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# FACULTY PROSPECTUS 2009

## FACULTY OF AGRICULTURE AND NATURAL RESOURCES



UNIVERSITY OF NAMIBIA

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## NOTE

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This Faculty Prospectus is valid for 2009 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 2008.

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 2009 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 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.

## 2009 ACADEMIC CALENDAR

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### FIRST SEMESTER

06 January	University opens
16 January	Lecturers resume office duties
19 Jan – 20 Febr	Registration - Dist Teaching (CES) (Last day for Late Reg: 25 Febr)
02 - 20 February	Registration - Full & Part time (Last day for Late Reg: 25 Febr)
<b>23 February</b>	<b>Lectures commence for FIRST SEMESTER</b>
14 April	EASTER BREAK starts
20 April	Lectures resume after Easter Break
<b>12 June</b>	<b>Lectures end for FIRST SEMESTER</b>
16 June	First Opportunity Examinations commence (Semester I modules)
03 July	First Opportunity Examinations end (Semester I modules)
<b>03 July</b>	<b>End of 1<sup>st</sup> Semester</b>

### SECOND SEMESTER

<b>27 July</b>	<b>Lectures commence for SECOND SEMESTER</b>
14 September	SPRING BREAK starts
21 September	Lectures resume after Spring Break
<b>06 November</b>	<b>Lectures end for SECOND SEMESTER</b>
10 November	First Opportunity Examinations commence (Sem II & Double modules)
27 November	First Opportunity Examinations end (Sem II & Double modules)
<b>27 November</b>	<b>End of 2<sup>nd</sup> Semester</b>
17 December	Academic Year ends & University closes (until 11 January 2010)
11 January 2010	University opens (2010 academic year)
12 January 2010	Second Opportunity Exams commence (Sem I, II & Double modules)
21 January 2010	Lecturers resume office duties
<b>29 January 2010</b>	<b>Second Opportunity Examinations end (Sem I, II &amp; Double modules)</b>

### DEADLINES FOR THE 2009 ACADEMIC YEAR

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(i)	<b>GENERAL</b>	
	Last day for Late Registration ( <i>Late fee payable</i> ) .....	25 February
	Last day for approval of exemption(s) .....	25 February
	Last day for approval of retention of continuous assessment mark .....	25 February
	Last day for approval of module(s) & qualification changes .....	25 February
	Last day to submit outstanding documentation .....	31 July
	Last day to apply for enrolment cancellation .....	02 October
(ii)	<b>CANCELLATIONS</b>	
	<b><u>First Semester Modules</u></b>	
	Last day to cancel Semester I modules .....	08 May
	<b><u>Second Semester Modules</u></b>	
	Last day to cancel Semester II modules .....	02 October
	<b><u>Double modules</u></b>	
	(a double module normally extends over one academic year)	
	Last day to cancel Double modules .....	02 October
(iii)	<b>FINANCE</b>	
	<b><u>First Semester Modules</u></b>	
	Last day to cancel with 100 % credit .....	13 March
	Last day to cancel with 50 % credit .....	17 April
	<b><u>Second Semester Modules</u></b>	
	Last day to cancel with 100 % credit .....	07 August
	Last day to cancel with 50 % credit .....	04 Sept
	<b><u>Double modules</u></b>	
	(a double module normally extends over one academic year)	
	Last day to cancel with 100 % credit .....	13 March
	Last day to cancel with 50 % credit .....	05 June

## STRUCTURE AND PERSONNEL OF THE FACULTY

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### OFFICE OF THE DEAN

<b>Executive Dean:</b>	Prof G P Kaaya: B.V.M., M.Sc. (Nairobi), PhD (Guelph, Canada)
<b>Deputy Dean (Neudamm Campus):</b>	Dr M B Schneider: M.Sc.,Dr.phil. (Frankfurt/Germany), SACNASP
<b>Deputy Dean (Ogongo Campus):</b>	Prof L Kanyomeka: Dipl. Agric; B. Agric Sci; M. Sc. (Agron) University of Zambia; PhD (Pretoria)
<b>Faculty Officer:</b>	Mr E Nowaseb: B.A. (Augustana College, Rock Island, Illinois,USA)
<b>Secretary:</b>	Ms M T Cloete
<b>Senior Researcher and Projects Coordinator:</b>	Dr M B Schneider: M.Sc.,Dr.phil. (Frankfurt/Germany), SACNASP
<b>Faculty Librarian:</b>	Ms M T Marenga: 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>Assistant Librarian:</b>	Ms S K Katjepunda
<b>Library Assistant:</b>	Mr E Thaniseb
<b>Library Attendant:</b>	Ms T Andowa
<b>Student Services Coordinator:</b>	Mr L N Shatipamba: B.A, M.A. (UNAM) {Office of the Dean of Students}

### NEUDAMM CAMPUS

<b>Deputy Dean:</b>	Dr M B Schneider: M.Sc., Dr.phil. (Frankfurt/Germany), SACNASP
<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>Finance &amp; Procurement Officer:</b>	Mr E Biwa
<b>Assistant Stores Controller:</b>	Ms I W Brandt
<b>Supervisor:</b>	Mr. G.V. Kandjii: National Dip. Agric., Neudamm, Namibia
<b>Supervisor:</b>	Mr. P. Beukes: National Dip. Agric., Neudamm, Namibia
<b>Assistant Supervisor:</b>	Mr. M. Katjiria: Grade 12 Certificate
<b>Secretary/Receptionist:</b>	Ms A R Beukes

### OGONGO CAMPUS

<b>Deputy Dean:</b>	Prof L Kanyomeka: Dipl. Agric; B. Agric Sci; M.Sc. (Agronomy) University of Zambia; PhD (Pretoria)
<b>Campus Administrator:</b>	Mr I Kalimba: (A+ Cert (UNAM), Cert Client Server Tech (India), Dipl Info Tech (N.C.I) Nam, Dipl IBM. (BMT College, SA)
<b>Farm Administrator:</b>	Mr V Namwoonde: Dipl Agric (Ogongo College)
<b>Senior Library Assistant:</b>	Mr J Kambuta
<b>Library Attendant:</b>	Ms S Shiimbi
<b>Assistant Stores Controller:</b>	Ms A Negwila
<b>Finance and Procurement Officer:</b>	Mr H Uupindi
<b>Secretary / Receptionist:</b>	Ms T Abed
<b>Secretary / Receptionist:</b>	Ms M A N Mandumbwa

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**  
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**Tel:** (061) 206 3363 / 3890  
**Fax:** (061) 206 3013 / 206 4027  
**E-mail:** enowaseb@unam.na

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

## ACADEMIC DEPARTMENTS

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### DEPARTMENT OF AGRICULTURAL ECONOMICS

<b>Head of Department:</b>	Dr E C Musaba
<b>Lecturer:</b>	Dr E C Musaba: B.Ag Sc (Zambia); M.Sc. (Guelph); PhD (Saskatchewan)
<b>Lecturer:</b>	Mr M M Eiseb: Dip Agric (Polytechnic); B.Sc, M.Sc. Agric Econ (Fort Hare)
<b>Lecturer:</b>	Ms C N Jona: B.Sc. Agric (UNAM); B.Sc. (Hons) Pretoria, M.Sc. Agric Extension (Pretoria)
<b>Lecturer:</b>	Mr S K Kalundu: NatDip Agric (Neudamm); B.Sc. Agric (UNAM); M.Sc. Agric Econ (Arkansas, USA)
<b>Lecturer:</b>	Mr B Thomas: B.Sc. Agric (UNAM); M.Sc. Agric Econ (Stellenbosch)

**Assistant Lecturer** Mr T Maharero: B.Sc. Agric (Natal)  
**Assistant Lecturer:** Ms E R Sheehama: B.Sc. Agric (UNAM)  
**Lecturer/Staff Dev Fellow:** Ms M Nandi: Dip Agric (Polytechnic); B.Agric Mgt (Natal); M.Sc.Dev Econ (Norway) Study leave (PhD Agric Econ, Free State)  
**Lecturer:** Ms M Hangula: B.Sc. Agric (UNAM) Study leave (Alberta,Canada)  
**Staff Dev Fellow:** Mr M N Angula: B.Sc. Agric (UNAM) Study leave (M.Sc., Michigan, USA)

#### DEPARTMENT OF ANIMAL SCIENCE

**Head of Department:** Dr. T O Itenge  
**Professor:** Prof G P Kaaya: B.V.M., M.Sc. (Nairobi), PhD (Guelph, Canada)  
**Associate Professor:** Vacant  
**Senior Lecturer:** Vacant  
**Lecturer:** Dr. T O Itenge: B.Sc. Hons (Molecular Biology), Murdoch University, Western Australia; Graduate Cert. (Applied Science), Lincoln University, New Zealand; PhD (Molecular Genetics and Wool Science), Lincoln University, New Zealand  
**Lecturer:** Dr. E Lutaaya: B.Sc. Agric. (Makerere); M.Sc. (Texas A & M); PhD (Georgia)  
**Lecturer:** Vacant  
**Lecturer:** Mr. S P Muteka: B.Sc. (Concordia), M.Sc. (Pretoria)  
**Lecturer:** Ms. N P Petrus: B.Agric (Nigeria); M.Sc. (CIRAD-France)  
**Lecturer:** Ms. B Claasen: B.Sc. Agric (Animal Science), UNAM; M.Sc. Agric (*cum laude*), Stellenbosch University  
**Lecturer:** Ms. M Nepembe M.Sc. Agric (Patrice Lumumba P F Univ)  
**Staff Dev Fellow:** Mr. C Mberema B.Sc. Agric (UNAM); M.Sc. (Arizona) Study leave  
**Staff Dev Fellow:** Mr. G Tjiho: B.Sc. Agric (UNAM) Study leave  
**Tutor/Staff Dev Fellow:** Vacant  
**Technologist:** Mr. L S Samunzala: National Dip. Agric., Neudamm, Namibia

#### DEPARTMENT OF CROP SCIENCE (Ogongo Campus)

**Ag. Head of Department:** Ms S Niitembu  
**Professor:** Prof O D Mwandemele: B.Sc. Hons; M.Sc. (Dar-es-Salaam); PhD (Sydney); Elected Fellow (ISGPB), Member UNU/INRA College of Res. Associates  
**Associate Professor:** Prof L Kanyomeka: Dip. Agric; B. Agric. Sc; M Sc. (Agron.) University of Zambia; PhD (Pretoria)  
**Lecturer:** Dr J Z U Kaurivi: B.Sc., (Natal); M.Sc., PhD (Arizona)  
**Lecturer:** Dr C Gwanama: B.AgricSc; M Sc (University of Zambia); PhD (Univ Orange Free State)  
**Lecturer:** Ms S Niitembu: MSc.(Patrice Lumumba); Diploma Animal Health, (Torgau,Leipzig)  
**Lecturer:** Mr U S K Kuvare: B.Sc. Agric (UNAM); M.Sc. Agric (Stellenbosch)  
**Lecturer:** Mr J Chigariro: Postgraduate Diploma Grain Storage Management (Greenwich University, UK); M.Sc. Grain Storage Management (Greenwich University, UK)  
**Lecturer:** Ms C Kamburona: B.Sc. Agric (UNAM); M.Sc. Genetics (Pretoria)  
**Lecturer:** Ms N Nghishitivali: M.Sc. Agric (Cuba)  
**Lecturer:** Mr F Shinombedi: M.Sc. Agric Eng (Czechelsovakia)  
**Assistant Lecturer:** Ms H Kandongo: B.Sc. Agric Mechanisation (Karl Marx University)  
**Assistant Lecturer:** Mr G Hatutale: B.Sc. Agric (UNAM)  
**Technologist:** Ms L Halueendo: B.Sc (UNAM); B.Sc. Hons, M.Sc. (Pretoria)  
**Technologist:** Ms A N Aluvilu: National Dip. Agric (Polytechnic of Namibia); B.Tech Agric (Cape Technikon) study leave  
**Staff Dev Fellow:** Mr P I Nanhapo: B.Sc. Agric (UNAM) Study leave  
**Staff Dev Fellow:** Mr P A Ausiku: National Dip Agric (Ogongo); B.Sc. Agric (UNAM) study leave  
**Staff Dev Fellow:** Ms O T Shivolo: Dip Agric (OAC); B.Sc. Agric (UNAM) study leave

#### DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

**Head of Department:** Dr N Shigwedha  
**Senior Lecturer:** Mr P G Bille: Dip Dairy Technol (Egerton); B.Sc. Hons Dairy Technol (California); M.Sc. Dairy Technol (Belfast)  
**Lecturer:** Ms M N Nambabi-Shikongo: B.Sc Hons (Kent); M.Sc (Brunel)  
**Lecturer:** Mr C Samundengu: B. Eng (Zambia); B. Eng Hons (Pretoria); M Eng (Pretoria)  
**Lecturer:** Dr N Shigwedha: B.Sc. Agric (UNAM); M.Sc., PhD (China)  
**Lecturer:** Mr S Barrion: B.Sc. Agric (UNAM); B.Sc. Hons, M.Sc.Distinction (Pretoria)  
**Staff Dev Fellow:** Ms P Hiwilepo: B.Sc. Agric (UNAM); M.Sc. Food Technology (Wageningen, The Netherlands) study leave  
**Staff Dev Fellow:** Ms N P Uusiku: B.Sc. Agric (UNAM); M.Sc. Food Sc (Stellenbosch) study leave  
**Staff Dev Fellow:** Mr T N Tjaronda: Dip Lab Tech (Botswana) study leave

## DEPARTMENT OF FISHERIES AND AQUATIC SCIENCES

<b>Head of Department:</b>	Prof E Omoregie
<b>Associate Professor:</b>	Prof E Omoregie: B.Sc. (Univ of Jos, Nigeria); M.Sc. (Univ of Jos, Nigeria ), M.Sc. (Porstmouth, UK), PhD (Univ of Jos, Nigeria)
<b>Lecturer:</b>	Mr L Kandjengo: B.Sc. (UNAM); B.Sc. (Hons), M.Sc. (Univ Cape Town) study leave
<b>Lecturer:</b>	Mr S K Mafwila: B.Sc. (UNAM); PGDE (UNAM); B.Sc.Hons (Rhodes); M.Sc. (UCT) study leave
<b>Lecturer:</b>	Mr J A Esterhuizen: B.Sc. (UNAM); B.Sc. Hons, M.Sc. (Rhodes) study leave
<b>Lecturer:</b>	Mr K Stephanus: B.Econ (UNAM); M.Sc (University of Tromso)
<b>Lecturer:</b>	Mr A Samakupa: B.Sc (UNAM); Cert Quality Control (Univ Iceland); M.Sc. Fisheries Biology and Management (Bergen University)
<b>Technologist:</b>	Mr I K V Kauvee: National Dip. Agric (Neudamm); B.Sc. Hons (University of Western Cape)

## DEPARTMENT OF INTEGRATED ENVIRONMENTAL SCIENCE (Ogongo Campus)

<b>Head of Department:</b>	Dr M Katjua
<b>Associate Professor:</b>	Prof J P Msangi : B.A. Hons (University of East Africa); M.A., PhD (University of Dar es Salaam)
<b>Senior Lecturer:</b>	Dr M Katjua: B.Sc. (UNAM); Grad Dip Env. Mgt And Dev. (Australian National University); M.Sc. (Canberra); Ph.D. Cons Ecology (Stellenbosch)
<b>Lecturer:</b>	Mrs. E Ndeunyema: National Dip Agric (OAC); B.Sc. Forestry (Wales Univ, Bangor); M.Sc. Agroforestry (Wales Univ, Bangor) study leave
<b>Lecturer:</b>	Ms A Ndeinoma: National Dip Agric (OAC); B.Sc. Forestry, M.Sc. Environmental Impact Assessment (Stellenbosch)
<b>Lecturer:</b>	Mr I Kaholongongo: Cert Forestry (OAC); B.Sc. Forestry (Stellenbosch)
<b>Lecturer:</b>	Ms H Mavatera: B.Sc. Agric; M.Sc. Agric (CRUJ-ROMANIA)
<b>Technologist:</b>	vacant
<b>Assistant Technologist:</b>	vacant

## A. REGULATIONS

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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 FANR may offer the following diploma and degree programmes:

#### A.1.1 UNDERGRADUATE DIPLOMA PROGRAMMES

<u>Qualification</u>	<u>Abbreviation</u>	<u>Minimum Duration</u>
Diploma in Agriculture	Dipl Agric	3 years, *FT
Diploma in Natural Resources Management	Dipl Nat Res Mgt	3 years, *FT

#### A.1.2 UNDERGRADUATE DEGREE PROGRAMMES

<u>Qualification</u>	<u>Abbreviation</u>	<u>Minimum Duration</u>
Bachelor of Science in Agriculture	B Sc Agric	4 years, *FT
Bachelor of Science in Natural Resources	B Sc Nat Res	4 years, *FT

Each of the above undergraduate degree programmes has a number of options which enable students to specialize in various fields of personal interest. The Faculty will advise the public which options will be offered at any given time.

#### A.1.3 POSTGRADUATE DEGREE PROGRAMMES

<u>Qualification</u>	<u>Abbreviation</u>	<u>Minimum Duration</u>
Master of Science in Rangeland Resources Management	M Sc RRM	2 years, *FT

**\*FT = full-time studies**

Apart from the above M Sc RRM 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 the diploma programmes shall be a Namibian Senior Secondary Certificate Ordinary Level (NSSC) or a recognized equivalent, provided that a candidate has passed five subjects with a minimum of 22 points on the UNAM Evaluation Point Scale, subject to performance using the following criteria:

A.2.1.2 Passes in:

- i) English with a score of "D" or better; at NSSC (English as a Second Language);
- ii) Mathematics with a score of "D" or better;
- iii) Any two of the following three subjects with an "E" symbol or better (Biology, Physical Science and Agriculture); and
- iv) Any fifth additional subject.

#### A.2.2 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 Faculty must have obtained a grade "C" or better in NSSC, or a recognized equivalent, in Biology and Mathematics, and not less than a grade "D" in Physical Science, or Chemistry. Candidates who meet the aforementioned criteria, but who might have obtained a "D" grade in Mathematics at NSSC or its equivalent, maybe admitted provided that they have scored a minimum of 27 points from five (5) subjects, including English, Biology, Mathematics and Physical Science or Chemistry, on the UNAM Evaluation Point Scale.

A.2.2.3 Candidates with a three-year Diploma in Agriculture, Forestry, Natural Resources or Fisheries and Marine/Aquatic Sciences with a combined average pass of 65% (i.e. credit pass), or higher from a recognized and accredited institution shall be granted admission to the first year B.Sc. Agriculture or B.Sc. Natural Resources degree programmes. Upon successful completion of the first year, such students maybe exempted from certain courses in the second and third year of their respective programmes, provided that the Faculty Board and the Senate of the University of Namibia are satisfied that the students will not gain any new knowledge by taking such courses which may be similar to courses they would have already taken at the diploma level.



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

- A.3.1 Candidates aspiring for admission to the Degree and Diploma programmes through the Mature Age Entry Scheme must satisfy the following conditions:
- A.3.2 Should be at least 25 years old on the first day of the academic year in which admission is sought.
- A.3.3 Should normally have successfully completed junior secondary education.
- A.3.4 Should have proof of at least five years relevant work experience relating to the proposed study programme.
- A.3.5 Applicants who have already attempted the Mature Age Entry Test twice without success, will not be considered under this scheme of entry.
- A.3.6 The applicants will be required to complete Mature Age Entry Application Forms, and return them to the Office of the Registrar, accompanied by a Processing Fee (as stipulated in the Application Form). They will then sit for the Mature Age Entry Test, which will consist of three papers:
- A.3.7 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 doing basic sciences and English communication modules within the Faculty of Science and the Language Centre at the University's Main Campus.
- A.4.2 These modules are compulsory and have been designed to build a strong foundation in the basic sciences and also improve communication and study skills of the students before they embark on their professional courses. Unless otherwise stated, these modules will be offered by the Faculty of Science, as well as the Language Centre, on the Main Campus in Windhoek. The rules and regulations of the Faculty of Science and the Language Centre governing the conduct of lectures and examinations of the basic science and English communication modules to FANR students shall apply. For details please consult the Faculty of Science and Language Centre Prospectus.
- A.4.3 Students will continue with their professional training in the Faculty at Neudamm campus after their first year at the Main campus. For each of the two undergraduate degree programmes, nearly all modules in the second year shall be common to all students in these programmes and specialization will normally commence in the third year of the respective programmes.
- A.4.4 The Faculty, in consultation with relevant Ministries, will play a significant role in advising students on the choice of options, taking into consideration the maximum places available in each option.

For the B.Sc. in Agriculture degree programme the following options will be offered:

- Agricultural Economics
- Animal Science
- Crop Science
- Food Science and Technology

For the B.Sc. in Natural Resources degree programme the following options will be offered:

- Fisheries and Aquatic Sciences
- Integrated Environmental Science

### **A.5 PASS REQUIREMENTS**

To proceed to second year, degree students must have fulfilled the following conditions:

- A.5.1 A student must have passed more than two-third (i.e.  $2/3 = 67\%$ ) of all the first year credits or modules.
- A.5.2 A student who has passed more than  $1/3$  but less than  $67\%$  of the full first year credits or modules will be allowed to repeat the failed courses, but will not be allowed to proceed to the second year.
- A.5.3 A student must have passed both Biology modules (i.e. Introduction to Biology and Diversity of Life) to be able to proceed to the second year.
- A.5.4 A student must pass at least  $1/3$  of the full first year curriculum in order to re-register in the Faculty.
- A.5.5 To proceed to the second and subsequent years, a Diploma student must have passed 60% of the credits taken during the year.

### **A.6 DURATION OF STUDY (UNDERGRADUATE PROGRAMMES)**

- A.6.1 Subject to the provisions of Faculty Special Regulations the duration of full-time study for a Bachelor's degree shall normally be four years, and that of the Diploma normally three years.
- A.6.2 The maximum period of full-time study for a Bachelor's degree or a Diploma, is the minimum period of study for that Degree/Diploma plus two years.

- A.6.3 The maximum period of part-time study for a Bachelors Degree or a Diploma, is the minimum period of study for that Degree/Diploma plus four years.

## A.7 MODULE STRUCTURE AND CODING

- A.7.1 The Modular system has been used in the design of the modules in each programme. However, the Faculty of Agriculture and Natural Resources has gone further in weighting the modules using credit/units to put more meaning to the module. All modules except for those offered in the Faculty of Science have each been given a unit weighting according to the time devoted to it. In this system, 14 one hour lectures, or 28 hours practical sessions, constitute one credit/unit. For example a module consisting of 28 one-hour lectures and 14 two hour practical classes would be a three credit module.

