communication Skills	ULEG 2410 English for General Communication
ACB 2161 Physics	AASC 2411 Physical Science
AEC 2112 Basic Concepts in Economics and Management	AGEC 2402 Basic Economics
ASC 2112 Animal Nutrition	AASC 2412 Animal Nutrition and Feeding
ASC 2132 Introduction to Ecology	AIES 2442 General Ecology
CSC 2112 Principles of Crop Production	ACSC 2412 Principles of Crop Production
AEN 2111 Surveying	no equivalent identified
ASC 2111 Animal Anatomy + Physiology	no equivalent identified
ASC 2122 Animal Reproduction + Breeding	no equivalent identified
AEN 2112 Workshop Technology	no equivalent identified
CSC 2122 Soil Science	no equivalent identified
<b>MODULE EQUIVALENTS</b>	
<b>OLD GRN CURRICULUM</b>	<b>NEW UNAM CURRICULUM</b>
<b>2nd YEAR</b>	
<b>Module Code + Title</b>	
ACA 2200 Farm Duties	AACA 2500 Farm Duties
ASC 2211 Range Management I	AASC 2511 Range Management
ASC 2221 Animal Health I	AASC 2512 Applied Animal Health
CSC 2211 Crop Protection	ACSC 2511 Crop Protection
NRO 2211 Introduction to Agroforestry	AIES 2531 Introduction to Agroforestry
AEN 2211 Farm Power + Machinery	ACSC 2502 Farm Technology I
AEC 2221 Research Methodology	AGEC 2502 Introduction to Social Research Methods
AEC 2211 Introduction to Extension	no equivalent identified
AEC 2212 Financial Management	AGEC 2501 Financial Management
AEC 2222 Indigenous Resource Management and Rural Sociology	AGEC 2521 Introduction to Rural Sociology
ASC 2212 Range Management II	AASC 2511 Range Management

<b>MODULE EQUIVALENTS</b>	
<b>OLD GRN CURRICULUM</b>	<b>NEW UNAM CURRICULUM</b>
ASC 2222 Animal Health II	AASC 2512 Applied Animal Health
ASC 2232 Small Ruminant Production	no equivalent identified
ASC 2242 Dairy Production	no equivalent identified
CSC 2212 Vegetable + Fruit Production	no equivalent identified
AEN 2212 Land Use Planning	no equivalent identified
<b>MODULE EQUIVALENTS</b>	
<b>OLD GRN CURRICULUM</b>	<b>NEW UNAM CURRICULUM</b>
<b>3rd YEAR</b>	
<b>Module Code + Title</b>	
ACA 2300 Farm Duties	no equivalent identified
AEC 2311 Marketing Policy + Trade	AGEC 2621 Marketing, Trade + Policy
ASC 2311 Beef Production	AASC 2612 Extensive Animal Production
ASC 2321 Pelt + Fibre Production	no equivalent identified
ASC 2331 Pig Production	AASC 2611 Intensive Animal Production
CSC 2311 Field Crops Production	ACSC 2602 Crop Production
AEN 2311 Animal Draft Power Technology	ACSC 2612 Farm Technology II
AEC 2341 Communications + Information Systems	no equivalent identified
AEN 2321 Soil + Water Management	ACSC 2601 Water Management + Soil Conservation
AEC 2312 Extension System Approaches	AGEC 2601 Extension Methods
AEC 2322 Personnel Management	no equivalent identified
AEC 2332 Introduction to Entrepreneurship	AGEC 2622 Entrepreneurship
AEC 2342 Project Management	AGEC 2602 Project Management
ASC 2312 Ostrich Production	AASC 2611 Intensive Animal Production
ASC 2322 Game Farming	AASC 2602 Game Farming
ASC 2332 Sustainable Resource Management	no equivalent identified
ASC 2342 Poultry Production	no equivalent identified
AEN 2312 Farm Structures	ACSC 2612 Farm Technology II
AEN 2322 Irrigation + Drainage	no equivalent identified

<b>MODULE EQUIVALENTS</b>	
<b>OLD GRN CURRICULUM</b>	<b>NEW UNAM CURRICULUM</b>