- A.7.2 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), AEN (Agricultural Engineering){Part of Crop Science Dept}, ASC (Animal Science) CSC (Crop Science), NRE (Environmental Science){Part of Natural Res Dept}, NRO (Forestry){Part of Natural Res Dept}, NRF (Natural Resources), FST (Food Science and Technology), NRW (Wildlife Management){Part of Natural Res Dept}. 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 credit  
4<sup>th</sup> numeric code: semester in which the module of offered

- A.7.3 A module may consist entirely of lectures, field work, project work or seminars. In addition to work during the term, a module may include prescribed fieldwork or assignments during University vacations. Tutorials will be offered in all terms and shall be compulsory.
- A.7.4 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.7.5 A student may, with the approval of the Faculty and Department, take modules from other Faculties with the provision that doing so will not affect his or her programme of study.

## A.8 FIELD ATTACHMENT REGULATIONS

- A.8.1 A student shall have to pass the first year of the Diploma or first year of the Degree study to qualify for the first field attachment. Similarly, second year Diploma and second year Degree students will be required to pass their year of study to be allowed to do the second field attachment.
- A.8.2 Attached students should be punctual at all times, must keep and leave accommodation provided to them clean, and report any breakages and damages caused to properties to their site supervisors, as well as maintain a positive attitude towards others and their work.
- A.8.3 Students are required to stay on duty till the last day of the attachment period. Failure to do so may result in the repetition of the attachment at student's own cost. Absence from the site of duty may only be authorized by the site management in writing. Weekends should be considered part of the attachment period, therefore students on attachment may be required to report for duty during weekends should the need arise.

## A.9 ASSESSMENT

- A.9.1 The Common Rules and Regulations of the University of Namibia governing evaluation of a student's performance shall apply. Evaluation of a student's performance shall be based on continuous assessment and examinations. An examination paper shall normally be a formal written examination of one and a half hours duration for courses of no more than 2 credits and of up to 3 hours for courses of more than 2 credits. Field attachment and modules that are wholly practical in nature shall be rated by continuous assessment. They may include orals, reports and presentations as appropriate. In order to pass a course, a student must obtain a final mark of at least 50%.
- A.9.2 Unless otherwise stipulated in these regulations, the 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 whilst examination will constitute a weighting of 40% of the final mark for modules consisting of lectures and practicals.  
UNDERGRADUATE PROGRAMMES  
Continuous assessment will constitute a weighting of 40% of the final mark whilst the examination will constitute a weighting of 60% of the final mark for modules consisting of lectures and practicals.
- A.9.3 Continuous assessment will include at least two tests and one assignment, including practical reports. For field attachment modules, an attachment report and an oral presentation shall constitute the total assessment mark.
- A.9.4 A student may be allowed to sit for supplementary examinations if he/she obtains a marginal fail mark of 45 - 49% in not more than five modules. The maximum score awarded for a supplementary examination will be 50%. A student who fails a supplementary examination shall repeat the failed module.
- A.9.5 A degree student

- 1) who has passed  $\frac{1}{2}$  or more modules in a year and obtains less than 45% marks in the failed courses shall repeat the failed courses;
- 2) will only be allowed to take modules in subsequent years if the pre-requisites have been passed.

A.9.6 To proceed to the second year, an undergraduate degree student must have passed more than two-thirds (i.e.  $\frac{2}{3}$  = 67%) of all the first year credits or modules, including passes in Introduction to Biology (BLG 3411) and Diversity of Life (BLG 3512).

A.9.7 An undergraduate degree student will only be permitted to proceed to the third year of study when all the modules in the first and second year have been successfully completed, or when not more than three (3) modules are being carried forward.

A.9.8 An undergraduate degree student may be allowed to proceed from the third year to the fourth year of study if:

- 1) He/She has passed all the modules examined during the year;
- 2) After supplementary examinations, he/she has passed at least 75% of the credits taken during the year.

#### A.10 REPEAT AND DISCONTINUATION

A.10.1 A student who has passed more than 40% but less than 60% of the full diploma credits for each academic year will be allowed to repeat the year.

A.10.2 A student who has passed more than a  $\frac{1}{3}$  [33%], but less than 67% of the full first year degree credits or modules will be allowed to repeat the year.

A.10.3 A student who has passed more than a  $\frac{1}{3}$  [33%], but less than 60% of the full second or third year degree credits or modules will be allowed to repeat the year.

A.10.4 A student who fails in more than  $\frac{2}{3}$  [67%] (for degree) and 60% (for diploma) of the full academic year credits will be discontinued.

#### 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 courses taken during the programme;
- (ii) Have completed and passed all field practical training courses.

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

## B. DIPLOMA IN AGRICULTURE (New Curriculum) {Neudamm & Ogongo Campus}

### B.1 FIRST YEAR

MODULE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
ULEG	2410	English for General Communication	4	04/56	0	16
UCLC	3409	Computer Literacy	4	02/28	42	8
UCSI	3429	Contemporary Social Issues	4	02/28	0	8
AGEC	2411	Mathematics and Basic Statistics	4	04/56	21	16
AASC	2401	Biology	4	02/28	14	8
AASC	2411	Physical Science	4	04/56	21	16
AACA	2400	Farm Duties I	4	0	49	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>80</b>
Semester 2						
ULEG	2310	English for General Communication	3	04/56	0	16
AGEC	2402	Basic Economics	4	02/28	14	8
AGEC	2422	Communication and Information Systems	4	02/28	14	8
AASC	2412	Animal Nutrition and Feeding	4	04/56	21	16
ACSC	2412	Principles of Crop Production	4	04/56	21	16
AIES	2442	General Ecology	4	02/28	14	8
AACA	2400	Farm Duties I	4	0	49	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>80</b>
<b>TOTAL FIRST YEAR CREDITS</b>						<b>160</b>

### B.2 SECOND YEAR

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AGEC	2501	Financial Management	5	02/28	14	8
AGEC	2521	Introduction to Rural Sociology	5	02/28	14	8
AASC	2511	Range Management	5	04/56	21	16
AASC	2531	Animal Anatomy, Physiology & Reproduction	5	04/56	21	16
ACSC	2511	Crop Protection	5	04/56	21	16
AACA	2500	Farm Duties II	5	0	49	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>72</b>
Semester 2						
AGEC	2502	Introduction to Social Research Methods	5	02/28	14	8
AASC	2512	Applied Animal Health	5	04/56	21	16
AASC	2502	Applied Animal Breeding	5	02/28	21	8
AASC	2522	Skin and Fibre Production	5	02/28	21	8
ACSC	2512	Soil Science	5	04/56	21	16
ACSC	2502	Farm Technology I	5	02/28	14	8
AACA	2500	Farm Duties II	5	0	49	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>72</b>
<b>TOTAL SECOND YEAR CREDITS</b>						<b>144</b>

### B.3 THIRD YEAR

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AGEC	2601	Extension Methods	6	02/28	14	8
AGEC	2621	Marketing, Trade and Policy	6	02/28	14	8
AASC	2611	Intensive Animal Production	6	04/56	21	16
ACSC	2601	Water Management & Soil Conservation	6	02/28	14	8
ACSC	2611	Vegetable & Fruit Production	6	04/56	21	16
AACA	2601	Field Attachment	6	0	0	8
AACA	2600	Special Study	6	02/28	21	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>72</b>
Semester 2						
AGEC	2602	Project Management	6	02/28	14	8
AGEC	2622	Entrepreneurship	6	02/28	14	8
AASC	2602	Game Farming	6	02/28	21	8
AASC	2612	Extensive Animal Production	6	04/56	21	16
ACSC	2612	Farm Technology II	6	04/5	21	16
ACSC	2602	Crop Production	6	02/28	21	8
AACA	2600	Special Study	6	02/28	21	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>72</b>
<b>TOTAL THIRD YEAR CREDITS</b>						<b>144</b>

## B.4 MODULE PRE- & CO-REQUISITES

NQF Level	MODULE	PRE-REQUISITE	CO-REQUISITE
5	AGEC 2502: Introduction to Social Research Methods	AGEC 2411: Mathematics & Basic Statistics	
	AASC 2511: Range Management	AIES 2442: General Ecology	
	AASC 2531: Animal Anatomy, Physiology & Reproduction	AASC 2401: Biology	
	AASC 2512: Applied Animal Health	AASC 2401: Biology & AASC 2411: Physical Science	
	AASC 2522: Skin & Fibre Production	AASC 2401: Biology	
	ACSC 2502: Farm Technology I	AGEC 2411: Mathematics & Basic Statistics	
6	AGEC 2601: Extension Methods	AGEC 2422: Communication & Information Systems and AGECE 2521: Introduction to Rural Sociology	
	AGEC 2621: Marketing, Trade & Policy	AGEC 2402: Basic Economics	
	AGEC 2602: Project Management	AGEC 2501: Financial Management	
	AGEC 2622: Entrepreneurship	AGEC 2501: Financial Management	
	ACSC 2601: Water Management & Soil Conservation	ACSC 2502: Farm Technology I	
	ACSC 2602: Crop Production	ACSC 2412: Principles of Crop Production	
	AACA 2610: Special Study	AGEC 2502: Introduction to Social Research Methods	

## B.5 MODULE DESCRIPTORS

### B.5.1 FIRST YEAR MODULES

#### B.5.1.1 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.

#### B.5.1.2 UCLC 3409: COMPUTER LITERACY

**Module title:** COMPUTER LITERACY  
**Code:** UCLC 3409  
**NQF level:** 4  
**Contact hours:** 2 periods per week for 14 weeks  
**Credits:** 8

**Module assessment:** Continuous Assessment 100%: Contribution to final Mark: 2 Practical Tests 50%; 2 Theory Tests 50%

**Prerequisites:** None

**Module description (Content):**

The aim of this module is to equip the student through hands-on experience with the necessary skills to use applications software such as Word processing, Spreadsheets, Database, Presentations and communications packages for increasing their productivity in an education and training environment.

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**B.5.1.3 UCSI 3429: CONTEMPORARY SOCIAL ISSUES**

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**Module Title:** CONTEMPORARY SOCIAL ISSUES  
**Code:** UCSI 3429  
**NQF:** 4  
**Contact Hours:** 2 Contact hours per week for 14 weeks  
**Credits:** 8  
**Module Assessment:** Continuous assessment (50%): test or assignment; Examination (50%): 1x2 hours paper  
**Prerequisite:** None

**Module Description (Content):**

The module raises awareness on the need for a personal, national and global ethics. The main objectives of the course is to help students reflect on the social moral issues; to discover themselves in a learner-centered, contextual, religious and life related setting. It also stimulates students for critical thinking and help them to appreciate their values, standards and attitudes.

Furthermore it orientates students with regards to the epidemiology of HIV/AIDS; the prevalence of the disease on Namibia, Africa and Internationally. It also informs students on the psycho social and environmental factors that contribute to the spread of the disease, the impact of HIV/AIDS on their individual lives, family and communities at large. The unit further seeks to enhance HIV/AIDS preventive skills among students by means of paradigm shift and behavior change and also to impart general introductory knowledge on gender, to make students aware, as well as sensitize them towards gender issues and how they affect our society, Sub-Region and continent at large.

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**B.5.1.4 AGEC 2411: MATHEMATICS AND BASIC STATISTICS**

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**Module title:** MATHEMATICS AND BASIC STATISTICS  
**Subject code:** AGEC 2411  
**NQF level:** 4  
**Contact hours:** Lectures: 4 hour/week, and Practical: 2 hours /week  
**Credits:** 16

**Module assessment:**

Continuous assessments 60% (minimum 2 test, and 3 assignment) Examination 40% (1 x 3 hour examination paper)

**Module description (Content):**

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

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**B.5.1.5 AASC 2401: BIOLOGY**

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**Module title:** BIOLOGY  
**Code:** AASC 2401  
**NQF level:** 4  
**Contact hours:** 2 lecture periods/week for 14 weeks; 3 hours practical alternative week.  
**Credits:** 8  
**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper)

**Prerequisites:** None

**Module description (Content):**

This module covers characteristics of living organisms; Overview of the five major kingdoms (Monera, Protista, Fungi, Plantae, Animalia) and Viruses; Chemical basis of life; Introductory structure of macromolecules (carbohydrates, lipids, proteins and nucleic acids) and their functions; Importance of carbohydrates, lipids, proteins, vitamins and minerals in animal nutrition; Prokaryotic and eukaryotic cells; Differences between plant and animal cells; Cell cycle; Mitosis and Meiosis; Sexual and asexual reproduction; Basic concepts of Mendelian genetics; Tissues, organs and systems in animals; Enzymes as catalysts; Photosynthesis; Osmosis & diffusion; Cell respiration; Monocotyledons and dicotyledons; Basic plant anatomy and physiology; External and internal plant morphology; Passive and active transport; Concept of evolution; Introduction to ecology, ecosystems and communities; Naming of ecosystems and communities; Food chain and food web; Interrelationships among organisms; The cycling of matter in ecosystems (water, carbon and nitrogen cycles).

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**B.5.1.6 AASC 2411: PHYSICAL SCIENCE**

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**Module title:** PHYSICAL SCIENCE  
**Code:** AASC 2411  
**NQF level:** 4  
**Contact hours:** 4 lecture periods/week for 14 weeks; 3 hours practical every week.  
**Credits:** 16

**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper)

**Prerequisites:** None

**Module description (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

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**B.5.1.7 AACA 2400: FARM DUTIES I**

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**Module title:** FARM DUTIES  
**Subject code:** AACA 2400  
**NQF Level:** 4  
**Contact hours:** Practical: 7 hours (one full day) on alternating weeks for 28 weeks  
Total: 98 hours  
**Credits:** 16  
**Module Assessment:** Assessment will be based on attendance at duty stations.

**Prerequisite:** None

**Module Description (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 Neudamm and 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 (5 credits at level 5) will be awarded for this work. Assessment will be based on attendance at duty stations, participating in and completion of tasks and attitudes towards work, as well as grading during specific courses that take place in the recess periods (e.g. Easter and, Winter and Spring).

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**B.5.1.8 AGECE 2402: BASIC ECONOMICS**

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**Module title:** BASIC ECONOMICS  
**Subject code:** AGECE 2402  
**NQF level:** 4  
**Contact hours:** Lectures: 2 hours/ week and Practicals: 2hours/week for 14 weeks weeks  
**Credits:** 8

**Module assessment**

One Exam Paper (3hrs) 40%, 2 Tests, 3 Assignments and Practicals 60%

**Module description (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; National accounts; Components of national income and expenditure; Government taxation in Namibia; Money, Banking and interests; Consumer price Index (CPI); Inflation and deflation; Unemployment; The contribution of agriculture to the national economy; International trade and comparative advantage.

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**B.5.1.9 AGECE 2422: COMMUNICATION AND INFORMATION SYSTEMS**

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**Module Title:** COMMUNICATION AND INFORMATION SYSTEMS  
**Subject code:** AGECE 2422  
**NQF level :** 4  
**Contact hours:** Lectures: 2 hours/week and Practicals 2 hours/week for 14 weeks  
**Credits:** 8

**Module assessment:**

Continuous assessment One Exam Paper (3hrs) 40%, 2 Tests, 2 Assignments and Practicals 60%

**Module description (Content):**

Theory of communication; the nature and importance of communication; Source Message Channel and Receiver (SMCRE) communication models: verbal and non verbal modes communication; writing informative articles and pamphlets for farmers; extension campaigns; organisation of agriculture show; and farmers day; effective speaking; presentation and use of common types of audio visual aids ; managing conflict and negotiation skills

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**B.5.1.10 AASC 2412: ANIMAL NUTRITION AND FEEDING**

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**Module title:** ANIMAL NUTRITION AND FEEDING  
**Code:** AASC 2412  
**NQF level:** 4

**Contact hours:** 4 lecture periods/week for 14 weeks; 3 hours practical every week.  
**Credits:** 16

**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3hour examination paper).

**Prerequisites:** None

**Module description (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.

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#### **B.5.1.11 ACSC 2412: PRINCIPLES OF CROP PRODUCTION**

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**Module Title:** PRINCIPLES OF CROP PRODUCTION  
**Code:** A CSC 2412  
**NQF level:** 4  
**Contact hours:** Lectures: 4 hours/week for 14 weeks  
Practical: 3 hours/week alternating for 14 weeks  
**Credits:** 16

**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments), Examination 40 % (1x3 hour examination paper)

**Module description (Content):** Crop environment in Namibia. Botany of crops—Plant structure: cells, tissues and organs; Plant function and growth processes; classification of plants; plant reproduction. Soil textural classification, soil physical and chemical properties, soil fertility. Cropping systems, tillage and crop establishment. Fertilization and management practices.

#### **B.5.2 SECOND YEAR MODULES**

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##### **B.5.2.1 AGECE 2501: FINANCIAL MANAGEMENT**

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**Module title:** FINANCIAL MANAGEMENT  
**Subject code:** AGECE 2501  
**NQF level:** 5  
**Contact hours:** Lectures: 2 hours/week for 14 weeks, Practicals: 2hours/week for 14 weeks  
**Credits:** 8

**Module assessment:**  
60% Continuous assessment (at least 2 tests, 2 assignments), 40% Examination (One 3 hour paper)

**Module description (Content):**  
Principles of financial Management; Budgeting and Record keeping; Risk management; Investment Analysis; Depreciation and Asset valuation; Financial Statements Analysis, Leasing and renting of equipments or assets; Income tax and Estate planning and legal aspects of borrowing and sources and terms of agricultural loans.

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##### **B.5.2.2 AGECE 2521: INTRODUCTION TO RURAL SOCIOLOGY**

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**Module title:** INTRODUCTION TO RURAL SOCIOLOGY  
**Subject code:** AGECE 2521  
**NQF level:** 6  
**Contact hours:** Lectures: 2 hours/week and Practicals: 2 hours/week for 14 weeks  
**Credits:** 8

**Module assessment :**  
Continuous assessment 60% (minimum 2 tests, 2 assignments) One Exam Paper (3hrs) 40%

**Module description (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; indigenous knowledge ; rural poverty and wealth ranking; characteristic of rural and urban communities ; rural urban migration and implication for rural development; gender roles and property right in agriculture ; Impact of HIV/AIDS on Agriculture development.

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##### **B.5.2.3 AASC 2511: RANGE MANAGEMENT**

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**Module title:** RANGE MANAGEMENT  
**Code:** AASC 2511  
**NQF level:** 5  
**Contact hours:** 4 lecture periods/week for 14 weeks; 3 hours practical every week.  
**Credits:** 16



**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper).

**Prerequisites:** AIES 2442 General Ecology

**Module description (Content):**

This module develops the students' understanding, skills and attitude regarding range and pasture management through taking into account major and minor topics like: Pastures and range in Namibia: roles, basic terminologies & background information on rangelands; Namibian range types i.e. sweet, sour & mixed veld and characteristics; Overview of the carrying capacity of Namibian range types; Morphology of common range plants: structure of a grass plant including inflorescence, node, internodes and leaf blade; Flowering, stem & leave development, elongation and tillering; Growth cycle of plants and plant & seed dormancy; Taxonomy & nomenclature: Objectives of plant taxonomy; sources of taxonomic evidence e.g. embryology, cytology & chemosystematics; Introduction to systematic botany with special focus on Annuals & Perennials range plants including herbs, grasses, shrubs, trees & bushes; Plant succession & retrogression: Types of succession including pioneer, sub-climax & climax processes; Retrogression & die-back rate of selected range plants; Factors influencing succession; State & transition models; Animal-plant interactions on range: Animal-plant interface i.e. herbivory and trampling; 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: Principles & practices; Opportunistic grazing management; Continuous and rotational including multi-camp, non-selective & controlled selective grazing; Deferment; Zonal/centripetal grazing; Range degradation: Bush encroachment, overgrazing, desertification & erosion; Land reclamation/restoration. Range evaluation & monitoring: Range condition & trend assessment; Carrying capacity determination – employing conventional & new methods incl. BECVOL; Integrated feed budgeting and fodder flow planning: cultivated pastures, fadders & forage conservation; Establishment (incl. species selection), management & use of cultivated pastures; Characteristics of selected species for cultivation; Conservation of forage e.g. hay and silage making, *in situ* conservation.

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#### B.5.2.4 AASC 2531: ANIMAL ANATOMY, PHYSIOLOGY AND REPRODUCTION

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**Module title:** ANIMAL ANATOMY, PHYSIOLOGY AND REPRODUCTION

**Code:** AASC 2531

**NQF level:** 5

**Contact hours:** A. Theory: 4 hours/week for 14 weeks. B. Practical 3 hours every alternate week

**Credit:** 16

**Module Assessment:** Continuous assessment 60% (2 tests and at least 3 practicals / assignments / quizzes). Examination 40% (1 x 3hour examination paper).

**Pre-requisites:** AASC 2401: Biology

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

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#### B.5.2.5 ACSC 2511: CROP PROTECTION

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**Module Title:** CROP PROTECTION

**Code:** ACSC 2511

**NQF level:** 5

**Contact hours:** Lectures: 4 hours/week for 14 weeks  
Practical: 3 hours/week alternating for 14 weeks

**Credits:** 16

**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments)  
Examination 40 % (1x3 hour examination paper)

**Module description (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. Methods of crop protection and their application. Integrated pest management. Pesticide handling and safety. Crop protection legislation in Namibia and International guidelines.

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#### B.5.2.6 AACA 2500: FARM DUTIES II

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**Module title:** FARM DUTIES

**Subject code:** AACA 2400

**NQF Level:** 4

**Contact hours:** Practical: 7 hours (one full day) on alternating weeks for 28 weeks  
Total: 98 hours

**Credits:** 16

**Module Assessment:** Assessment will be based on attendance at duty stations.

**Prerequisite:** None

**Module Description (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 Neudamm and 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 ( 5 credits at level 5) will be awarded for this work. Assessment will be based on attendance at duty stations, participating in and completion of tasks and attitudes towards work, as well as grading during specific courses that take place in the recess periods (e.g. Easter and, Winter and Spring).

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#### **B.5.2.7 AGEC 2502: INTRODUCTION TO SOCIAL RESEARCH METHGODS**

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**Module title:** INTRODUCTION TO SOCIAL RESEARCH METHODS  
**Subject Code:** 2502  
**NQF Level:** 5  
**Contact Hours:** Lectures: 2hours/ week and Practical: 2hours/alternate week for 14 weeks  
**Credits:** 8

**Module Assessment:** Continuous assessment 60% (at least 2 tests and 2 assignments) One Exam Paper (3Hrs) 60%

**Pre-requisite:** AGEC 2411: Mathematics and Basic Statistics

**Module Description (Content):** Introduces the student to social research methods commonly used in agriculture. It covers definitions of research, agricultural research, types of data, socio-economic indicators and indexes. 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, Participatory research approaches ( e.g. Rural Rapid Appraisal (PRA)), Case study approach, and Participant observation. Exploratory analysis and estimation (descriptive statistics);

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#### **B.5.2.8 AASC 2512: APPLIED ANIMAL HEALTH**

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**Module title:** APPLIED ANIMAL HEALTH  
**Code:** AASC 2512  
**NQF level:** 5  
**Contact hours:** 16  
**Module Assessment:** Continuous assessment 60% (2 tests and at least 3 practicals / assignments / quizzes). Examination 40% (1 x 3hour examination paper).

**Prerequisites:** AASC 2401: Biology and AASC 2411: Physical Science

**Module Description (Content):**

Concepts of health and disease, disease development and body response in livestock. Introduction to Bacteriology, Virology, Parasitology, Toxicology, Pharmacology and Epidemiology of Disease. Notifiable diseases caused by bacteria, viruses, fungi and yeast. Congenital and environmental induced defects. Important economic and zoonotic diseases of domestic animals. Common diseases of cattle, sheep, goats, pigs and poultry in Namibia. Actual activities pertaining to animal health (Restraint of animals, clinical examination, specimen collection, hygiene and sanitation) as performed by veterinarian and technicians on the farm as well as manipulating laboratory techniques necessary for diagnosing diseases of domestic animals. .

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#### **B.5.2.9 AASC 2502: APPLIED ANIMAL BREEDING**

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**Module title:** APPLIED ANIMAL BREEDING  
**Code:** AASC 2502  
**NQF level:** 5  
**Contact hours:** 3 lecture periods/week for 14 weeks; 3hours practical every other week.  
**Credits:** 8

**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper)

**Prerequisites:** None

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

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#### **B.5.2.10 AASC 2522: SKIN AND FIBRE PRODUCTION**

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**Module title:** SKIN AND FIBRE PRODUCTION  
**Code:** AASC 2522  
**NQF level:** 5  
**Contact hours:** A. Theory: 2 hours/week for 14 weeks. B. Practical 3 hours every alternate week

**Credit:** 8

**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper)

**Pre-requisites:** AASC 2401: Biology

**Module Description (Content):** Characteristics, requirements and constraints of skin and fibre production systems in Namibia. Breeds of pelt- and hair-producing sheep and goats and their adaptability. Facilities and handling. Histology of the skin, fibre and fleece properties, lamb and pelt description (boniture), photography and judging. Genetic factors affecting pelt, fibre and fleece properties. Management: sexual activity and fertility, flock composition, management targets and calendar. Farm processing, tanning of skins and hides. Product quality. Economics of and factors affecting skin and fibre production in Namibia, including legal framework. Record keeping. Future prospects.

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### B.5.2.11 ACSC 2512: SOIL SCIENCE

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**Module Title:** SOIL SCIENCE

**Code:** ACSC 2512

**NQF level:** 5

**Contact hours:** Lectures: 4 hours/week for 14 weeks  
Practical: 3 hours/week alternating for 14 weeks

**Credits:** 16

**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments)  
Examination 40 % (1x3 hour examination paper)

**Module description (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, structure, profile, water holding capacity, cation exchange. Soil nutrients for plant growth: nutrient content and nutrient availability. Movement and availability of soil water. Soil conditions: acidity, salinity, compaction. Inorganic and organic fertilizers. Soil types of Namibia. Agro-ecological zones of Namibia.

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### B.5.2.12 ACSC 2502: FARM TECHNOLOGY I

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**Module Title:** FARM TECHNOLOGY I

**Code:** ACSC 2502

**NQF level:** 5

**Contact hours:** Lectures: 2 hours/week for 14 weeks  
Practical: 2 hours/week alternating for 14 weeks

**Credits:** 8

**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments)  
Examination 40 % (1x3 hour examination paper)

**Pre-requisites:** AGECE 2411: Mathematics & Basic Statistics

**Module description (Content):**

Workshop safety, workshop materials, technical drawing. Workshop equipment. Joining and assembly of metal and nonmetals. Internal combustion engines. Tractors and tractor maintenance. Tillage equipment, crop protection and harvesting equipment. Farm machinery management. Animal draft power in Namibia. Selection, training and maintenance of draft animals. Animal drawn implements.

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## B.5.3 THIRD YEAR MODULES

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### B.5.3.1 AGECE 2601: EXTENSION METHODS

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**Module Title:** EXTENSION METHODS

**Subject code** AGECE 2601

**NQF level** 6

**Contact hours** Lectures: 3 hours/week and Practicals 3 hour/week for 14 weeks

**Credits** 8

**Module assessment :** Continuous assessment 60% ( minimum 2 tests, 2 assignments) Exam Paper (3hrs) 40%

**Pre-requisite:** AGECE 2422: Communication & Information Systems and AGECE 2521: Introduction to Rural Sociology

**Module description (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; plan of work coordination supervision and administration feedback and evaluation procedure

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### B.5.3.2 AGECE 2621: MARKETING, TRADE AND POLICY

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**Module title:** MARKETING, TRADE AND POLICY

**Subject code** AGECE 2621

**NQF level:** 6  
**Credits:** 8  
**Contact hours:** Lectures: 2 hours/week and Practicals: 1.5 hours/week for 14 weeks  
**Module assessment :** Continuous assessment 60% (minimum 2 tests and 2 assignments) One Exam Paper (3hrs) 40%  
**Pre-requisite:** AGECE 2402: Basic Economics

**Module description (Content):**

Introduction to agricultural marketing; Marketing function 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 contracts markets) and strategies; Market structures; Government interventions in agricultural marketing- the National Agricultural Policy, credit policy; International agricultural trade and the gains and loss of trade; Differences between domestic, and regional.

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### B.5.3.3 AASC 2611: INTENSIVE ANIMAL PRODUCTION

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**Module title:** INTENSIVE ANIMAL PRODUCTION  
**Code:** AASC 2611  
**NQF level:** 6  
**Contact hours:** 4 lecture periods/week for 14 weeks; 3hours practical every other week.  
**Credits:** 16  
**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper).  
**Prerequisites:** None

**Module description (Content):** This Module covers current status of dairy cattle, pigs, poultry and ostriches production in Namibia; Characteristics and constraints of intensive animal production systems in Namibia; Efficiency of production; Breeds of dairy cattle, pigs, poultry and ostriches; Management of dairy cattle, pigs, poultry and ostriches in different stages of production; Housing: reasons for housing and essential features required; Nutrients requirement for dairy cattle, pigs, poultry and ostriches in different stages of production; Processing, preservations and storage of animal products; Transportation and animal welfare; Slaughtering and product quality; Marketing of animals products; Record keeping; Future prospects.

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### B.5.3.4 ACSC 2601: WATER MANAGEMENT AND SOIL CONSERVATION

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**Module Title:** WATER MANAGEMENT AND SOIL CONSERVATION  
**Code:** ACSC 2601  
**NQF level:** 6  
**Contact hours:** Lectures: 2hours/week for 14 weeks  
Practical: 2 hours /week alternating for 14 weeks  
**Credits:** 8  
**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments)  
Examination 40 % (1x3 hour examination paper)  
**Pre-requisites:** ACSC 2502: Farm Technology I

**Module description (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. Social, economic and institutional factors in water management and soil conservation planning. Overview or irrigation in Namibia. Soil/plant/water relationships. Crop water requirements. Irrigation methods. Drainage of agricultural lands.

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### B.5.3.5 ACSC 2611: VEGETABLE AND FRUIT PRODUCTION

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**Module Title:** VEGETABLE AND FRUIT PRODUCTION  
**Code:** ACSC 2611  
**NQF level:** 6  
**Contact hours:** Lectures: 4hours/week for 14 weeks  
Practical: 3 hours / week alternating for 14 weeks  
**Credits:** 16  
**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments)  
Examination 40 % (1x3 hour examination paper)

**Module description (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: citrus, mangoes, pawpaw, grapes, peaches, figs, dates. Soil and climatic requirements, establishment, management practices, harvesting and post-harvest technology.

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### B.5.3.6 AACA 2601: FIELD ATTACHMENT

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**Module title:** FIELD ATTACHMENT  
**Subject code:** AACA 2601

**NQF Level:** 6  
**Contact hours:** Lecture: 21 hours per three years  
Practical: 6 weeks per three years  
**Credits:** 8

**Module Assessment:** Continuous assessment during site inspection. Assessment of field report and assessment of oral presentation.

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

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#### B.5.3.7 AACA 2600: SPECIAL STUDY

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**Module title:** SPECIAL STUDY  
**Subject code:** AACA 2600  
**NQF Level:** 6  
**Contact hours:** Lecture: 2 hours per week for 28 weeks  
Practical: 3 hours per week for 28 weeks  
**Credits:** 16

**Module Assessment:** Assessment will be based on written report (50%) and assessed by the supervisor and one other lecturer, an oral presentation (30% assessed by all lecturers) and Assignments.

**Module Description (Content):**

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.

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#### B.5.3.8 AGECE 2602: PROJECT MANAGEMENT

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**Module title:** PROJECT MANAGEMENT  
**Subject Code:** 2602  
**NQF Level:** 6  
**Contact Hours:** Lectures: 2hours/ week for 14 weeks and Practical: 2hours/week for 7 weeks  
**Credits:** 8

**Module Assessment:**Continuous assessment 60% (minimum 2 tests and 2 assignments) One Exam Paper (3Hrs) 40%

**Pre-requisite:** AGECE 2501: Financial Management

**Module Description (Content):**

Project as 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.

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#### B.5.3.9 AGECE 2622: ENTREPRENEURSHIP

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**Module Name:** ENTREPRENEURSHIP  
**Subject Code:** AGECE 2622  
**NQF Level:** 6  
**Contact Hours:** Lectures: 2 hours/ week and Practicals 1.5 hours/ alternate week for 14 weeks  
**Credits:** 8

**Module Assessment:** Continuous assessment 60% (minimum 2 tests 2 assignments), One Exam Paper (3 hours) 40%

**Pre-requisite:** AGECE 2501: Financial Management

**Module Description (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.

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#### B.5.3.10 AASC 2602: GAME FARMING

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**Module title:** GAME FARMING  
**Code:** AASC 2602  
**NQF level:** 6  
**Contact hours:** 2 lecture periods/week for 14 weeks; 3 hours practical every other week.  
**Credits:** 8

**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper). Examination 60% (1 x 3hour examination paper)

**Prerequisites:** None

**Module description (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.

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#### **B.5.3.11 AASC 2612: EXTENSIVE ANIMAL PRODUCTION**

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**Module title:** EXTENSIVE ANIMAL PRODUCTION  
**Code:** AASC 2612  
**NQF level:** 6  
**Contact hours:** 4 lecture periods/week for 14 weeks; 3hours practical every other week.  
**Credits:** 16  
**Module assessment:** Continuous assessment 60% (2 tests and at least 3 practical reports or assignments). Examination 40% (1 x 3 hour examination paper).

**Prerequisites:** None

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

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#### **B.5.3.12 ACSC 2612: FARM TECHNOLOGY II**

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**Module Title:** FARM TECHNOLOGY II  
**Code:** ACSC 2612  
**NQF level:** 6  
**Contact hours:** Lectures: 4 hours/week for 14 weeks  
Practical: 3 hours/week alternating for 14 weeks  
**Credits:** 16  
**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments)  
Examination 40 % (1x3 hour examination paper)

**Module description (Content):**

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. 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, traverse

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#### **B.5.3.13 ACSC 2602: CROP PRODUCTION**

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**Module Title:** CROP PRODUCTION  
**Code:** ACSC 2602  
**NQF level:** 6  
**Contact hours:** Lectures: 2 hours/week for 14 weeks  
Practical: 3 hours/week alternating for 14 weeks  
**Credits:** 8  
**Module assessment:** Continuous assessment 60 % (2 tests, practical and 3 assignments)  
Examination 40 % (1x3 hour examination paper)

**Pre-requisites:** ACSC 2412: Principles of Crop Production

**Module description (Content):**

Crop production practices: land preparation, cropping systems, weed, pest and disease control, harvesting and post-harvest technology. Importance, soil and climatic requirements and management practices for cereals (maize, millet, sorghum, wheat, rice); legumes (groundnuts, bambara groundnuts, cowpeas), fibre crops (cotton), oil seed crops (soybean, sunflower, castor), root and tuber crops (Irish potato, sweet potato, cassava).

## C. DIPLOMA IN NATURAL RESOURCES MANAGEMENT (New Curriculum) {Ogongo Campus}

### C.1 FIRST YEAR

MODULE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
ULEG	2410	English for General Communication	4	04/56	0	16
UCLC	3409	Computer Literacy	4	02/28	42	8
UCSI	3429	Contemporary Social Issues	4	02/28	0	8
AGEC	2411	Mathematics and Basic Statistics	4	04/56	21	16
AASC	2401	Biology	4	02/28	14	8
AASC	2411	Physical Science	4	04/56	21	16
AACA	2400	Farm Duties I	4	0	49	8

**TOTAL SEMESTER 1 CREDITS 80**

#### Semester 2

ULEG	2410	English for General Communication	4	04/56	0	16
AIES	2402	Nursery Management	4	02/28	21	8
AIES	2422	Plant Taxonomy	4	02/28	21	8
AIES	2442	General Ecology	4	02/28	14	8
AGEC	2402	Basic Economics	4	02/28	14	8
AGEC	2422	Communication and Information Systems	4	02/28	14	8
ACSC	2412	Principles of Crop Production	4	04/56	21	16
AACA	2400	Farm Duties I	4	0	49	8

**TOTAL SEMESTER 2 CREDITS 80**

**TOTAL FIRST YEAR CREDITS 160**

### C.2 SECOND YEAR

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AIES	2511	Plant Entomology and Pathology	5	04/56	21	16
AIES	2531	Introduction to Agroforestry	5	04/56	21	16
AIES	2501	Vegetation Assessment and Monitoring Techniques	5	02/28	14	8
AIES	2521	Wildlife Survey Techniques and Monitoring	5	02/28	21	8
AGEC	2501	Financial Management	5	02/28	14	8
AGEC	2521	Introduction to Rural Sociology	5	02/28	14	8
AACA	2500	Farm Duties II	5	0	49	8

**TOTAL SEMESTER 1 CREDITS 72**

#### Semester 2

AIES	2512	Forest and Veld Fire Management	5	04/56	21	16
AIES	2532	Silviculture	5	04/56	21	16
AGEC	2502	Intro to Social Research Methods	5	02/28	14	8
ACSC	2512	Soil Science	5	04/56	21	16
ACSC	2502	Farm Technology I	5	02/28	14	8
AACA	2500	Farm Duties II	5	0	49	8

**TOTAL SEMESTER 2 CREDITS 72**

**TOTAL SECOND YEAR CREDITS 144**

### C.3 THIRD YEAR

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AIES	2611	Forest Resource Utilization & Harvesting Techniques	6	04/56	21	16
AIES	2631	Community Based Natural Resource Management	6	04/56	21	16
AIES	2601	Principles of Beekeeping	6	02/28	14	8
AGEC	2601	Extension Methods	6	02/28	14	8
ACSC	2601	Water Management and Soil Conservation	6	02/28	14	8
AACA	2601	Field Attachment	6	0	0	8
AACA	2600	Special Study	6	02/28	21	8

**TOTAL SEMESTER 1 CREDITS 72**

#### Semester 2

AIES	2602	Introduction to Natural Resource Economics	6	02/28	21	8
AIES	2612	Integrated Natural Resource Mgt and Planning	6	04/56	21	16
AIES	2622	Natural Resource Policies and Administration	6	02/28	21	8
AGEC	2602	Project Management	6	02/28	14	8
ACSC	2612	Farm Technology II	6	04/56	21	16
ACSC	2602	Crop Production	6	02/28	21	8
AACA	2600	Special Study	6	02/28	21	8

**TOTAL SEMESTER 2 CREDITS 72**

**TOTAL THIRD YEAR CREDITS 144**

#### C.4. MODULE PRE- & CO-REQUISITES

NQF Level	MODULE	PRE-REQUISITE	CO-REQUISITE
5	AIES 2531: Introduction to Agroforestry	ACSC 2412: Principles of Crop Production	
	AIES 2501: Vegetation Assessment & Monitoring Techniques	AIES 2442: General Ecology	
	AIES 2512: Forest and Veld Fire Management	AIES 2442: General Ecology	
	AIES 2532: Silviculture	AIES 2402 :Nursery Management	
	ACSC 2502: Farm Technology I	AGEC 2411: Mathematics & Basic Statistics	
6	AIES 2611: Forest Resource Utilization and Harvesting Techniques	ACSC 2502 Farm Technology I	
	AIES 2602: Introduction to Natural Resource Economics	AGEC 2402: Basic Economics	
	AIES 2612: Integrated Natural Resource Management and Planning		AIES 2631: Community Based Natural Resource Management
	AIES 2622: Natural Resource Policies & Administration		AIES 2631: Community Based Natural Resource Management
	ACSC 2601: Water Management & Soil Conservation	ACSC 2502: Farm Technology I	
	ACSC 2602: Crop Production	ACSC 2412: Principles of Crop Production	
	AACA 2610: Special Study	AGEC 2502: Introduction to Social Research Methods	
	AGEC 2601: Extension Methods	AGEC 2521: Introduction to Rural Sociology	
	AGEC 2602: Project Management	AGEC 2501: Financial Management	

#### C.5 MODULE DESCRIPTORS

##### C.5.1 FIRST YEAR MODULES

##### C.5.1.1 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.

##### C.5.1.2 UCLC 3409: COMPUTER LITERACY

**Module title:** COMPUTER LITERACY

**Code:** UCLC 3409

**NQF level:** 4

**Contact hours:** 2 periods per week for 14 weeks

**Credits:** 8

**Module assessment:** Continuous Assessment 100%: Contribution to final Mark: 2 Practical Tests 50%; 2 Theory Tests 50%

**Prerequisites:** None

**Module description (Content):**

The aim of this module is to equip the student through hands-on experience with the necessary skills to use applications software such as Word processing, Spreadsheets, Database, Presentations and communications packages for increasing their productivity in an education and training environment.



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**C.5.1.3 UCSI 3429: CONTEMPORARY SOCIAL ISSUES**

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**Module Title:** CONTEMPORARY SOCIAL ISSUES  
**Code:** UCSI 3429  
**NQF:** 4  
**Contact Hours:** 2 Contact hours per week for 14 weeks  
**Credits:** 8  
**Module Assessment:** Continuous assessment (50%): test or assignment; Examination (50%): 1x2 hours paper  
**Prerequisite:** None

**Module Description (Content):**

The module raises awareness on the need for a personal, national and global ethics. The main objectives of the course is to help students reflect on the social moral issues; to discover themselves in a learner-centered, contextual, religious and life related setting. It also stimulates students for critical thinking and help them to appreciate their values, standards and attitudes.

Furthermore it orientates students with regards to the epidemiology of HIV/AIDS; the prevalence of the disease on Namibia, Africa and Internationally. It also informs students on the psycho social and environmental factors that contribute to the spread of the disease, the impact of HIV/AIDS on their individual lives, family and communities at large. The unit further seeks to enhance HIV/AIDS preventive skills among students by means of paradigm shift and behavior change and also to impart general introductory knowledge on gender, to make students aware, as well as sensitize them towards gender issues and how they affect our society, Sub-Region and continent at large.

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**C.5.1.4 AIES 2402: NURSERY MANAGEMENT**

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**Module Title:** NURSERY MANAGEMENT  
**Code:** AIES 2402  
**NQF level:** 4  
**Contact hours:** Lectures: 2 hours/week for 14 weeks. Practical: 3 hours/week alternating for 14 weeks  
**Credits:** 8  
**Module Assessment:** Continuous assessment 60% (minimum 2 tests, 2 assignments, 10 practical excises/reports). Examination 40% (01 x 03 hour paper).  
**Pre-requisites:** None

**Module description (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.

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**C.5.1.5 AIES 2422: PLANT TAXONOMY**

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**Module name:** PLANT TAXONOMY  
**Subject code:** AIES 2422  
**NQF level:** 4  
**Contact hours:** Lectures: 2 hour/week for 14 weeks  
Practical: 3 hours/week alternating for 14 weeks  
**Credits** 8

**Module assessment :**

Continuous assessments 60% (tests, practical assessments) Examination 40% (1 x 3 hour paper)

**Pre-requisite** None

**Module description (Content):**

Introduction to plant taxonomy. taxonomic concepts, plant classification, nomenclature. Tree, shrubs and herb identification. Botanical keys: types and use. Specimen collection. Major plant families in Namibia: Fabaceae (3 sub-families), Euphorbiaceae, Rubiaceae, Combretaceae.

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**C.5.1.6 AIES 2442: GENERAL ECOLOGY**

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**Module name:** GENERAL ECOLOGY  
**Subject code:** AIES 2442  
**NQF level :** 4  
**Contact hours:** Lectures: 2 hours/week for 14 weeks, Practical: 3 hours/week alternating for 14 weeks  
**Credits:** 8  
**Module assessment:** Continuous assessments 60% (2 tests, 3 practical reports/exercises, 1 assignment); Examination 40% (1x3 hour paper)

**Module description (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.

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**C.5.1.7 AACA 2400: FARM DUTIES I**

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**Module title:** FARM DUTIES  
**Subject code:** AACA 2400  
**NQF Level:** 4

**Contact hours:** Practical: 7 hours (one full day) on alternating weeks for 28 weeks  
Total: 98 hours

**Credits:** 16

**Module Assessment:** Assessment will be based on attendance at duty stations.

**Prerequisite:** None

**Module Description (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 Neudamm and 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 (5 credits at level 5) 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).

## C.5.2 SECOND YEAR MODULES

### C.5.2.1 AIES 2511: PLANT ENTOMOLOGY AND PATHOLOGY

**Module name:** PLANT ENTOMOLOGY AND PATHOLOGY

**Subject code:** AIES 2511

**NQF level:** 5

**Contact hours :** Lectures: 4 hours/week for 14 weeks; Practical: 3 hours/week for 14 weeks

**Credits:** 16

**Module assessment** Continuous assessments 60% (Minimum 2 tests, 3 practical exercises/reports, and 1 assignment); Examination 40% (1 x 3 hour paper)

**Pre-requisite** None

**Module description (Content):**

Introduction to Entomology, General insect biology, Insect classification, Insects as pests, Beneficial insects, Insects in Namibian Forests, Insect population dynamics, Preventive and control measures. Integrated pest management Introduction to plant Pathology, Non-infectious agents and diseases, Infectious agents and diseases, Diseases caused by fungi, Beneficial fungi and Disease prevention and control.

### C.5.2.2 AIES 2531: INTRODUCTION TO AGROFORESTRY

**Module title:** INTRODUCTION TO AGROFORESTRY

**Code:** AIES 2531 :

**NQF level:** 5

**Contact hours:** Lectures: 4 hours/week for 14 weeks Practical: 3 hours/week for 14 weeks

**Credits:** 16

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

**Pre-requisite:** ACSC 2412: Principles of Crop Production

**Module description (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. Research in agroforestry. Agroforestry project work.

### C.5.2.3 AIES 2501: VEGETABLE ASSESSMENT AND MONITORING TECHNIQUES

**Module name:** VEGETATION ASSESSMENT AND MONITORING TECHNIQUES

**Subject code:** AIES 2501

**NQF level:** 5

**Contact hours:** Lectures: 2 hour/week for 14 weeks; Practical: 23 hours /week alternating for 14 weeks

**Credits:** 8

**Module assessment:** Continuous assessments 60% (minimum 2 tests, 3 practical exercises, 1 inventory report); Examination 40% (1 x 3 hour paper)

**Prerequisite:** AIES 2442: General Ecology

**Module description (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.

### C.5.2.4 AIES 2521: WILDLIFE SURVEY TECHNIQUES AND MONITORING

**Module name:** WILDLIFE SURVEY TECHNIQUES AND MONITORING

**Subject code:** AIES 2521

**NQF level:** 5

**Contact hours:** Lectures: 2 hours/week for 14 weeks; Practical: 3 hours/week alternating for 14 weeks

**Credits:** 8

**Module assessment:** Continuous assessments 60% (2 test, 3 practical exercise, 1 assignment) Examination 40% (1 x 3 hour paper)

**Pre-requisite** None

**Module description (Content):**

General principles and purpose of surveys and sampling. Sampling techniques: quadrats, transects, strip transects, point counts, aerial surveys, waterhole counts and spoor counts, mark-recapture techniques, Monitoring: design monitoring schemes, timing and frequency of monitoring.

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**C.5.2.5 AIES 2512: FOREST AND VELD FIRE MANAGEMENT**

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**Module Title:** FOREST AND VELD FIRE MANAGEMENT

**Code:** AIES 2512

**NQF level:** 5

**Contact hours:** Lectures: 4 hours/week for 14 weeks; Practical: 3 hours/week for 14 weeks

**Credits:** 16

**Module Assessment:**

Continuous assessment 60% (minimum 2 tests, 2 assignments, 3 practical reports/exercises, 1 excursion report, 1 fire management plan). Examination 40% (1x 3 hours paper)

**Pre-requisites:** AIES 2442: General Ecology

**Module description (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.

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**C.5.2.6 AIES 2532: SILVICULTURE**

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**Module Title:** SILVICULTURE

**Code:** AIES 2532

**NQF level:** 5

**Contact hours:** Lectures: 4 hours/week for 14 weeks; Practical: 3 hours/week for 14 weeks

**Credits:** 16

**Module Assessment:** Continuous assessment 60% (minimum 2 tests, 2 assignments, 3 practical reports/exercises, 1 excursion report). Examination 40% (1 x 3 hours paper)

**Pre-requisites:** AIES 2402: Nursery Management

**Module description (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. Silvicultural systems: high forest systems, coppice systems and agroforestry systems. Factors affecting the selection of a silvicultural system. Introduction to tree breeding: definitions and concepts, species trial selection, provenance trial (with specific reference to the performance of trials in Namibia)

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**C.5.2.7 AACA 2500: FARM DUTIES II**

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**Module title:** FARM DUTIES

**Subject code:** AACA 2400

**NQF Level:** 4

**Contact hours:** Practical: 7 hours (one full day) on alternating weeks for 28 weeks

Total: 98 hours

**Credits:** 16

**Module Assessment:** Assessment will be based on attendance at duty stations.

**Prerequisite:** None

**Module Description (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 Neudamm and 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 (5 credits at level 5) will be awarded for this work. Assessment will be based on attendance at duty stations, participating in and completion of tasks and attitudes towards work, as well as grading during specific courses that take place in the recess periods (e.g. Easter and, Winter and Spring).

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**C.5.3 THIRD YEAR MODULES**

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**C.5.3.1 AIES 2611: FOREST RESOURCE UTILIZATION AND HARVESTING TECHNIQUES**

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**Module Title:** FOREST RESOURCE UTILISATION & HARVESTING TECHNIQUES

**Code:** AIES 2611  
**NQF level:** 6  
**Contact hours:** Lectures: 4 hours/week for 14 weeks; Practical: 3 hours/week for 14 weeks  
**Credits:** 16  
**Module Assessment:** Continuous assessment 60% (minimum 2 tests, 2 assignments, 3 practical reports/exercises, 1 excursion report). Examination 40% (1 x 3 hours paper)  
**Pre-requisites:** ACSC 2502: Farm Technology I

**Module description (content):**

Ergonomics and work safety. Uses and maintenance of forestry tools and machinery: edged tools, handsaws, other tools and accessories, chain saw, farm tractors and hi-tech machinery. Harvesting and transportation techniques of various timber and non-timber products: objectives, methods and systems: Harvesting and transport costs. Forest roads, their design and maintenance. Factors affecting harvesting and transportation systems (economic, social, political and environmental). Wood processing and utilization in Namibia and in the world: charcoal production, sawmilling, wood based materials (veneer, particle boards, fibre boards, hard boards, pulps and papers, wood carving and traditional implements). Wood preservation: principles and methods of preserving wood. Wood seasoning: principles and methods of drying and seasoning wood. . The use of market demand for sustainable utilization of forest products with relevance to Namibia wood industry e.g. charcoal. Wood carving, beekeeping, medicinal plants, etc

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### C.5.3.2 AIES 2631: COMMUNITY BASED NATURAL RESOURCE MANAGEMENT

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**Module Title: COMMUNITY BASED NATURAL RESOURCE MANAGEMENT (CBNRM)**

**Code:** AIES 2631  
**NQF level:** 6  
**Contact hours:** Lectures: 4 hours/week for 14 weeks; Practical: 3 hours/week for 14 weeks  
**Credits:** 16

**Module assessment (Content):**

Continuous Assessments 60% (Minimum 2 tests, 2 assignment, 1 field trip report). Examination 40% (1x3 hours paper)

**Prerequisite:** None

**Module description (Content):**

Rural development concepts and principles; Rural livelihood strategies; Introduction to community based management of natural resources; History of community involvement in conservation in Southern Africa; Formation of conservancies and community forestry initiatives, processes and procedures for formations; Policy and strategy frames relevant to community forestry and conservancies; Conflict resolution mechanisms.

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### C.5.3.3 AIES 2601: PRINCIPLES OF BEEKEEPING

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**Module name:** PRINCIPLES OF BEE KEEPING  
**Subject code:** AIES 2601  
**NQF level:** 6  
**Contact hours:** Lectures: 2 hour/week for 14 weeks; Practical: 3 hours/week alternating for 14 weeks  
**Credits:** 8  
**Module assessment (Content):** Continuous assessments 60% (2 tests, 3 practical reports); Examination 40% (1x3 hour paper)  
**Prerequisite:** None

**Module description (Content):**

The history and importance of bee keeping. Biology of honey bee including races and social behaviour. Honeybee types. Honey bee colony, life history, and anatomy. Honey bee nutrition and production of nectar and pollen. Bee forage and harvesting. Beekeeping equipment and starting up. The beehive, types and their management for honey production. Honey products, production, and processing including their handling, grading quality control, record keeping and marketing of products. Summer and winter management of productive colonies. Crop pollination and damage to bee colonies by poisoning. Diseases and pests of honeybees. Bee diseases and parasites and their control.

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### C.5.3.4 AAC A 2601: FIELD ATTACHMENT

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**Module title:** FIELD ATTACHMENT  
**Subject code:** AAC A 2601  
**NQF Level:** 6  
**Contact hours:** Lecture: 21 hours per three years  
Practical: 6 weeks per three years  
**Credits:** 8

**Module Assessment:** Continuous assessment during site inspection. Assessment of field report and assessment of oral presentation.

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

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### C.5.3.5 AAC A 2600: SPECIAL STUDY

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**Module title:** SPECIAL STUDY  
**Subject code:** AAC A 2600

**NQF Level:** 6  
**Contact hours:** Lecture: 2 hours per week for 28 weeks  
Practical: 3 hours per week for 28 weeks

**Credits:** 16

**Module Assessment:** Assessment will be based on written report (50%) and assessed by the supervisor and one other lecturer, an oral presentation (30% assessed by all lecturers) and Assignments.

**Module Description (Content):**

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.

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### C.5.3.6 AIES 2602: INTRODUCTION TO NATURAL RESOURCE ECONOMICS

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**Module name:** INTRODUCTION TO NATURAL RESOURCE ECONOMICS

**Subject code:** AIES 2602

**NQF level:** 6

**Contact hours:** Lectures: 2 hour/week for 14 weeks; Practical: 3 hours/week alternating for 14 weeks

**Credits:** 8

**Module assessment:** Continuous assessments 60% (minimum 2 tests, 3 practical reports and 1 term assignment) Examination 40% (1x2 hour examination paper)

**Pre-requisite :** AGECE 2402: Basic Economics

**Module description (Content):**

Review of economic principles: Costs of production, price formation, capital and interest, depreciation. Economic analysis: Investment analysis, productivity, economic efficiency. Value of the land and other natural resources; valuation techniques and surrogate markets; natural resources contribution to the national economy.

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### C.5.3.7 AIES 2612: INTEGRATED NATURAL RESOURCE MANAGEMENT AND PLANNING

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**Module Title:** INTEGRATED NATURAL RESOURCE MANAGEMENT AND PLANNING

**Code:** AIES 2612

**NQF level:** 6

**Contact hours:** Lectures: 4 hours/week for 14 weeks; Practical: hours/week for 14 weeks

**Credits:** 16

**Module Assessment:** Continuous assessment 60% (minimum 2 tests, 2 assignments, 1 excursion report, 1 integrated management plan). Examination 40% (1 x 3 hours paper)

**Co-requisites:** AIES 2631: Community Based Natural Resource Management

**Module description (Content):**

Introduction: definition and approaches, natural resources and data, objective formulation of natural resource management plan, models and approaches used. Planning concepts and methods in forest management: sustainability, growth and yield of renewable resources, operational planning. Components of integrated natural resource management and their interactions (land, water, forests, water, non-wood products and services, others). Integrated natural resource management processes. Methodologies for integrated natural resource management plan formulation. Integrated resource management plan for water, rangelands and forests. Evaluation and monitoring methods for integrated resource management plan.

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### C.5.3.8 AIES 2622: NATURAL RESOURCE POLICIES AND ADMINISTRATION

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**Module name:** NATURAL RESOURCE POLICIES AND ADMINISTRATION

**Subject code:** AIES 2622

**NQF level:** 6

**Contact hours:** Lectures: 2 hours/week for 14 weeks; Practical: 3 hours/week alternating for 14 weeks

**Credits:** 8

**Module assessment:** Continuous assessments 60% (2 tests, 2 practical reports, 2 assignments); Examination 40% (1 x 3 hour paper)

**Co-requisite:** AIES 2631: Community Based Natural Resource Management

**Module description (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.

## D. B.S.C. AGRICULTURE (AGRICULTURAL ECONOMICS)

### D.1 FIRST YEAR (New Curriculum)

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.

COURSE	CODE	COURSE TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
UCLC	3409	Computer Literacy	4	02/28	42	8
ULCE	3419	English Communication and Study Skills	4	04/56	0	16
UCSI	3429	Contemporary Social Issues	4	02/28	0	8
SBLG	3411	Introduction to Biology	4	04/56	42	16
SPHY	3401	Physics for Life Sciences I	4	02/28	42	8
SMAT	3511	Basic Mathematics	5	04/56	0	16
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>72</b>
<b>Semester 2</b>						
ULEA	3419	English for Academic Purposes	4	04/56	0	16
SCHM	3412	Chemistry for Life Sciences	4	04/56	42	16
SPHY	3412	Physics for Life Science II	4	04/56	42	16
SBLG	3512	Diversity of Life	5	04/56	42	16
SMAT	3512	Precalculus	5	04/56	0	16
SSTS	3522	Introduction to Statistics	5	04/56	0	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>88</b>
<b>TOTAL FIRST YEAR CREDITS</b>						<b>160</b>

For module descriptions please refer to section D.5

### D.2 SECOND YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
AGEC	3681	Principles of Microeconomics	6	03/42	0	12
AGEC	3691	Rural Sociology	6	03/42	0	12
AASC	3601	Genetics	6	02/28	21	8
ACSC	3681	Plant Science	6	03/42	28	12
AFST	3601	Human Nutrition	6	02/28	14	8
AFST	3621	General Microbiology	6	02/28	21	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>60</b>
<b>Semester 2</b>						
AAEN	3502	Agricultural Engineering	5	02/28	21	8
AGEC	3682	Production Economics	6	03/42	0	12
AGEC	3692	Principles of Macroeconomics	6	03/42	0	12
AASC	3612	Biochemistry	6	04/56	21	16
AASC	3602	Livestock Production Systems	6	02/28	21	8
ACSC	3682	Agronomy	6	03/42	42	12
AFST	3602	Food Technology	6	02/28	21	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>76</b>
<b>TOTAL SECOND YEAR CREDITS</b>						<b>136</b>

### D.3 THIRD YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS	PREREQUISITE
<b>Semester 1</b>							
AGEC	3711	Mathematical Econ & Linear Prog	7	04/56	14	16	
AGEC	3781	Farm Planning and Management	7	03/42	21	12	
AGEC	3791	Research Methods in Agric Economics	7	03/42	14	12	
AGEC	3708	Field Attachment I	7	0	0	6	
AGER	3781	Resource Economics	7	03/42	14	12	
ACSC	3691	Field Crop Production	7	03/42	21	12	
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>70</b>	
<b>Semester 2</b>							
AGEC	3782	Agricultural Marketing	7	03/42	14	12	
AGEC	3792	Econometrics for Agric Economists	7	03/42	28	12	
AGEC	3712	Agricultural Extension	7	04/56	21	16	
AGEF	3782	Agricultural Finance and Credit	7	03/42	14	12	
AASC	3702	Game Ranching	7	02/28	21	8	
AAEN	3722	Farm Mechanization	7	02/28	21	8	
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>68</b>	
<b>TOTAL THIRD YEAR CREDITS</b>						<b>138</b>	

**D.4 FOURTH YEAR (Old Curriculum)**

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3410	Research Project	1.5	0	42	42
AEP	3411	Project Planning and Management	4.0	42	28	70
AER	3411	Resource Economics	4.0	42	28	70
AED	3411	Rural Development	3.75	42	21	63
AEA	3471	Field Attachment	3.0			
AEI	3411	International Agric Trade & Policy	4.0	42	28	70
ASB	3411	Beef Production	3.75	42	21	63
			<b>24.25</b>	<b>196</b>	<b>175</b>	<b>371</b>
Semester 2						
AEC	3410	Research Project	1.5	0	42	42
AEP	3412	Agricultural Policy Analysis	3.75	42	21	63
AEB	3412	Entrepreneurship & Agric Business Management	4.0	42	28	70
AES	3402	Seminars	0.5	0	14	14
AEC	3452	Development Economics	3.0	42	0	42
AEN	3412	Land Use Planning	3.0	42	21	63
ASD	3412	Dairy Production	2.75	42	21	63
			<b>19.50</b>	<b>196</b>	<b>154</b>	<b>350</b>
<b>TOTALS</b>			<b>43.75</b>	<b>392</b>	<b>329</b>	<b>721</b>

**AGRICULTURAL ECONOMICS DEPARTMENT: MODULE PRE- & CO-REQUISITES**

YEAR	MODULE	PRE-REQUISITE	CO-REQUISITE
1	ULEA 3419: English for Academic Purposes	ULCE: English Comm & Study Skills	
2	AEC 3682: Production Economics		AEC 3681: Prin Microeconomics
3	AEC 3711: Mathematical Econ & Linear Programming	SMAT 3511: Basic Mathematics; SMAT 3512L Pre-calculus	
	AEC 3781: Farm Planning & Mgt	AEC 3682: Production Economics	
	AER 3781: Resource Economics	AEC 3681: Prin Microeconomics; AEC 3682: Production Economics	
	AEC 3782: Agric Marketing	AEC 3682: Production Economics	
	AEC 3792: Econometrics for Agric Economics	STS 3522: Introduction to Statistics	
	AEC 3712: Agric Extension	AEC 3691: Rural Sociology	
	AEF 3782: Agric Finance & Credit		AEC 3781: Farm Planning & Mgt
4	AEC 3810: Research Project in Agric Economics	AEC 3791: Research Methods in Agric Economics	
	AEC 3881: Project Planning & Mgt	AEC 3681: Prin Microeconomics	
	AEC 3801: Rural Development	AEC 3691: Rural Soc; AEC 3712: Agric Extension	
	AEC 3891: Int'l Agric Trade & Policy	AEC 3782: Agric Marketing	
	AEC 3882: Agric Policy & Analysis	AEC3782: Agric Marketing; AEC 3682: Production Economics	
	AEC 3892: Entrepreneurship & Agric Business Management	AEC 3782: Agric Marketing	AEC 3881: Project Planning & Mgt
	AEC 3802: Development Economics	AEC 3692: Prin Macroeconomics	AEC 3801: Rural Development

**1ST AND 2ND YEAR MODULE EQUIVALENTS**

YEAR	OLD MODULES	NEW MODULES
1	BLG 3101: Biology 1A	SBLG 3411: Introduction to Biology
	BLG 3112L: Biology 1B	SBLG 3512: Diversity of Life
	PHC 3101: Physics 1A	SPHY: 3401: Physics for Life Science I
	PHC 3112: Physics 1B	SPHY 3412: Physics for Life Science II
	MTS 3101: Mathematics 1A	SMAT 3511: Basic Mathematics
	MTS 3112: Mathematics 1B	SMAT 3512: Pre-calculus
	STS 3101: Statistics 1A	SSTS 3522: Introduction to Statistics
	PHC 3192: Lab 1	Phased out
2	AEN 3202: Introduction to Agricultural Engineering	AEN 3602: Agricultural Engineering
	CSC 3231: Introduction to Plant Science	CSC 3681: Plant Science
	CSC 3212: Introduction to Agronomy	CSC 3682: Agronomy
	CSC 3271: Biometrics	CSC 3781: Research Methods I; CSC 3782: Research Methods II
	FSC 3201: Food and Human Nutrition	FST 3601: Human Nutrition
	FSC 3202: Introduction to Food Technology	FST 3602: Food Technology

**AGRICULTURAL ECONOMICS DEPARTMENT: MODULE EQUIVALENTS**

YEAR	OLD MODULES	NEW MODULES
3	AEC 3311: Mathematics for Agric Economists	AEC 3711: Mathematical Economics and Linear Programming
4	AEC 3410: Research Project	AEC 3810: Research Project in Agric Economics

**D.5 MODULE DESCRIPTORS****D.5.1 FIRST YEAR MODULES (New Curriculum)****D.5.1.1 UCLC 3409: COMPUTER LITERACY****Module title:** COMPUTER LITERACY**Code:** UCLC 3409**NQF level:** 4**Contact hours:** 2 periods per week for 14 weeks**Credits:**8**Module assessment:** Continuous Assessment 100%: Contribution to final Mark: 2 Practical Tests 50%; 2 Theory Tests 50%**Prerequisites:** None**Module description (Content):**

The aim of this module is to equip the student through hands-on experience with the necessary skills to use applications software such as Word processing, Spreadsheets, Database, Presentations and communications packages for increasing their productivity in an education and training environment.

**D.5.1.2 UCSI 3429: CONTEMPORARY SOCIAL ISSUES****Module Title:** CONTEMPORARY SOCIAL ISSUES**Code:** UCSI 3429**NQF:** 4**Contact Hours:** 2 Contact hours per week for 14 weeks**Credits:** 8**Module Assessment:** Continuous assessment (50%): test or assignment; Examination (50%): 1x2 hours paper**Prerequisite:** None**Module Description (Content):**

The module raises awareness on the need for a personal, national and global ethics. The main objectives of the course is to help students reflect on the social moral issues; to discover themselves in a learner-centered, contextual, religious and life related setting. It also stimulates students for critical thinking and help them to appreciate their values, standards and attitudes.

Furthermore it orientates students with regards to the epidemiology of HIV/AIDS; the prevalence of the disease on Namibia, Africa and Internationally. It also informs students on the psycho social and environmental factors that contribute to the spread of the disease, the impact of HIV/AIDS on their individual lives, family and communities at large. The unit further seeks to enhance HIV/AIDS preventive skills among students by means of paradigm shift and behavior change and also to impart general introductory knowledge on gender, to make students aware, as well as sensitize them towards gender issues and how they affect our society, Sub-Region and continent at large.

**D.5.1.3 ULCE 3419: ENGLISH COMMUNICATION AND STUDY SKILLS****Module title:** ENGLISH COMMUNICATION AND STUDY SKILLS**Code:** ULCE 3419**NQF Level:** 4**Contact hours:** 4 hours per week for 14 weeks**Credits:** 16**Module Assessment:** Continuous assessment (60%): 2 tests (reading and writing) 2 reading assignments 1 oral presentation Examination (40%):1 x 3 hour examination paper**Pre-requisites:** None**Module description (Content):**

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

**D.5.1.4 ULEA 3419: ENGLISH FOR ACADEMIC PURPOSES****Module title:** ENGLISH FOR ACADEMIC PURPOSES**Code:** ULEA 3419**NQF level:** 4**Contact hours:** 4 periods per week**Credits:**16



**Module assessment:** Continuous assessment: 60%. Two graded assessments in reading and writing skills. One graded assessment based on a referenced academic essay. One graded assessment of presentation skills. Examination: 40%: 1x 2 hour paper.

**Pre-requisites:** ULCE 3419: English Communication and Study Skills or B in English at NSSC or 4 in English at HIGHER GRADE NSSC

**Module description (Content):** This course 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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#### D.5.1.5 SBLG 3411: INTRODUCTION TO BIOLOGY

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**Module title:** INTRODUCTION TO BIOLOGY

**Code:** SBLG 3411

**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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#### D.5.1.6 SBLG 3512: DIVERSITY OF LIFE

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**Module title:** DIVERSITY OF LIFE

**Code:** SBLG 3512

**Course Equivalent:** NSCC (/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 that 10 marked assignments) 50% Examination: 60% (1 x 2 hour examination paper)

**Prerequisites:** NSCC (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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#### D.5.1.7 SPHY 3401: PHYSICS FOR LIFE SCIENCES I

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

**Code:** SPHY3401

**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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#### D.5.1.8 SPHY 3412: PHYSICS FOR LIFE SCIENCES II

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**Module Title:** PHYSICS FOR LIFE SCIENCES II

**Code:** SPHY 3412

**NQF Level:** 4

**Contact Hours:** 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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#### D.5.1.9 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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#### D.5.1.10 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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#### D.5.1.11 SCHM 3412: CHEMISTRY FOR LIFE SCIENCES

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**Module Title:** CHEMISTRY FOR LIFE SCIENCES

**Code:** SCHM3412

**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.

**D.5.1.12 SSTS 3522: INTRODUCTION TO STATISTICS****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 IGCESE 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.

*(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.)*

**D.6 MODULE DESCRIPTORS: AGRICULTURAL ECONOMICS****D.6.1 SECOND YEAR MODULES (New Curriculum)****D.6.1.1 AGEC 3681: PRINCIPLES OF MICROECONOMICS****Module Title:** PRINCIPLES OF MICROECONOMICS**Code:** AGEC 3681**NQA Level:** 6**Contact Hours:** 3 lectures/ week for 14 weeks**Credits:** 12**Module Assessment:** Continuous assessment (40%); at least two assessments; Examination (60%): (1 x 3-hour paper)**Prerequisites:** None**Module Description (Content):**

In this module students will be exposed to basic concepts and principles in microeconomics, including scarcity and concepts of supply and demand, consumer theory, demand and supply, the theory of the firm under perfect competition, profits, monopoly and other market structures, externalities, and public goods. The course provides an essential foundation for higher level Agricultural economics courses such as Marketing, Production Economics, and Farm management etc.

**D.6.1.2 AGEC 3691: RURAL SOCIOLOGY****Module Title:** RURAL SOCIOLOGY**Code:** AGEC 3691**NQA Level:** 6**Contact Hours:** 03 lectures /week for 14 weeks**Credits:** 12**Module Assessment:** Continuous assessment (40%); at least two assessments; Examination (60%): (1 x 3-hour-paper)**Prerequisites:** None**Module Description (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 populations; social theory and the types of societies; Socialization issues including social roles; deviance, conformity, sanctions, culture and society; social institutions including family, religion, education and government, social interaction, groups and group dynamics; rural urban migration and its causes; gender differences and gender and power relations;

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### D.6.1.3 AGEC 3682: PRODUCTION ECONOMICS

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**Module Title:** PRODUCTION ECONOMICS

**Code:** AGEC 3682

**NQA Level:** 6

**Contact Hours:** 03 lectures /week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%); at least two assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** AGEC 3681: Principles of Microeconomics

**Module Description (Content):**

The course builds on basic concepts and principles of microeconomics in particular the theory of the firm. It introduces students to uses of economic principles in the process of decision making for optimal resource allocation and profit maximization in agricultural production. In addition, students will also have an understanding of the decision making under uncertainty.

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### D.6.1.4 AGEC 3692: PRINCIPLES OF MACROECONOMICS

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**Module Title:** PRINCIPLES OF MACROECONOMICS

**Code:** AGEC 3692

**NQA Level:** 6

**Contact Hours:** 3 Lecturers/week

**Credits:** 12

**Module Assessment:** Continuous assessment (40%); at least two assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** None.

**Module Description (Content):**

The modules introduces the students to basics concepts in macroeconomics including choice and scarcity in a modern economy, 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.

### D.6.2 THIRD YEAR MODULES (New Curriculum)

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#### D.6.2.1 AGEC 3711: MATHEMATICAL ECONOMICS AND LINEAR PROGRAMMING

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**Module Title:** MATHEMATICAL ECONOMICS AND LINEAR PROGRAMMING

**Code:** AGEC 3711

**NQA Level:** 7

**Contact Hours:** 4 lectures /week and 1 hour practical /week for 14 weeks

**Credits:** 16

**Module Assessment:** Continuous assessment (40%); at least three assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites** SSMAT 3511: Basic Mathematics, SSMAT 3512 Pre-calculus

**Module Description (Content):**

The module provides students with the basic knowledge of mathematical concepts and tools that are often used for proper understanding of agricultural economics. The module focuses on sets, matrix algebra, functions, differentiation, integration, simplex method and linear programming and their applications to decision making in agricultural economics and business.

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#### D.6.2.2 AGEC 3781: FARM PLANNING AND MANAGEMENT

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**Module Title:** FARM PLANNING AND MANAGEMENT

**Code:** AGEC 3781

**NQA Level:** 7

**Contact Hours:** 03 lectures and 1.5 hour practical /week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%); at least three assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** Production Economics AGEC 3682

**Module Description (Content):**

Students acquaint themselves with the essential functions of management (planning, implementation, control) and decision making process which are fundamental to owning, managing, advising, and/ or servicing farm firms and other businesses. It emphasizes whole farm firm business planning with emphasis on resources availability and budgeting. Trend analysis and projecting future farm business plans using budgeting and computerized tools. It exposes students to management of farm records; machinery; land; labour; applications of linear programming in farm planning; and agricultural risk management strategies. Examples will be used from communal and commercial farms in SADC region and supplemented by farm management field trips and case studies.

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#### D.6.2.3 AGEC 3791: RESEARCH METHODS IN AGRICULTURAL ECONOMICS

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**Module Title:** RESEARCH METHODS IN AGRICULTURAL ECONOMICS

**Code:** AGEC3791

**NQA Level:** 7

**Contact Hours:** 03 lectures and 1 hour practical /week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%); at least three assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** None

**Module Description (Content):**

Students acquaint themselves with basics concepts of research methodology, including the types of research used by agricultural economists, research problem definition and formulation, literature review, hypothesis formulation, research design and sampling, research budgeting and funding, construction of data collection instruments, data collection, data processing, presentation and report writing.

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#### D.6.2.4 AGER 3781: RESOURCE ECONOMICS

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**Module Title:** RESOURCE ECONOMICS

**Code:** AGECE 3781

**NQA Level:** 7

**Contact Hours:** 03 lectures and 1 hour practical / week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%); at least three assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** AEC3681 Principles of Microeconomics

**Module Description (Content):**

This module is aimed at increasing student's knowledge on the theory of natural resources and environmental economics. It will also address property rights (tragedy of the commons), externalities, methods of valuation of natural resources, government and market failures, and optimal use of natural resources and the institutional process within which natural resource and environmental policies are formulated. Finally it will enable students to apply theoretical concepts to the analysis of policy issues related to natural resources utilization (e.g. water, land, fisheries, wildlife, and forests).

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#### D.6.2.5 AGER 3782: AGRICULTURAL MARKETING

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**Module Title:** AGRICULTURAL MARKETING

**Code:** AGECE3782

**NQA Level:** 7

**Contact Hours:** 03 lectures and 1 hour practical /week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%); at least three assessment; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** AGECE 3681 Principles of Microeconomics

**Module Description (Content):**

The module presents key concepts and theory in agricultural marketing, including agricultural marketing functions; marketing systems e.g. commodity exchanges and futures markets; market structures, agricultural pricing; marketing of agricultural products and inputs, market research, market planning and analysis of consumer behavior in purchasing agricultural products; and estimation of demand and supply elasticities. Students are also exposed to marketing constraints of developing countries, importance of market efficiency for economic growth development.

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#### D.6.2.6 AGER 3792: ECONOMETRICS FOR AGRICULTURAL ECONOMISTS

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**Module Title:** ECONOMETRICS FOR AGRICULTURAL ECONOMISTS

**Code:** AGECE 3792

**NQA Level:** 7

**Contact Hours:** 04 lectures and 02 hours practical /week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%); at least three assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** SSTS 3522: Introduction to Statistics

**Module Description (Content):**

The module familiarizes students with econometrics using an applications oriented approach comprising of identification of economic problems, formulation of economic and econometric model and assumptions; identification of data consistent with the problem and econometric model, estimation of key parameters of the model using OLS regression techniques; hypotheses testing, and discussion of empirical findings and implications for the economic model. Appropriate computer based software (e.g. SPSS or Shazam) will be used during the practical part of the module to ensure that all students acquire computing capabilities in econometrics and statistical analysis to answer economic questions.

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#### D.6.2.7 AGER 3712: AGRICULTURAL EXTENSION

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**Module Title:** AGRICULTURAL EXTENSION

**Code:** AGECE 3712

**NQA Level:** 7

**Contact Hours:** 04 lectures and 1 hour practical/week for 14 weeks

**Credits:** 16

**Module Assessment:** Continuous assessment (40%); at least three assessments; Examination (60%): (1 x 3-hour paper)

**Prerequisites:** AGECE 3691 Rural Sociology.

**Module Description (Content):**

The course explores Extension concepts, principles and philosophies theories and origin of extension, including the role of agricultural extension in sustainable agricultural development; Agricultural extension as adult learning; Extension methods; Audio-visual media in extension; Extension teaching methods. Designing extension programmes; Agricultural extension approaches; Applying learning theory in extension; Science based and indigenous knowledge systems and participatory methodologies. It also investigates farming systems research and extension approach and its applicability to Namibia and SADC countries.

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#### D.6.2.8 AGEF 3782: AGRICULTURAL FINANCE & CREDIT

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**Module Title:** AGRICULTURAL FINANCE & CREDIT  
**Code:** AGEF 3782  
**NQA Level:** 7  
**Contact Hours:** 03 lectures and 1 hour practical work/week for 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment (40%); at least three assessments; Examination (60%): (1 x 3-hour paper)  
**Prerequisites:** AGEF 3781 Farm Planning and Management

**Module Description (Content):**

The module focuses on the application of principles and tools of finance to managerial problems in agribusiness and farming. The focus is on evaluating and controlling profitability, growth, risk and liquidity in the farm and agribusiness firms. Key concepts covered in the module include, farm accounting records, credit, leverage, capital budgets, and capital costs. These concepts are applied using financial analysis and developed in the context of agriculture. The course also examines land acquisition and improvements, and how and from whom farmers and agribusiness obtain loans.

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#### D.6.2.9 AGEF 3708: FIELD ATTACHMENT I

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**Module Title:** FIELD ATTACHMENT I  
**Code:** AGEF 3708  
**NQA Level:** 7  
**Contact Hours:** 6 Weeks  
**Credits:** 6  
**Prerequisite:** None  
**Module Assessment:** Final assessment 100% : (Attachment report and Oral presentation).

**Module Description (Content):**

The module is designed to expose students to practical experience of actual operations on farms, agro-industries, and research institutions in Namibia. They are expected to observe many different aspects of operations, and participate in physical work and management of operations.

### D.6.3 FOURTH YEAR MODULES (Old Curriculum)

#### D.6.3.1 AEC 3410: RESEARCH PROJECT

Lectures: 0 hours/week  
Practicals: 3 hours /week for the whole year  
Prerequisite: Research Methods in Agricultural Economics (AER 3311)

Students will carry out a research project under the supervision of competent academic staff. Project write-up and oral presentation will constitute total assessment mark.

#### D.6.3.2 AEP 3411: PROJECT PLANNING AND MANAGEMENT

Lectures: 3 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Project planning; Basic ideas; the application of project analysis; the project planning process; the project cycle incorporating environmental concerns; main features project resource statements Logical framework; Financial and economic analysis of a project; Project Analysis techniques – Payback Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return and Cost Benefit Ratio; Sensitivity Analysis, Risk and Uncertainty Analysis Monitoring and Evaluation; Project annual costs, benefits and cash flows; The concept of sustainability in project analysis; Gender issues in project planning and evaluation. Project management systems: Project monitoring and evaluation systems, the control system. Managing people in projects: managers and communication, interpersonal needs, managing conflict, managers and motivation. Gender issues in project management.

#### D.6.3.3 AER 3411: RESOURCE ECONOMICS

Lectures: 3 hours / week  
Practicals: 2 hours / week

A study of natural resource economics with emphasis on environmental economics, measurement of non-market goods, property rights, externalities and environmental problems, market and government failures, optimal use of / management of natural resources and the environment with special reference to water, soil, natural vegetation. Issues on rural land use: agricultural and rangelands conservation.

#### D.6.3.4 AED 3411: RURAL DEVELOPMENT

Lectures: 3 hours/week  
Practicals: 1½ hours /week  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

The concept of rural development and agricultural development; Strategic measures of agricultural development and efficiency; Theories of development; Experiences of agrarian development in Eastern Europe, Northwest Europe, Africa, Asia and Latin America; Changes in Agricultural productivity in the

developing world (the impact of the green revolution); Land tenure system across the world; Smallholder versus large scale agriculture; Effects of urban development on agrarian reforms. Poverty and measurement issues in poverty analysis; Design of poverty alleviation strategies in rural areas; Food security and its importance; The roles of CBOs and NGOs in rural development. Cooperatives as a developing strategy in agriculture – including their objectives, principles, organization and structures; Cooperative management and credit mobilization. Challenges to development of cooperatives in developing countries.

#### **D.6.3.5 AEA 3471: FIELD ATTACHMENT**

Six Weeks of Field Attachment

At the end of the third year, students will be attached to farms, agro-industries and research stations to enable them to undergo practical experience and acquire hands-on skills. An attachment report and an oral presentation will constitute the total assessment mark.

#### **D.6.3.6 AEI 3411: INTERNATIONAL AGRICULTURAL TRADE AND POLICY**

Lectures: 3 hours / week

Practicals: 2 hours / week

Prerequisite: Principles of Macroeconomics (AEC 3232) & Agricultural Marketing (AEM 3312)

A survey of the theory and practice of international trade and commercial policy with emphasis on agriculture. Topics include theories of determinants of trade, the effects of trade policies (tariffs, levies, taxes, embargoes, exchange rates, customs unions, Free-trade areas, etc.) on exporters and importers. Effect of imperfect competition on growth on trading partners and welfare. Strategic trade theory and protection. World Trade Organization (WTO) trade rules. Namibia's Agricultural trade policies; SADC, SACU, EPA's and FTA's. Measurement of welfare impacts of agricultural trade policies using partial equilibrium framework.

#### **D.6.3.7 AEP 3412: AGRICULTURAL POLICY ANALYSIS**

Lectures: 3 hours/week

Practicals: 1½ hours /week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Welfare economics - Definition and Measurement of Welfare, Welfare versus Utility, Definition and scope of agricultural and natural resource policy; Agricultural policy interventions; Policy changes across countries and overtime; The role of government and private sectors in agriculture; Land tenure policy; Credit policies and experiences; Agricultural marketing policies: Agricultural Incentive policies; Framework for social evaluation in agricultural policy analysis - The fundamentals of Sustainable development; Framework for analysis of efficiency - Social valuation of agricultural sector investment programmes ; Analysis of domestic constraints and resource sustainability; Cooperative policies; Equal opportunities legislation ; Effects of Trade and Exchange Rate policies on incentive structure.

#### **D.6.3.8 AEB 3412: ENTREPRENEURSHIP AND AGRICULTURAL BUSINESS MANAGEMENT**

Lectures: 3 hours/week

Practicals: 2 hours /week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Introduction to management principles applied to agribusiness. Topics covered will include business environment – PESTILE (Political , economic, social, technological and legal aspects), entrepreneurship, small and medium enterprises and corporate organizations, financial analysis, marketing and planning. SWOT analysis and ZETA scoring. Challenges of small businesses – A business survival strategy. Employee compensation; theories of motivation and group dynamics; Management of change; Communication in business. Preparation of a business plan.

#### **D.6.3.9 AES 3402: SEMINARS**

Lectures: 0 hours/week

Practicals: 1 hours /week

Seminars to acquaint students with information gathering, oral presentation and discussion of topics related to Agricultural Economics and Extension. A seminar, write-up and oral presentation will constitute total assessment mark.

#### **D.6.3.10 AEC 3452: DEVELOPMENT ECONOMICS**

Lectures: 3 hours/week

Practicals: 0 hours /week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Development: Definition and measurement of Economic Development; Characteristics of Developing Countries; Comparisons between Countries; Estimating and Comparing Growth Rates. General theories of development and underdevelopment: Theories of Capitalism and Socialism, The Theory of the Vicious Cycle of Poverty; Dualistic Economies; Classical Theories; Lump-Sum Capital and Vent for Surplus; The Big Push Theory; Balanced vs. Unbalanced Growth; Stages of Growth. Industrialisation: The Role of Industry; The Type of Industry; The Choice of Techniques: Capital-Intensive Technology versus Labour intensive; Agriculture versus Industry argument. Human resource development: Population Growth; The Unemployment Problem; The Contribution of Education to Growth and Development. Development planning: Types of Planning; The Need for Development Planning. Issues in economic development: Income distribution; appropriate technology; Foreign aid; Capital Flows; North-South Relations.

## E. B.SC. AGRICULTURE (ANIMAL SCIENCE)

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

### E.1 FIRST YEAR (New Curriculum)

COURSE	CODE	COURSE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
UCLC	3409	Computer Literacy	4	02/28	42	8
ULCE	3419	English Communication and Study Skills	4	04/56	0	16
UCSI	3429	Contemporary Social Issues	4	02/28	0	8
SBLG	3411	Introduction to Biology	4	04/56	42	16
SPHY	3401	Physics for Life Sciences I	4	02/28	42	8
SMAT	3511	Basic Mathematics	5	04/56	0	16
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>72</b>
Semester 2						
ULEA	3419	English for Academic Purposes	4	04/56	0	16
SCHM	3532	Chemistry for Life Sciences	4	04/56	42	16
SPHY	3412	Physics for Life Science II	4	04/56	42	16
SBLG	3512	Diversity of Life	5	04/56	42	16
SMAT	3512	Pre-calculus	5	04/56	0	16
SSTS	3522	Introduction to Statistics	5	02/28	0	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>88</b>
<b>TOTAL FIRST YEAR CREDITS</b>						<b>160</b>

*For module descriptions please refer to section D.5*

### E.2 SECOND YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AGEC	3681	Principles of Microeconomics	6	03/42	0	12
AGEC	3691	Rural Sociology	6	03/42	0	12
AASC	3601	Genetics	6	02/28	21	8
ACSC	3681	Plant Science	6	03/42	28	12
AFST	3601	Human Nutrition	6	02/28	14	8
AFST	3621	General Microbiology	6	02/28	21	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>60</b>
Semester 2						
AAEN	3602	Agricultural Engineering	6	02/28	21	8
AGEC	3682	Production Economics	6	03/42	0	12
AGEC	3692	Principles of Macroeconomics	6	03/42	0	12
AASC	3612	Biochemistry	6	03/42	21	16
AASC	3602	Livestock Production Systems	6	02/28	21	8
ACSC	3682	Agronomy	6	03/42	42	12
AFST	3602	Food Technology	6	02/28	21	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>76</b>
<b>TOTAL SECOND YEAR CREDITS</b>						<b>136</b>

### E.3 THIRD YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AASC	3701	Animal Nutrition	7	03/42	21	8
AASC	3721	Parasitology	7	02/28	21	8
AASC	3711	Animal Anatomy and Physiology	7	04/56	21	16
AASC	3708	Field Attachment I	7	0	0	6
AASC	3781	Animal Breeding	7	03/42	21	12
AGEC	3781	Farm Planning and Management	7	03/42	21	12
ACSC	3781	Research Methods I	7	03/42	21	12
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>74</b>
Semester 2						
AASC	3782	Feeds and Feeding	7	03/42	21	12
AASC	3702	Animal Health	7	02/28	21	8
AASC	3722	Pig and Rabbit Production	7	03/28	21	8
AASC	3742	Game Ranching	7	02/28	21	8
AGEC	3732	Agricultural Extension	7	04/56	21	16
AGEC	3782	Agricultural Marketing	7	03/42	14	12
ACSC	3782	Research Methods II	7	03/42	21	12
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>76</b>
<b>TOTALS THIRD YEAR CREDITS</b>						<b>150</b>



**E.4 FOURTH YEAR (Old Curriculum)**

COURSE	CODE	TITLE	CREDITS	L	P	T (HRS)
Semester 1						
ASC	3410	Research Project	1.5	0	42	42
ASC	3411	Range and Pasture Management	4.75	42	28	70
ASB	3411	Beef Production	3.75	42	21	63
ASC	3431	Poultry and Ostrich Production	3.75	42	21	63
ASS	3401	Seminars	0.5	0	14	14
ASA	3471	Field Attachment	3.0			
AEP	3411	Project Planning and Management	4.0	42	28	70
			<b>26.25</b>	<b>224</b>	<b>175</b>	<b>399</b>
Semester 2						
ASC	3410	Research Project	1.5	0	42	42
ASC	3412	Small Ruminant Production	3.75	42	21	63
ASD	3412	Dairy Production	2.75	42	21	63
ASC	3432	Meat Science and Livestock Products	3.75	42	21	63
AEB	3412	Entrepreneurship & Agric Business Management	4.0	42	28	70
			<b>15.75</b>	<b>154</b>	<b>133</b>	<b>287</b>
<b>TOTALS</b>			<b>42.0</b>	<b>378</b>	<b>308</b>	<b>686</b>

**ANIMAL SCIENCE DEPARTMENT: MODULE PRE- & CO-REQUISITES**

YEAR	MODULE	PRE-REQUISITE	CO-REQUISITE
3	ASC 3781: Animal Breeding	ASC 3601: Genetics	
	ASC 3782: Feeds and Feeding		ASC 3701: Animal Nutrition
	ASC 3702: Animal Health		ASC 3721: Parasitology

**E.5 MODULE DESCRIPTORS: ANIMAL SCIENCE****E.5.1 SECOND YEAR MODULES (New Curriculum)****E.5.1.1 AASC 3601: GENETICS****Module title:** GENETICS**Code:** AASC 3601**NQF level:** 06**Contact hours:** 2 lecture periods/week for 14 weeks; 3 hours practical every other week.**Credits:** 8**Module assessment:** Continuous assessment 40% (at least 2x tests; 1x assignment); Examination 60% (1 x 2hour paper)**Prerequisites:** None

**Module description (content):** This module covers the transmission of the genetic material: mitosis and meiosis and their genetic significance are discussed; Mendelian genetics, extension of Mendelian Analysis (e.g. multiple alleles, gene interactions, lethal alleles, modified Mendelian ratios). The module examines linkage, applications of linkage in livestock, chromosome variation, sex determination and chromosome mutations. The content also covers the structure of DNA, presents the classical experiments that revealed DNA and RNA to be the genetic material and that established the double helix model as the structure of DNA. The coverage also includes properties of DNA, the double helix model and replication in prokaryotes and eukaryotes. Subsequent material covered includes transcription, the genetic code and its properties, translation, point mutations, their types and causes.

**E.5.1.2 AASC 3612: BIOCHEMISTRY****Module Title:** BIOCHEMISTRY**Code:** AASC 3612**Contact hours:** 4 lecture periods/week for 14 weeks; 3 hours practical every other week.**Credits:** 16**Module assessment:** Continuous assessment 40% (2 tests and at least 2 laboratory reports or assignments). Examination 60% (1 x 3hour examination paper)**Prerequisites:** Introduction to Biology (SBLG3411)

**Module description (Content):** Introduction to Biochemistry; Functional groups, REDOX reaction; Water; Acids, Bases, Buffers and their functions in biological systems; Structure and function of macromolecules (carbohydrates, proteins and lipids); Enzymes as catalysts; Nomenclature of enzymes; Factors affecting enzyme activities; Centrifuge, chromatography, DNA and protein electrophoresis; Introduction to metabolism - Glycolysis, Alcohol and lactic acid fermentation, TCA cycle, Electron Transport Chain and Oxidative Phosphorylation; Endergonic and Exergonic reactions; ATP - The universal currency of free energy; Photosynthesis; Glyoxylate cycle (oily seeds); Overview of the synthesis of disaccharides (lactose and sucrose) and polysaccharides (starch and glycogen); Gluconeogenesis; Pentose Phosphate Pathway; Regulation of carbohydrate metabolism; Diseases associated with carbohydrate metabolism; Regulation of gene expression – The Lac operon; Enzyme Kinetics - Michaelis/Menten and Lineweaver-Burk plot; Vitamins and Coenzymes; Digestion and absorption of macromolecules (carbohydrates, proteins, lipids, nucleic acids) in animals; The Cori cycle; Enzyme inhibition and Allosterism; Introduction to Fat metabolism; Integration of carbohydrate and fat metabolism; Biochemical degradation of plant poisons and pesticides.

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### E.5.1.3 AASC 3602: LIVESTOCK PRODUCTION SYSTEMS

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**Module title:** LIVESTOCK PRODUCTION SYSTEMS

**Code:** AASC 3602

**NQF level:** 06

**Contact hours:** 2 lecture periods/week for 14 weeks; 3 hours practical every other week.

**Credits:** 8

**Module assessment:** Continuous assessment 40% (at least 3 assessments). Examination 60% (1 x 2 hours paper)

**Prerequisites:** None

**Module description (content):** This module covers the role of livestock and agriculture in the national economy and gives a broad overview of the industry, potentials, competitiveness and constraints. It covers the different production systems, their impacts on the environment, productivity levels and sustainability. Coverage also includes breed and species adaptability to the environments; drought and its effects; the management of ruminants and non-ruminants with regard to breeding, nutrition, health and housing; livestock management facilities; harvesting, handling and marketing of livestock products. The module also discusses the constraints facing communal and commercial farmers in Namibia.

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## E.5.2 THIRD YEAR MODULES (New Curriculum)

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### E.5.2.1 AASC 3701: ANIMAL NUTRITION

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**Module title:** ANIMAL NUTRITION

**Code:** AASC 3701

**NQF level:** 07

**Contact hours:** Theory: 3 hours/week for 14 weeks; Practical: 1.5 hours/week for 14 weeks.

**Credits:** 8

**Module assessment:** Continuous Assessment: 40% (at least 3 assessments); Examination: 60% (1 x 2 hour papers).

**Prerequisite:** None.

**Module description/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, Gas Chromatograph, Spectrophotometer in animal nutrition; Use of feed value estimates and; Mineral and vitamin nutrition.

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### E.5.2.2 AASC 3721: PARASITOLOGY

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**Module Title:** PARASITOLOGY

**Code:** AASC 3721

**NQF level:** 7

**Contact hours:** 2 hour lectures a week and 3 hours practical work every second week for 14 weeks

**Credits:** 8

**Module Assessment:** Continuous Assessment: 40% (at least 3 assessments); Examination: 60% (1x2 hour papers).

**Pre-requisite:** None.

**Module Description/Content:** Students are introduced to concepts pertaining to the 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 behavioural 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.

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### E.5.2.3 AASC 3711: ANIMAL ANATOMY AND PHYSIOLOGY

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**Module Title:** ANIMAL ANATOMY AND PHYSIOLOGY

**Code:** AASC 3711

**NQF level:** 7

**Contact hours:** 4 hour lectures a week and 3 hours practical work every second week for 14 weeks.

**Credits:** 16

**Module Assessment:** Continuous Assessment: 40% (at least 4 assessments); Examination 60% (1 x 3 hours papers).

**Pre-requisite:** None

**Module Description (Content):** 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). The anatomical and functional interrelationship of these systems and their embryonic development with special reference to their progenitors and derivatives are discussed. Practical classes that involve the use of carcass dissections, examination of internal organs in dead animals, and the study of laboratory models, help in the understanding of theoretical concepts discussed in the lectures.

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### E.5.2.4 AASC 3708: FIELD ATTACHMENT I

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**Module title:** FIELD ATTACHMENT I

**Code:** AASC 3708

**NQF Level:** 07

**Contact hours:** Six weeks of field attachment  
**Credits:** 6  
**Module assessment:** 40% (Class oral presentation) 60% (report write up.)  
**Prerequisite:** none  
**Module description (Content):**

This module exposes students to different agricultural and/or agro-industry environments through attaching students to farms, research stations, agro-industries and governmental and non-governmental institutions involved in agriculture and rural development. Students gain insights and additional hands-on experience in day-to-day running of an agricultural enterprise and have the opportunity to complement their theoretical knowledge.

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#### E.5.2.5 AASC 3781: ANIMAL BREEDING

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**Module title:** ANIMAL BREEDING  
**Code:** AASC 3781  
**NQF level:** 07  
**Contact hours:** 3 lecture periods/week for 14 weeks; 3hours practical every other week.  
**Credits:** 12  
**Module assessment:** Continuous Assessment: 40% (at least 4 assessments); Examination 60% (1 x3 hour papers).  
**Prerequisites:** Genetics (AASC 3601)

**Module description (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, partitioning of variation into its causes; estimation of heritability; 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. To keep abreast with the latest developments the course also introduces molecular genetics and its applications, specifically: types of genetic markers, gene mapping and QTL detection; marker-assisted selection, gene introgression; selection for disease resistance.

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#### E.5.2.6 AASC 3782: FEEDS AND FEEDING

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**Module title:** FEEDS AND FEEDING  
**Code:** AASC 3782  
**NQF level:** 07  
**Contact hours:** 3 hours/week for 14 weeks; Practical: 1.5 hours/week for 14 weeks.  
**Credits:** 12  
**Module assessment:** Continuous Assessment: 40% (at least 4 assessment); Examination 60% (1 x3 hour papers).  
**Co-requisite:** Animal Nutrition (AASC 3701).  
**Module description (Content):**

This module introduces students to basic feeds and feeding concepts and terminologies. Livestock feeds and feed resources classification such as browse, cakes/concentrates, crop residues, hays, silages, supplements e.g. energy, protein, mineral & vitamins and, feed additives will be covered; Comparative nutritional values of different feedstuffs; Analysis and effects of phenolics, tannins and other anti-quality factors in animal feeding; Acquaint students to ways of improving feeding value of low quality feedstuffs; Nutrient requirements of farm animals for maintenance, growth, reproduction and other productive functions; Significance and use of feeding standards & tables; Applied animal feeding & ration formulation including livestock feeding systems, ration formulation methods & feed mixing for different farm animals; Feed intake regulation and prediction; Diagnosis, treatment and prevention of metabolic disorders.

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#### E.5.2.7 AASC 3702: ANIMAL HEALTH

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**Module Title:** ANIMAL HEALTH  
**Code:** AASC 3702  
**NQF level:** 7  
**Contact hours:** 2 hour lectures a week and 2 hours practical work every second week for 14 weeks.  
**Credits:** 8  
**Module Assessment:** Continuous Assessment: 40% (at least 4 assessments); Examination 60% : 1 x2 hour papers).  
**Co- requisites:** Parasitology (AASC 3721)  
**Module Description (Content):**

This module acquaints students with the understanding of the concepts of animal health and disease, disease development and body response in livestock. At the end of the module, the students learn common diseases of cattle, sheep, goats, pigs, and poultry in Namibia. Practical classes allow the participation of students in actual activities pertaining to animal health as performed by veterinarian and technicians on the farm as well as manipulating laboratory techniques necessary for diagnosing diseases of domestic animals.

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#### E.5.2.8 AASC 3722: PIG AND RABBIT PRODUCTION

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**Module title:** PIG AND RABBIT REPRODUCTION  
**Code:** AASC 3722  
**NQF level:** 07  
**Contact hours:** 3 lecture periods/week for 14 weeks; 3hours practical every other week.  
**Credits:** 12  
**Module assessment:** Continuous Assessment: 40% (at least 4 assessments) Examination: 60% (1 x3 hour papers).  
**Prerequisites:** None.

**Module description (Contents):**

Students will be introduced to methods of pig farming in both intensive and extensive systems. It also exposes students to routine management practices performed in pig industries. Students will acquaint themselves to different techniques of breeding, animal behavior, pig reproduction and physiology. Business of pig products and processing will be discussed. General principles of feeding of pigs and rabbits will be fully covered.

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**E.5.2.9 AASC 3742: GAME RANCHING**


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**Module Title:** GAME RANCHING**Code:** AASC 3742**NQF level:** 07**Contact Hours:** 2 hours/week for 14 weeks; Practical: 1.5 hours/week for 14 weeks.**Credits:** 8**Module assessment:** Continuous assessment: (40%) consisting of at least two tests, two assignments and seminars & practicals. Examination: 60% (1x3 hour papers).**Prerequisite:** None

**Module description (Content):** The module familiarizes students with Game Ranching issues in Namibia and develops the students' understanding, skills and attitude pertinent to Game Ranching taking into account topics including: Role of Game Ranching at the farm level & contribution to the national economy; Ethics & reasons for conserving & preserving game animals; Comparative productivity indices of selected game and domestic animals; 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.

**E.5.3 FOURTH YEAR MODULES (Old Curriculum)**
**E.5.3.1 ASC 3410: RESEARCH PROJECT****Lectures:** 0 hours/week**Practicals:** 3 hours /week for the whole year

Students will carry out a research project under the supervision of competent academic staff. Project write-up and an oral presentation will constitute total assessment mark.

**E.5.3.2 ASC 3411: RANGE AND PASTURE MANAGEMENT****Lectures:** 3 hours/week**Practicals:** 2 hours /week**Assessment:** One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

The role of pasture and range in Namibia; Rangeland ecology, range succession and retrogression, climax vegetation; Taxonomy, nomenclature and morphology of common range plants; Principles and practices of range management; Range evaluation and monitoring devices; Interrelationships between plant species, the grazing animal and grazing management systems; Control of poisonous plants; Establishment, management and utilization of cultivated pastures and fodders; Conservation of forage; Seeds and seed production.

**E.5.3.3 ASB 3411: BEEF PRODUCTION****Lectures:** 3 hours/week**Practicals:** 3 hours alternate weeks**Assessment:** One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.**Prerequisite:** Livestock Production Systems (ASC 3202)

The beef cattle industry and systems of production; Feeding, reproduction, disease control and management facilities and equipment in beef production; Growth and development, performance testing and visual evaluation of slaughter animals; Marketing live animals and beef, challenges facing beef industry in Namibia.

**E.5.3.4 ASC 3431: POULTRY AND OSTRICH PRODUCTION****Lectures:** 3 hours/week**Practicals:** 3 hours alternate weeks**Assessment:** One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

The poultry and ostrich industries in Namibia; Exotic and indigenous breeds; Production systems; Specialised ostrich farming operations; Reproduction including the physiology of egg formation and embryo development; Egg incubation and hatching; Digestive physiology of birds; Management and nutrition of ostriches and of breeder birds, layers and broilers; Housing and disease control; Marketing of poultry meat and eggs and of meat, skin, eggs and egg shells, feathers and carcass meal from ostriches.

#### **E.5.3.5 ASS 3401: SEMINARS**

Lectures: 0 hours/week  
Practicals: 1 hours /week

Seminars to acquaint students with information gathering, oral presentation and discussion of topics related to animal science. A seminar write-up and oral presentation will constitute total assessment mark.

#### **E.5.3.6 ASA 3471: FIELD ATTACHMENT**

Six Weeks of Field Attachment

At the end of the third year, students will be attached to farms, agro-industries and research stations to enable them undergo practical experience and acquire hands-on skills. An attachment report and an oral presentation will constitute the total assessment mark.

#### **E.5.3.7 ASC 3412: SMALL RUMINANT PRODUCTION**

Lectures: 3 hours/week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.  
Prerequisite: Livestock Production Systems (ASC 3202)

The role of small ruminants in agriculture; Breeds of goats and sheep; Production systems; Nutrition, breeding, reproduction and housing management of sheep and goats; Karakul pelt production; Performance testing in small ruminants; Marketing of meat, fibre, skins and pelts from sheep and goats.

#### **E.5.3.8 ASD 3412: DAIRY PRODUCTION**

Lectures: 3 hours/week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.  
Prerequisite: Livestock Production Systems (AS 3202)

The dairy industry and systems of production; Principles of housing and health as applied to dairy production; Nutrition of the calf, heifer and mature cow; Managing dairy animals for fertility; Condition scoring dairy cattle; Milk synthesis and secretion; Milking machines and equipment; Important diseases of dairy cattle and their effect on milk production; Marketing of milk and products, challenges facing the dairy industry in Namibia.

#### **E.5.3.9 ASC 3432: MEAT SCIENCE AND LIVESTOCK PRODUCTS**

Lectures: 3 hours/week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Muscle physiology and carcass composition; Handling, slaughtering, inspection, grading and classification of meat; Jointing and cut identification; Abattoir hygiene; Basic processing, preservation and storage of livestock products; Quality traits of eggs, milk, meat, wool, hides and skins; Factors affecting quality; Public health hazards, bio-security and consumer concerns.

## F. B.S.C. AGRICULTURE (CROP SCIENCE) {Ogongo Campus}

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.

### F.1 FIRST YEAR (New Curriculum)

COURSE	CODE	COURSE TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
UCLC	3409	Computer Literacy	4	02/28	42	8
ULCE	3419	English Communication and Study Skills	4	04/56	0	16
UCSI	3429	Contemporary Social Issues	4	02/28	0	8
SBLG	3411	Introduction to Biology	4	04/56	42	16
SPHY	3401	Physics for Life Sciences I	4	02/28	42	8
SMAT	3511	Basic Mathematics	5	04/56	0	16
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>72</b>
<b>Semester 2</b>						
ULEA	3419	English for Academic Purposes	4	04/56	0	16
SCHM	3412	Chemistry for Life Sciences	4	04/56	42	16
SPHY	3412	Physics for Life Science II	4	04/56	42	16
SBLG	3512	Diversity of Life	5	04/56	42	16
SMAT	3512	Precalculus	5	04/56	0	16
SSTS	3522	Introduction to Statistics	5	04/56	0	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>88</b>
<b>TOTAL FIRST YEAR CREDITS</b>						<b>160</b>

For module descriptions please refer to section D.5

### F.2 SECOND YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
AGEC	3681	Principles of Microeconomics	6	03/42	0	12
AGEC	3691	Rural Sociology	6	03/42	0	12
AASC	3601	Genetics	6	02/28	21	8
ACSC	3681	Plant Science	6	03/42	28	12
AFST	3601	Human Nutrition	6	02/28	14	8
AFST	3621	General Microbiology	6	02/28	21	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>60</b>
<b>Semester 2</b>						
AAEN	3502	Agricultural Engineering	5	02/28	21	8
AGEC	3682	Production Economics	6	03/42	0	12
AGEC	3692	Principles of Macroeconomics	6	03/42	0	12
AASC	3612	Biochemistry	6	04/56	21	16
AASC	3602	Livestock Production Systems	6	02/28	21	8
ACSC	3682	Agronomy	6	03/42	42	12
AFST	3602	Food Technology	6	02/28	21	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>76</b>
<b>TOTAL SECOND YEAR CREDITS</b>				<b>136</b>		

### F.3 THIRD YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
ACSC	3781	Research Methods I	7	03/42	21	12
ACSC	3791	Field Crop Production	7	03/42	21	12
ACSC	3701	Seed Science & Technology	7	02/28	21	8
ACSC	3721	Weed Science	7	02/28	21	8
ACSC	3708	Field Attachment I	7	0	0	6
ACRS	3781	Plant Breeding	7	03/42	21	12
AGEC	3781	Farm Planning and Management	7	03/42	21	12
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>70</b>
<b>Semester 2</b>						
ACSC	3782	Research Methods II	7	03/42	21	12
ACSC	3702	Crop Ecophysiology	7	02/28	21	8
AAEN	3702	Crop Storage & Handling	7	02/28	21	8
AAEN	3722	Farm Mechanization	7	02/28	21	8
ANRE	3602	Climatology and Hydrology	6	02/28	21	8
AGEC	3732	Agricultural Extension	7	04/56	21	16
AGEC	3782	Agricultural Marketing	7	03/42	14	12
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>72</b>
<b>TOTAL THIRD YEAR CREDITS</b>						<b>142</b>

**F.4 FOURTH YEAR (Old Curriculum)**

COURSE	CODE	TITLE	CREDITS	L	P	T (HRS)
Semester 1						
CSC	3410	Research Project	1.5	0	42	42
CSS	3401	Seminars	0.5	0	14	14
CSA	3471	Field Attachment	3.0			
CSC	3461	Horticulture I	3.0	28	28	56
CSE	3411	Entomology	3.75	42	21	63
CSS	3411	Soil Fertility and Plant Nutrition	4.0	42	28	70
AEN	3431	Soil and Water Management	4.25	42	35	77
AEP	3411	Project Planning and Management	4.0	42	28	70
			<b>25</b>	<b>196</b>	<b>196</b>	<b>392</b>
Semester 2						
CSC	3410	Research Project	1.5	0	42	42
CSC	3412	Horticulture II	3.75	42	21	63
CSC	3432	Plant Pathology	3.75	42	21	63
CSC	3452	Plant Biotechnology	3.75	42	21	63
AEN	3412	Land Use Planning	3.75	42	21	63
AEB	3412	Entrepreneurship and Agric Business Management	4.0	42	28	70
			<b>16.75</b>	<b>168</b>	<b>133</b>	<b>301</b>
<b>TOTALS</b>			<b>41.75</b>	<b>364</b>	<b>329</b>	<b>693</b>

**F.5 MODULE DESCRIPTORS: CROP SCIENCE****F.5.1 SECOND YEAR MODULES (New Curriculum)****F.5.1.1 ACSC 3681: PLANT SCIENCE****Module title:** PLANT SCIENCE**Code:** ACSC 3681**NQF level:** 6**National professional standards competencies:** N/A**Contact hours:** 03 Lecture hours / week for 14 weeks; 02 Practical hours / week for 14 weeks**Credits:** 12**Module assessment:** Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 03 hours paper)**Prerequisites:** None**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding agricultural botany and plant physiology aspects, namely: Agronomic and Horticultural Taxonomy: binomial system, use of taxonomic keys. Anatomy of economic crop species; cell types, tissues types. Morphology and anatomy of root, stem, leaves, flowers, fruits. Pollination: process, methods. Double fertilization. Agriculturally important plant families. Photosynthesis: chemistry, energy requirements. Respiration. Water: importance, uptake, transpiration. Translocation. Growth regulators.

**F.5.1.2 ACSC 3682: AGRONOMY****Module title:** AGRONOMY**Code:** ACSC 3682**NQF level:** 6**National professional standards competencies:** N/A**Contact hours:** 03 Lecture hours / week for 14 weeks; 03 Practical hours / week for 14 weeks**Credits:** 12**Module assessment:** Continuous Assessment: 40 % (minimum of 2 tests, 1 assignment, 7 practicals). Examination: 60% (01 x 03 hours paper)**Prerequisites:** None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding the principles of agronomy and soil science, namely: Land preparation: aims, timeliness. Seeding: factors affecting seed quality, seeding depth, seeding rate, effects of plant spacing. Harvesting: timeliness, harvest index. For each operation: procedures, labour requirements, costs and speed of operation. Cropping systems. Definition of soil. Soil formation. Soil profile, horizons, and influence of environmental factors. Sampling methods. Soil as a triphasic system: texture, structure, water holding capacity, etc. Soil colloids and soil reaction. Soil organic matter and soil organisms. Basics of soil fertility and Plant nutrition: required elements, functions, amounts required, deficiency and toxicity symptoms.

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**F.5.1.3 ACSC 3602: AGRICULTURAL ENGINEERING**


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<b>Module title</b>	<b>AGRICULTURAL ENGINEERING</b>
<b>Code</b>	AAEN 3602
<b>NQF level</b>	6
<b>National professional Standards competencies:</b>	N/A
<b>Contact hours:</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 40 % (minimum of 2 tests, 1 assignment, 7 practicals) Examination 60% (01 x 03 hours paper)
<b>Prerequisites</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding basic agricultural engineering concepts, namely Fundamentals of Engineering; Farm Power (Different sources of Power); Internal Combustion Engines. 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.

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**F.5.2 THIRD YEAR MODULES (New Curriculum)**


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**F.5.2.1 ACSC 3791: FIELD CROP PRODUCTION**


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<b>Module title:</b>	<b>FIELD CROP PRODUCTION</b>
<b>Code:</b>	ACSC 3791
<b>NQF level:</b>	7
<b>National professional standards competencies:</b>	N/A
<b>Contact hours:</b>	03 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Credits:</b>	12
<b>Module assessment:</b>	Continuous Assessment 40 % (minimum of 2 tests, 1 assignment, 7 practicals) Examination 60% (01 x 03 hours paper)
<b>Prerequisites</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding crop production issues, namely: Cereals (pearl millet, maize, wheat, sorghum, barley), oilseed (sunflower, castor bean), Legumes (cowpea, soybean, groundnuts, bambara nuts, Field beans), fiber crops (cotton), root and tuber crops (sweet potatoes, cassava, Irish potatoes) grown in Namibia: their importance to the economy, amount, uses, and production practices. Areas where grown, limitations to production. Potential crops (sisal).



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**F.5.2.2 ACSC 3721: WEED SCIENCE**

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<b>Module title:</b>	<b>WEED SCIENCE</b>
<b>Code:</b>	ACSC 3721
<b>NQF level:</b>	7
<b>National professional standards competencies:</b>	N/A
<b>Contact hours:</b>	03 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 40 % (minimum of 2 tests, 1 assignment, 7 practicals) Examination 60% (01 x 03 hours paper)
<b>Prerequisites:</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding weed issue, namely: History of weed science. Characteristics and effects of weeds. 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.

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**F.5.2.3 ACSC 3701: SEED SCIENCE AND TECHNOLOGY**

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<b>Module title:</b>	<b>SEED SCIENCE AND TECHNOLOGY</b>
<b>Code:</b>	ACSC 3701
<b>NQF level:</b>	7
<b>National professional standards competencies:</b>	N/A
<b>Contact hours:</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 40 % (minimum of 2 tests, 1 assignment, 7 practicals) Examination 60% (01 x 03 hours paper)
<b>Prerequisites:</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding seed science and technology issues, namely: Importance of quality seed for crop production. Overview of Variety breeding: selection methods, variety evaluation and release. DUS-test. 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 dormancy, seed ecology and seed banks. Seed quality control: legislation, certification, inspection, testing. Marketing and distribution: demand forecasting, supply, pricing. End user utilization. Seed production of important crops of Namibia.

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**F.5.2.4 ACSC 3708: FIELD ATTACHMENT I**

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<b>Module Title:</b>	<b>FIELD ATTACHMENT I</b>
<b>Code:</b>	ACSC 3708
<b>NQF Level:</b>	07
<b>Contact Hours:</b>	3 Weeks
<b>Credits:</b>	6
<b>Prerequisite:</b>	None
<b>Module Assessment:</b>	Final assessment 100% (Attachment report and Oral presentation).

**Module Description (Content):**

The module is designed to expose students to practical experience of actual operations on farms, agro-industries, and research institutions in Namibia. They are expected to observe many different aspects of operations, and participate in physical work and management of operations.

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**F.5.2.5 ACSC 3781: PLANT BREEDING**

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<b>Module title:</b>	<b>PLANT BREEDING</b>
<b>Code:</b>	ACSC 3781
<b>NQF level:</b>	7
<b>National professional standards competencies</b>	N/A
<b>Contact hours:</b>	03 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Credits:</b>	12
<b>Module assessment:</b>	Continuous Assessment 40 % (minimum of 2 tests, 1 assignment, 7 practicals) Examination 60% (01 x 03 hours paper)
<b>Prerequisites:</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding plant breeding techniques and germplasm conservation issues, namely:

Aims of plant breeding. Selection theory. Pollination systems: inbreeding, out breeding, inbreeding depression, hybrid vigour, male sterility. Breeding procedure: conventional. Cultivars evaluation. Germplasm sources, wild ancestors and relatives. Process and effects of domestication. Germplasm collection and storage. Inbreeding and out breeding crops: unconventional: haploid plants, tissue culture, and gene transfer.

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**F.5.2.6 ACSC 3781: RESEARCH METHODS I**

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<b>Module Title:</b>	<b>RESEARCH METHODS I</b>
<b>Code:</b>	ACSC 3781
<b>NQF level:</b>	07
<b>Contact hours:</b>	3 lecture hours / week for 14 weeks; 3 tutorial / practical hours alternate weeks for 14 weeks
<b>Credits:</b>	12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Types of research: basic research and applied research; Research process: research problem formulation, research objectives, hypothesis formulation, literature review, research methods and principles of experimental designs, sampling and sample size determinations, and replications. Workplans and budgets; Types of experimental designs: Analysis of Variance, standard experimental designs, factorial experiments, linear regression and correlation, transformations, non-parametric statistical techniques, mean comparisons. Procedures for implementing research project and presentation of research results. In addition, probability, Bayes' theorem, combinations and permutations, binomial, Poisson, T and normal distributions are reviewed.

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**F.5.2.7 ACSC 3782: RESEARCH METHODS II**

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<b>Module Title:</b>	<b>RESEARCH METHODS II</b>
<b>Code:</b>	ACSC 3782
<b>NQF level:</b>	07
<b>Contact hours:</b>	03 lecture hours / week for 14 weeks; 3 tutorial hours / practical hours alternate weeks for 14 weeks
<b>Credits:</b>	12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Co-requisite:** ACSC 3781: RESEARCH METHODS I

**Module description (Content):**

Review of basic statistical methods; Comparison between non-parametric and parametric statistics. Non-parametric statistics (Goodness of fit tests; tests of association, Chi Square tests; paired comparisons, Wilcoxon's tests; rank correlation); regression and correlation; Multivariate methods (multiple regression, discriminant analysis, canonical analysis, multidimensional scaling, principal component analysis). Introduction to Statistical Computer packages.

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**F.5.2.8 ACSC 3702: CROP ECOPHYSIOLOGY**

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<b>Module title:</b>	<b>CROP ECOPHYSIOLOGY</b>
<b>Code:</b>	ACSC 3702
<b>NQF level:</b>	7

<b>National professional standards competencies:</b>	N/A
<b>Contact hours:</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 40% (minimum of 2 tests, 1 assignment, 7 practicals) Examination 60% (01 x 03 hours paper)
<b>Prerequisites:</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding environmental crop physiology, namely: 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. 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.

**F.5.2.9 AAEN 3702: CROP STORAGE AND HANDLING**

<b>Module title:</b>	<b>CROP STORAGE AND HANDLING</b>
<b>Code:</b>	AAEN 3702
<b>NQF level</b>	7
<b>National professional standards competencies:</b>	N/A
<b>Contact hours:</b>	02 Lecture hours / week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Credits:</b>	8
<b>Module assessment:</b>	Continuous Assessment 40 % (minimum of 2 tests, 1 assignment, 7 practicals) Examination 60% (01 x 03 hours paper)
<b>Prerequisites:</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding farm machinery operation, namely: The Post harvest system. Properties of crop commodities. Crop Drying. Energy required for drying. Drying methods. Psychometrics. Types of driers. Types and Management of Storage Structures. Processing of Agricultural Crops: Threshing. Shelling. Milling. Oil expression. Handling and Storage of Horticultural and perishable Crops

**F.5.2.10 AAEN 3722: FARM MECHANIZATION**

<b>Module title</b>	<b>FARM MECHANIZATION</b>
<b>Code</b>	AAEN 3722
<b>NQF level</b>	7
<b>National professional standards competencies</b>	N/A
<b>Contact hours:</b>	02 Lecture hours per week for 14 weeks 03 Practical hours / alternate week for 14 weeks
<b>Credits</b>	8
<b>Module assessment:</b>	Continuous Assessment 40 % (minimum of 2 tests, 1 assignment, 7 practicals); Examination 60% (01 x 03 hours paper)
<b>Prerequisites</b>	None

**Module description (Content):**

This module develops a student's understanding, skills and attitude regarding farm machinery operation, namely: 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.

**F.5.3 FOURTH YEAR MODULES (Old Curriculum)****F.5.3.1 CSC 3410: RESEARCH PROJECT**

Lectures: 0 hours/week  
Practicals: 3 hours /week for the whole year

Students will carry out a research project under the supervision of competent academic staff. Project write-up and oral presentation will constitute total assessment mark.

**F.5.3.2 CSS 3401: SEMINARS**

Lectures: 0 hours/week  
Practicals: 1 hours /week

Seminars to acquaint students with information gathering, oral presentation and discussion of topics related to crop science. A seminar write-up and oral presentation will constitute total assessment mark.

**F.5.3.3 CSA 3471: FIELD ATTACHMENT**

Six Weeks of Field Attachment

At the end of the third year, students will be attached to farms, agro-industries and research stations to enable them undergo practical experience and acquire hands-on skills. An attachment report and an oral presentation will constitute the total assessment mark.

**F.5.3.4 CSC 3461: HORTICULTURE I**

Lectures: 2 hours/week  
Practicals: 2 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Vegetable production: Importance of vegetables in human nutrition and to the economy. Specific environment requirements of vegetables. Specifics in cultivation systems of vegetables. Hydroponics. Vegetable nursery management. Main vegetables (fruit vegetables, root vegetables, leaf vegetables, perennial vegetables, leguminous vegetables) - propagation, cultivation, cultivars, harvest and handling. Indigenous vegetables. Mushroom production: cultivation technology and species of main importance.

**F.5.3.5 CSE 3411: ENTOMOLOGY**

Lectures: 3 hours/week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Insects: general characteristics, economic importance. Insect structure: External morphology, Internal morphology. Insect functions: (Perception, communication, Movement, Reproduction). Classification of insects – Main orders (review and characteristics). Pest control and management – Strategies and concepts (IPM, injury, damage, economic injury level, economic threshold etc), Management (chemical, physical, biological, cultural). Crop pests of Namibia (Pests of field crops, pests of fruits and vegetables, pests of stored products).

**F.5.3.6 CSS 3411: SOIL FERTILITY AND PLANT NUTRITION**

Lectures: 3 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Soil organic matter: carbon cycle, CO<sub>2</sub> global warming, bioassay, and response to management practices. Plant nutrients: N,P,K cycles, and micronutrients. Salinity, pH and nutrient availability. Economics of fertilizer use: Liebig Law of minimum,. Fertilizers: nutrients content, solubility, losses. Soil laboratory analysis interpretation and fertilizer recommendations. Soil organisms: detection, identification, nitrogen fixation.

#### **F.5.3.7 CSC 3412: HORTICULTURE II**

Lectures: 3 hours / week  
Practical: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practical 40%

Fruit and nut production: importance of fruits and nuts in human nutrition and to the economy. 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. Non-food Crops: Spices, medicinal plants and pharmaceutical plants. Ornamental and landscape plants. Herbs, Stimulating drinks, Aesthetic uses of plants. Propagation, uses, ethnobotany

#### **F.5.3.8 CSC 3432: PLANT PATHOLOGY**

Lectures: 3 hours/week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Definition of disease. For viruses, bacteria, fungi: characteristics of group, major species of agricultural importance, effects on crop, dispersal mechanisms. Epidemiology. Methods for assessing crop losses. Methods of control: agronomic, tolerant or resistant crops and cultivars, fungicides used, seed treatment. Effects of fungicides on environment. Biological control. Costs/benefits of control methods

#### **F.5.3.9 CSC 3452: PLANT BIOTECHNOLOGY**

Lectures: 3 hours / week  
Practicals: 3 hours / week  
Assessment: One Exam Paper (3hrs) 60%; Tests, Assignments and Practical (40%)

Plant tissue culture – concept of totipotency, culture media composition and environmental conditions. Micropropagation. Direct and indirect organogenesis and non-zygotic embryogenesis. Embryo culture. Protoplast culture and regeneration. Production of haploid plants. Production of secondary metabolites. Cryopreservation. Basics of molecular breeding. DNA isolation and amplification (PCR). Molecular analysis of DNA, RNA, and proteins. Recombinant DNA. Direct and indirect gene transfer. GMO and Terminator Gene Technology. Genetic markers.

#### **F.5.3.10 AEN 3431: SOIL AND WATER MANAGEMENT**

Lectures: 3 hours/week  
Practicals: 2 hours/week  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Topographic survey; water resources; Irrigation; Irrigation Agronomy Crop water requirements: Irrigation water requirements, Irrigation Engineering: planning and Irrigation project, Choosing an irrigation methods. 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. 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.

#### **F.5.3.11 AEN 3412: LAND USE PLANNING**

Lectures: 3 hours/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Concepts of land use planning. EIA. Soil morphology: depth, colour, texture, structure. Soil profile characterization (layers, horizons and diagnostic horizons). Soil classification (nomenclature and approach). Classification systems. Landscape assessment (climate, topography and vegetation inventory). Land evaluation: classification for arable and irrigated cropping, livestock and wood production. Land use systems and productivity. Computer tools (GPS, GIS and Remote Sensing). Land use law and policies. History and evolution of land tenure in Namibia. Commercial land reformed Act and Communal Reform Land Act.

## G. B.S.C. AGRICULTURE (FOOD SCIENCE & TECHNOLOGY)

### G.1 FIRST YEAR (New Curriculum)

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

COURSE	CODE	COURSE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
UCLC	3409	Computer Literacy	4	02/28	42	8
ULCE	3419	English Communication and Study Skills	4	04/56	0	16
UCS	3429	Contemporary Social Issues	4	02/28	0	8
SBLG	3411	Introduction to Biology	4	04/56	42	16
SPHY	3401	Physics for Life Sciences I	4	02/28	42	8
SMAT	3511	Basic Mathematics	5	04/56	0	16
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>72</b>
Semester 2						
ULEA	3419	English for Academic Purposes	4	04/56	0	16
SCHM	3412	Chemistry for Life Sciences	4	04/56	42	16
SPHY	3412	Physics for Life Science II	4	04/56	42	16
SBLG	3512	Diversity of Life	5	04/56	42	16
SMAT	3512	Precalculus	5	04/56	0	16
SSTS	3522	Introduction to Statistics	5	02/28	0	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>88</b>
<b>TOTAL FIRST YEAR CREDITS</b>						<b>160</b>

For module descriptions please refer to section D.5

### G.2 SECOND YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AGEC	3681	Principles of Microeconomics	6	03/42	0	12
AGEC	3691	Rural Sociology	6	03/42	0	12
AASC	3601	Genetics	6	02/28	21	8
ACSC	3681	Plant Science	6	03/42	28	12
AFST	3601	Human Nutrition	6	02/28	14	8
AFST	3621	General Microbiology	6	02/28	21	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>60</b>
Semester 2						
AAEN	3602	Agricultural Engineering	6	02/28	21	8
AGEC	3682	Production Economics	6	03/42	0	12
AGEC	3692	Principles of Macroeconomics	6	03/42	0	12
AASC	3612	Biochemistry	6	03/42	21	16
AASC	3602	Livestock Production Systems	6	02/28	21	8
ACSC	3682	Agronomy	6	03/42	42	12
AFST	3602	Food Technology	6	02/28	21	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>76</b>
<b>TOTAL SECOND YEAR CREDITS</b>						<b>136</b>

### G.3 THIRD YEAR (New Curriculum)

COURSE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AFST	3781	Food Chemistry	7	03/42	21	12
AFST	3791	Food Microbiology	7	03/42	21	12
AFST	3708	Field Attachment I	7	0	0	6
AFSC	3781	Post Harvest Technology	7	03/42	21	12
AFSC	3791	Food Processing Technology	7	03/42	21	12
AFSF	3781	Fruits and Vegetable Technology	7	03/42	21	12
ACSC	3781	Research Methods I	7	03/42	21	12
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>78</b>
Semester 2						
AFST	3782	Food Analysis, Instrum & Sen Eva	7	03/42	21	12
AFST	3792	Meat Science and Technology	7	03/42	21	12
AFST	3712	Principles of Food Engineering	7	04/56	14	16
ACSC	3782	Research Methods II	7	03/42	28	12
AGEC	3782	Agricultural Marketing	7	03/42	14	12
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>64</b>
<b>TOTAL THIRD YEAR CREDITS</b>						<b>142</b>

## G.4 FOURTH YEAR (Old Curriculum)

COURSE	CODE	TITLE	CREDITS	L	P	T (HRS)
Semester 1						
FSC	3410	Research Project	1.5	0	42	42
FSC	3401	Fruits and Vegetable Technology	2.75	28	21	49
FSC	3421	Sea Foods Technology	2.75	28	21	49
FSF	3401	Food Packaging, Storage and Distribution	2.75	28	21	49
FSC	3441	Applied Food Engineering	2.75	28	21	49
FSS	3401	Seminars	0.5	0	14	14
FSC	3461	Food Economics	2.75	28	21	49
FSE	3411	Edible Fats and Oils Technology	2.75	42	21	63
FSA	3471	Field Attachment	3.0			
			<b>21.5</b>	<b>168</b>	<b>182</b>	<b>350</b>
Semester 2						
FSC	3410	Research Project	1.5	0	42	42
FSC	3462	Cereal Science and Technology	3.5	28	42	70
FSC	3422	Dairy Science and Technology	3.5	28	42	70
FSP	3402	Plant Equipment and Management	2.75	28	28	56
FSC	3442	Quality Management Systems	2.5	28	21	49
AEB	3412	Entrepreneurship & Agric Business Management	4.0	42	28	70
			<b>17.75</b>	<b>154</b>	<b>203</b>	<b>357</b>
<b>TOTALS</b>			<b>39.25</b>	<b>322</b>	<b>385</b>	<b>707</b>

### FOOD SCIENCE DEPARTMENT: MODULE PRE- & CO-REQUISITES

YEAR	MODULE	PRE-REQUISITE	CO-REQUISITE
3	FST 3781: Food Chemistry	ASC 3612: Biochemistry	
	FST 3791: Food Microbiology	FST 3621: General Microbiology	
	FSC 3791: Food Processing Technology	FST 3602: Food Technology	
	FSF 3781: Fruit & Veg Technology		FST 3791: Food Processing Technology
	FST 3792: Meat Science & Technology	FST 3602: Food Technology	
4	FST 3801: Sea Food Technology	FST 3602: Food Technology	
	FST 3881: Dairy Science and Technology	FSC 3791: Food Processing Technology; FST 3791: Food Microbiology	
	FST 3821: Edible Fats & Oils Technology	FST 3781: Food Chemistry	
	FST 3822: Plant Equipment and Management	FSC 3791: Food Processing Technology	
	FST 3842: Quality Management Systems	FST 3602: Food Technology	

## G.5 MODULE DESCRIPTORS: FOOD SCIENCE AND TECHNOLOGY

### G.5.1 SECOND YEAR MODULES (New Curriculum)

#### G.5.1.1 AFST 3601: HUMAN NUTRITION

**Module Title:** HUMAN NUTRITION

**Code:** AFST 3601

**NQF Level:** 06

**Contact Hours:** Lectures: 2 hr per week; practicals: 2 hr per alternative week

**Credits:** 08

**Module Assessment:** Continuous Assessment: 40% (at 3 assessments); Examination: 60% (One 2 hr exam paper)

**Prerequisite:** None.

**Module Description (Content):**

*The module develops student' knowledge and skills and provides information regarding:*

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. Students will be able to carry out anthropometric measurements: Body Mass Index (BMI), Basal Metabolic Rate (BMR) and Physical Activity Level (PAL); determine nutritional disorders resulting from deficiencies and excesses e.g. Blindness, Marasmus, Kwashiorkor and Obesity and other macronutrient deficiencies such as Rickets and Anaemia. Students will also be able to formulate balanced ration for each group of people. Students will acquire knowledge in the areas of preservation of nutrients, food intolerances and allergies. The role of nutrition with respect to HIV/AIDS will be covered.

#### G.5.1.2 AFST 3621: GENERAL BIOCROBIOLOGY

**Module Title:** GENERAL MICROBIOLOGY

**Code:** AFST 3621

**NQF Level:** 06

**Contact Hours:** Lectures: 3 hr per week; practicals: 3 hr per alternative week

**Credits:** 08

**Module Assessment:** 100%: 60% 2 hr exam papers & 40% tests, assignments & practicals.

**Prerequisites:** None.

**Module Description (Content):**

This course provides a student with a general overview of microbiology including their environment, classifications, their morphology, structures and chemical composition. The biology of bacteria, fungi, algae, protozoa and viruses. Effect of antibiotics on microorganisms, important pathogens of plants and animals. The role of microorganisms in general industries, food industries and in the soils. Concept of microbiology with special reference to microscopy, staining procedure, sterilization, aseptic, pure culture techniques and media preparation.

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**G.5.1.3 AFST 3602: FOOD TECHNOLOGY**

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**Module Title:** FOOD TECHNOLOGY

**Code:** AFST 3602

**NQF Level:** 06

**Contact Hours:** Lectures: 2 hr per week; practicals: 3 hr per alternate week

**Credits:** 08

**Module Assessment:** 100%: 60% 2 hr exam papers & 40% tests, assignments & practicals.

**Prerequisite:** None.

**Module Description (Content):**

This course will introduce students to food industry in Namibia and SADC region; principles of food handling; food processing and preservation; food packaging and labeling. Impact of food technology on traditional foods and diet; influence of food technology on the culture and civilization of food consumption in Namibia; implications of population growth on the advancement of food technology. Food laws and quality management systems.

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**G.5.2 THIRD YEAR MODULES (New Curriculum)**

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**G.5.2.1 AFST 3781: FOOD CHEMISTRY**

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**Module Title:** FOOD CHEMISTRY

**Code:** AFST 3781

**NQF Level:** 07

**Contact Hours:** Lectures: 3 hr per week; practicals: 3 hr per alternate week.

**Credits:** 12

**Module Assessment:** 100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.

**Prerequisite:** AASC 3612: Biochemistry

**Module Description (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. Food contaminants.

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**G.5.2.2 AFST 3791: FOOD MICROBIOLOGY**

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**Module Title:** FOOD MICROBIOLOGY

**Code:** AFST 3791

**NQF Level:** 07

**Contact Hours:** Lectures: 3 hr per week; practicals: 3 hr per alternate week.

**Credits:** 12

**Module Assessment:** 100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.

**Prerequisites:** AFST 3621: General Microbiology

**Module Description (Content):**

This course is intended to provide students with knowledge on microorganisms of interest in food. The laboratory techniques used in the isolation, enumeration and identification of microorganisms in food. Students are also taught the kinetics of multiplication of microorganisms, microbiological principles of food processing and preservation as well as food poisoning and toxicology. Sampling and sampling plans, indices of sanitation in food, biochemical reactions of microorganisms in food and application of genetic engineering to food.

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**G.5.2.3 AFST 3708: FIELD ATTACHMENT I**

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**Module Title:** FIELD ATTACHMENT I

**Code:** AFST 3708

**NQF Level:** 07

**Contact Hours:** 3 Weeks

**Credits:** 6

**Prerequisite:** None

**Module Assessment:** Final assessment 100% (Attachment report and Oral presentation).

**Module Description (Content):**

The module is designed to expose students to practical experience of actual operations on farms, agro-industries,



and research institutions in Namibia. They are expected to observe many different aspects of operations, and participate in physical work and management of operations.

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#### **G.5.2.4 AFSC 3781: POST HARVEST TECHNOLOGY**

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**Module Title:** POST HARVEST TECHNOLOGY  
**Code:** AFSC 3781  
**NQF Level:** 07  
**Contact Hours:**Lectures: 3 hr per week; practicals: 3 hr per alternate week.  
**Credits:** 12  
**Module Assessment:**100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.  
**Prerequisites:** None.

**Module Description (Content):**

This course provides a student with an excellent understanding of physiological and biochemical characteristics of agricultural products with respect to their maturation, ripening and agricultural products storage life. The student has a chance to be introduced to methods of post-harvest handling of agricultural product, traditional and modern methods of drying and storage of grain in Namibia.

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#### **G.5.2.5 AFSC 3791: FOOD PROCESSING TECHNOLOGY**

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**Module Title:** FOOD PROCESSING TECHNOLOGY  
**Code:** AFSC 3791  
**NQF Level:** 07  
**Contact Hours:**Lectures: 3 hr per week; practicals: 3 hr per alternate week. Duration of 14 weeks.  
**Credits:** 12  
**Module Assessment:**100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.  
**Prerequisites:** AFST 3602: Food Technology

**Module Description (Content):**

This course develops the students understanding of the principles and practices employed in food processing. The technologies employed in unit operations common to the food industry are covered. In addition, students are given an understanding of food preservation techniques and factors that affect food quality and shelf life.

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#### **G.5.2.6 AFSF 3781: FRUIT AND VEGETABLE TECHNOLOGY**

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**Module Title:** FRUITS AND VEGETABLE TECHNOLOGY  
**Code:** AFSF 3781  
**NQF Level:** 07  
**Contact Hours:**Lectures: 3 hr per week; practicals: 3 hr per alternate week. Total duration of 14 weeks.  
**Credit:** 12  
**Module Assessment:**100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.  
**Co-requisites:** AFSC 3791: Food Processing Technology

**Module Description (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 analyze 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,. They evaluate quality and shelf life of processed fruits and vegetable products including packaging and labeling. They learn how to apply good manufacturing practices (GMPs) and Hazard analysis critical control points (HACCP).

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#### **G.5.2.7 AFST 3782: FOOD ANALYSIS, INSTRUMENTATION AND SENSORY EVALUATION**

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**Module Title:** FOOD ANALYSIS, INSTRUMENTATION AND SENSORY EVALUATION  
**Code:** AFST 3782  
**NQF Level:** 07  
**Contact Hours:**Lectures: 3 hr per week; practicals: 3 hr per alternate week.  
**Credits:** 12  
**Module Assessment:**100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.  
**Prerequisites:** None.

**Module Description (Content):**

This course builds on concepts and principles of providing students with skills and dispositions regarding sensory evaluation and analysis. 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. It also investigates the application of sensory evaluation; types of panels, types of tests and their specific functions when conducting statistical analysis and during the interpretation of data. The application of a SACCP system and Product development will be covered.

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#### **G.5.2.8 AFST 3792: MEAT SCIENCE AND TECHNOLOGY**

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**Module Title:** MEAT SCIENCE AND TECHNOLOGY  
**Code:** AFST 3792

**NQF Level:** 07  
**Contact Hours:** Lectures: 3 hr per week; practicals: 3 hr per alternate week.  
**Credits:** 12  
**Module Assessment:** 100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.  
**Prerequisite:** AFST 3602: Food Technology

**Module Description (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 procedures. Selected topics related to animal anatomy. Grading and pricing of carcasses. Slaughterhouse hygiene. Carcass composition, characteristics and meat quality. Wholesale and retail of meat cuts. Meat processing, equipment and handling: meat packaging, meat storage, chilling of meat, freezing of meat, smoking of meat, curing of meat, luncheon meats, sausages, sausage casings, meat fermentation. Quality factors and shelf life of processed meat products.

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### **G.5.2.9 AFST 3712: PRINCIPLES OF FOOD ENGINEERING**

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**Module Title:** PRINCIPLES OF FOOD ENGINEERING  
**Code:** AFST 3712  
**NQF Level:** 07  
**Contact Hours:** Lectures: 4 hr per week; practicals: 2 hr per alternate week. Duration of 14 weeks.  
**Credits:** 16  
**Module Assessment:** 100%: 60% 3 hr exam papers & 40% tests, assignments & practicals.  
**Prerequisites:** None.

**Module Description (Content):**

This course introduces the student to concepts of process engineering through the quantitative description of unit operations related to food processing operations. Students are given an understanding of how to perform material and energy balances. In addition, the application of Pressure/ Enthalpy charts to size mechanical refrigeration cycle components is taught.

### **G.5.3 FOURTH YEAR MODULES (Old Curriculum)**

#### **G.5.3.1 FSC 3410: RESEARCH PROJECT**

**Lectures:** 0 hours/week  
**Practicals:** 3 hours /week for the whole year

An individually tailored research study in any of the food science field and related subjects. With the assistance of an allocated supervisor, each student will be expected to write a research proposal, carry out the research and analyze data, write up a report and make a presentation of their research project to fellow students and staff. Project write-up and oral presentation will constitute total assessment mark.

#### **G.5.3.2 FSC 3401: FRUITS AND VEGETABLE TECHNOLOGY**

**Lectures:** 2 hrs/week  
**Practicals:** 3 hr/alternate week  
**Assessment:** One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Types of fruits and vegetables, their differences, uses and economic importance. Structure and composition. Maturation of fruits and vegetables. Quality evaluation and handling. Extension of shelf life of fresh produce and minimally processed products. Processing and preservation: Juicing, freezing, concentration, drying, canning, fermentation: wines, ciders, pickles, sauerkraut. carbonated beverages. Quality evaluation and shelf life of processed fruit and vegetable products.

#### **G.5.3.3 FSC 3421: SEAFOODS TECHNOLOGY**

**Lectures:** 2 hrs/week  
**Practicals:** 3 hr/alternate week  
**Assessment:** One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Fishing industry in Namibia. Fish catching technology: Composition and chemistry of seafood components; Processing: surimi from fatty fish; fish Protein hydrolysates/concentrates; fish meal; fish oil Seafood processing by-products; Quality of seafoods: Freshness quality of seafoods; Preservation of seafood quality; Microbiological quality of seafoods: virus, bacteria and parasites; Microbiological quality of seafoods: marine toxins; Sensory assessment of quality in fish and seafoods. Quality control and management

#### **G.5.3.4 FSF 3401: FOOD PACKAGING, STORAGE AND DISTRIBUTION**

**Lectures:** 2 hrs/week  
**Practicals:** 3 hr/alternate week  
**Assessment:** One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Functions of food packaging. Types of packages, methods of manufacturing and their physical and chemical effects on foods. Permeability properties of packaging materials, lamination and lacquering of packaging materials, shelf life and storage of packaging materials. Newer packaging technologies, storage of bulk and packaged food materials. Aseptic packaging, Free Oxygen Scavenging Packaging, Types of Oxygen Absorbers, Gas-Exchange Packaging, Vacuum Packaging, Alcohol Generating Agent, labeling and distribution.

#### **G.5.3.5 FSC 3441:APPLIED FOOD ENGINEERING**

Lectures: 2 hrs/week  
Practicals: 3 hr/alternate week  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Unit operations related to food processing and the equipments. Statements of error and accuracy. Methods of heating, cooling, pressure development, vacuum creation and fluid transport. Mechanical and electrical actuators. Measurements and control of temperature pressure liquid and solid level. Fluid flow rate; Density and viscosity. Time switching and recorders. Advanced preservation technology.

#### **G.5.3.6 FSS 3401:SEMINARS**

Lectures: 0 hours/week  
Practicals: 1 hours /week

Seminars to acquaint students with information gathering, oral presentation and discussion of topics related to food science and technology. A seminar write-up and oral presentation will constitute total assessment mark.

#### **G.5.3.7 FSC 3461:FOOD ECONOMICS**

Lectures: 2 hrs/week  
Practicals: 3 hrs/alternate week  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Requirements for the successful running of a food industry. Planning, production and human resource management, local storage problems and transport management. Socio-economic principles of consumers' behaviour in food. The market for processed food as affected by quality, presentation, income and price. Market research and product publicity.

#### **G.5.3.8 FSE 3411:EDIBLE FATS AND OIL TECHNOLOGY**

Lectures: 3 hrs/week  
Practicals: 3 hr/alternate week  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Lipid chemistry review: structure of common fats and oils, common chemical reactions and some simple Physical properties: Seed decortication and simple tools in use as decorticators; Graters and pulverizers; Heaters and roasters; Expellers and presses used in small-scale oil extraction. Commercial extraction of fats and oils using the example of soya bean oil. Oil refinery: Degumming, Neutralization, Bleaching and deodorization. Storage and packaging. Shelf life. Side reactions during processing and during food preparation: Cooking oils, margarine, lard, butter substitutes, Salad oils; Product utilization and quality Control.

#### **G.5.3.9 FSA 3471:FIELD ATTACHMENT**

Six Weeks of Field Attachment

At the end of the third year, students will be attached to food related industries and research institutions to enable them undergo practical experience and acquire hands-on skills. An attachment report and an oral presentation will constitute the total assessment mark.

#### **G.5.3.10 FSC 3462:CEREAL SCIENCE AND TECHNOLOGY**

Lectures: 2 hrs/week  
Practicals: 3 hr/week  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Types of cereals, their differences, uses and economic importance. Physico-chemical composition of cereals grains. Quality assessment of cereal grains. Grain handling and storage. Nutritional value of cereal grains. Milling of different cereals: Dry milling of maize, wet milling of maize, milling of wheat and milling of rice. Flour quality. Starch and its uses. Rheology of wheat flour doughs. Processing and characterization of cereal products: Baking technology: bread, cakes, biscuits. Breakfast cereals: corn flakes, weetabix, puffed products. Pasta Products: spaghetti, macaroni, noodles. Brewing technology: - malting, malt milling, yeast growth kinetics, fermenter design, wort preparation and fermentation to beer, beer ageing. Quality assurance and control.

#### **G.5.3.11 FSC 3422:DAIRY SCIENCE AND TECHNOLOGY**

Lectures: 2 hrs/week  
Practicals: 3 hr/ week  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Raw milk - milk production, collection, preservation, transportation and quality testing. Milking machines and equipments. Quality Control and Quality Assurance: chemical, physical, organoleptic and bacteriological tests. Milk processing, handling, packaging and storage. Milk distribution. Processing, handling, packaging, quality assurance and distribution of cream, butter, fermented milks, cheeses, ice cream and condensed/evaporated milks. Marketing of milk and other dairy products.

### **G.5.3.12 FSC 3402:PLANT EQUIPMENT AND MANAGEMENT**

Lectures: 2 hrs/week  
Practicals: 3 hr/alternate week  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

The food processing plant layout and safety design. Water sources and quality. Water treatment and disposal. Waste water treatment. Electrical power installation and safety steam generation and utilisation. Solar energy utilisation. Wood as fuel. Refrigeration and cooling systems. Utilisation of compressed air and vacuum. Preventive maintenance of utility machineries. Industrial colour codes. Graphic symbol for presentation of plant layout. Plant records and accounts. Food processing plant site selection, layout and safety design.

### **G.5.3.13 FSC 3442:QUALITY MANAGEMENT SYSTEMS**

Lectures: 2 hrs/week  
Practicals: 3 hr/alternate week  
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Basic principles of quality management. Good manufacturing practice. Food safety. Food hygiene and sanitation. Food laws and regulations. Codex Alimentarius, HACCP, ISO 9001:2000 and 14 001. Cleaner productions. Food risk assessment analysis.

## H. B.S.C. NATURAL RESOURCES (FISHERIES AND AQUATIC SCIENCES)

### H.1 FIRST YEAR (New Curriculum)

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

MODULE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
UCLC	3409	Computer Literacy	4	02/28	42	8
ULCE	3419	English Communication and Study Skills	4	04/56	0	16
UCSI	3429	Contemporary Social Issues	4	02/28	0	8
SBLG	3411	Introduction to Biology	4	04/56	42	16
SPHY	3401	Physics for Life Sciences I	4	02/28	42	8
SMAT	3511	Basic Mathematics	5	04/56	0	16
<b>TOTAL SEMESTER 1 CREDITS (L 4 = 56; L 5 = 60)</b>						<b>72</b>

#### Semester 2

ULEA	3419	English for Academic Purposes	4	04/56	0	16
SCHM	3412	Chemistry for Life Sciences	4	04/56	42	16
SPHY	3412	Physics for Life Science II	4	04/56	42	16
SBLG	3512	Diversity of Life	5	04/56	42	16
SMAT	3512	Precalculus	5	04/56	0	16
SSTS	3522	Introduction to Statistics	4	04/56	0	8
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>88</b>
<b>TOTAL FIRST YEAR CREDITS</b>						<b>160</b>

*For module descriptions please refer to section D.5*

### H.2 SECOND YEAR (New Curriculum)

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AGEC	3681	Principles of Microeconomics	6	03/42	0	12
AGEC	3691	Rural Sociology	6	03/42	0	12
AASC	3601	Genetics	6	02/28	21	8
ANRE	3601	Environmental Science	6	03/42	14	12
ANRW	3681	Biosystematics	6	03/42	21	12
AFST	3621	General Microbiology	6	02/28	21	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>64</b>

#### Semester 2

AGEC	3682	Production Economics	6	03/42	0	12
AGEC	3692	Principles of Macroeconomics	6	03/42	0	12
AASC	3612	Biochemistry	6	04/56	21	16
ANRE	3602	Climatology and Hydrology	6	02/28	14	8
ANRF	3682	Water Chemistry	6	03/42	21	12
ANRF	3692	Natural Resource Economics	6	03/42	21	12
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>70</b>
<b>TOTAL SECOND YEAR CREDITS</b>						<b>134</b>

### H.3 THIRD YEAR (New Curriculum)

COURSE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
ANRF	3781	Physical Oceanography	7	03/42	21	12
ANRF	3711	Fish Biology and Marine Animal Physiology	7	04/56	28	16
ANRF	3708	Field Attachment	7	0	0	6
ANRF	3791	Integrated Coastal Zone Management	7	03/42	14	12
ANRB	3781	Business Management	7	03/42	28	12
ACSC	3781	Research Methods I	7	03/42	21	12
<b>TOTAL SEMESTER 1 MODULES</b>						<b>68</b>

#### Semester 2

ANRF	3782	Microbiol & Chemistry of Seafood	7	03/42	42	12
ANRF	3792	Aquatic Ecology	7	03/42	21	12
ANRC	3782	Chemical and Biological Oceanography	7	03/42	14	12
ANRC	3792	Conservation Biology	7	03/42	21	12
ANRA	3782	Aquatic Invertebrate Biology	7	03/42	14	12
ACSC	3782	Research Methods II	7	03/42	21	12
<b>TOTAL SEMESTER 2 MODULES</b>						<b>72</b>
<b>TOTAL THIRD YEAR CREDITS</b>						<b>140</b>

#### H.4 FOURTH YEAR (Old Curriculum)

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
NRF	3410	Research Project	3.0	0	42	42
NRF	3491	Population Dynamics for Aquatic Resources	5.0	56	28	84
NRM	3411	Microbiology and Chemistry of Fish and Sea Food	5.0	56	28	84
NRA	3471	Field Attachment	3.0			
NRE	3411	Fisheries Economics	5.0	56	28	84
NRF	3471	Integrated Coastal Zone Management	5.0	56	28	84
AEP	3411	Project Planning and Management	4.0	42	28	70
			<b>30.0</b>	<b>266</b>	<b>182</b>	<b>448</b>
Semester 2						
NRF	3410	Research Project	3.0	0	42	42
NRP	3472	Fish Processing and Quality Control	5.0	56	28	84
NRS	3402	Seminars	1.0	0	14	14
NRF	3462	Fishing Technology	2.5	28	14	42
NRL	3402	Law of the Sea	2.0	28	0	28
NRM	3472	Fisheries Management	5.0	56	28	84
			<b>18.5</b>	<b>168</b>	<b>126</b>	<b>294</b>
<b>TOTALS</b>			<b>48.5</b>	<b>434</b>	<b>308</b>	<b>742</b>

#### NATURAL RESOURCES DEPARTMENT: MODULE PRE- & CO-REQUISITES

YEAR	MODULE	PRE-REQUISITE	CO-REQUISITE
3	NRF 3791: Integrated Coastal Zone Management	NRE 3601: Environmental Science	
	NRF 3782: Microbiology & Chemistry of Seafood	FST 3621: General Microbiology; ASC 3612: Biochemistry	
	NRC 3792: Conservation Biology	NRE 3601: Environmental Science	
4	NRF 3881: Fisheries Economics	NRF 3692: Natural Resource Economics	
	NRF 3811: Population Dynamics	CSC 3782: Research Methods II	
	NRF 3812: Fish Processing & Quality Control	NRF 3782: Microbiology & Chemistry of Seafood	
	NRF 3832: Fisheries Management	NRF 3692: Natural Resource Economics	
	NRF 3852: Aquaculture	NRF 3711: Fish Biology & Marine Animal Physiology; NRF 3682: Water Chemistry	

#### FISHERIES AND AQUATIC SCIENCES DEPARTMENT: MODULE EQUIVALENTS

YEAR	OLD MODULES	NEW MODULES
3	NRF 3391: Biostatistics I	CSC 3781: Research Methods I
	NRF 3392: Biostatistics II	CSC 3782: Research Methods II

### H.5 MODULE DESCRIPTORS: FISHERIES AND AQUATIC SCIENCES

#### H.5.1 SECOND YEAR MODULES (New Curriculum)

##### H.5.1.1 ANRE 3601: ENVIRONMENTAL SCIENCE

**Module Title:** ENVIRONMENTAL SCIENCE  
**Code:** ANRE 3601  
**NQF level:** 6  
**Contact hours:** 02 lecture hours / week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks  
**Credits:** 8  
**Module Assessment:** Continuous assessment (40%): at least 2 assessments; Examination (60%): (01 x 02 hour paper)  
**Prerequisites:** None

##### Module description (Content):

The concept of environment, natural resources, demography and land use. Major environmental concerns including pollution, soil degradation in crop and livestock production systems; effects of agrochemicals, desertification and methods of control, natural and human-made hazards, human population growth, industrialization, urbanization, energy sources, waste management and recycling.

##### H.5.1.2 ANRW 3681: BIOSYSTEMATICS

**Module title:** BIOSYSTEMATICS  
**Code:** ANRW 3681  
**NQF level:** 06  
**Contact hours:** 03 lecture hours/week (14 weeks); 02 hours practicals (14 weeks- alternate weeks)  
**Credits:** 12  
**Module assessment:** Continuous assessment (40%): at least three assessments; Examinations (60%): (1 x 3 hour examination paper)

**Prerequisites:** None

**Module description (Content):**

Principles and practices of animal and plant taxonomy with emphasis on the phylogenetic relationships and evolutionary features in classification. Detailed study of selected locally important families of plants and animals. Introduction to novel technologies in systematics; Evolution and diversity of marine and freshwater fishes. Taxonomy and biogeography of the fish fauna. Introduction to macrophytes.

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### H.5.1.3 ANRE 3602: CLIMATOLOGY AND HYDROLOGY

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**Module Title:** CLIMATOLOGY AND HYDROLOGY

**Code:** ANRE 3602

**NQF level:** 6

**Contact hours:** 2 lecture hours / week for 14 weeks; 2 practical hours, alternate weeks over 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%) 01 x 02 hour paper

**Prerequisites:** None

**Module description (Content):**

This module 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. Topics covered include: Introduction to Climatology (concepts in climatology-weather, meteorology, climate, climatology, atmosphere; weather systems and weather forecasting-weather parameters, weather forecasting, world weather systems, Namibia weather conditions; climate-climatic data, climatic classifications, climatic zones of the world, climatic zones of Namibia). Hydrology (parameters and their measurement; hydrologic cycle (elements and their estimation; groundwater hydrology-aquifers, water table and aquifer recharge).

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### H.5.1.4 ANRF 3682: WATER CHEMISTRY

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**Module:** WATER CHEMISTRY

**Module Code:** ANRF 3682

**NQF Level:** 06

**Contact hours:** 03 Lecture hours/week (14 weeks total); 03 hours Practicals/week (7 weeks)

**Credits:** 12

**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 1x03 hour examination paper

**Prerequisites:** SCHM 3412 Chemistry for Life Sciences

**Module Description (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 oxygen; decomposition of organic matter; photosynthesis and pH. Nutrients and nutrient cycles: phosphorus, nitrogen, sulphur, iron and manganese; silicon and other micro-nutrient constituents. Conductivity.

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### H.5.1.5 ANRF 3692: NATURAL RESOURCE ECONOMICS

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**Module Title:** NATURAL RESOURCE ECONOMICS

**Code:** ANRF 3692

**NQF level:** 6

**Contact hours:** 03 lecture hours / week for 14 weeks; 2 tutorial / practical hours alternate weeks over 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Natural resource economics: Renewable and non-renewable resources; natural- and man-made capital: Conservation and development. Sustainability: Resource scarcity and population growth; ecocentric vs anthropocentric approach; Resource use; the precautionary use of user-pay principle; Economic growth and sustainable development. Brundtland report. Market failures: public goods, externalities. Valuing natural resources: surrogate market techniques, travel time, contingency valuation methods, non-use values; opportunity costs.

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## H.5.2 THIRD YEAR MODULES (New Curriculum)

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### H.5.2.1 ACSC 3781: RESEARCH METHODS I

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**Module Title:** RESEARCH METHODS I

**Code:** ACSC 3781

**NQF level:** 06

**Contact hours:** 3 lecture hours / week for 14 weeks; 3 tutorial / practical hours alternate weeks for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Statistical packages, scientific research, objectives of experiments, principles of experimental design and experimental designs, Topics covered include: Analysis of Variance, standard experimental designs, factorial experiments, linear regression and correlation, transformations, non-parametric statistical techniques, mean comparisons. Procedures for implementing research project and presentation of research results. In addition, probability, Bayes' theorem, combinations and permutations, binomial, Poisson, T and normal distributions are reviewed.

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### H.5.2.2 ANRF 3781: PHYSICAL OCEANOGRAPHY

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**Module:** PHYSICAL OCEANOGRAPHY  
**Module Code:** ANRF 3781  
**NQF Level:** 07  
**Contact hours:** Lectures/week 03hrs/week (14 weeks total); Practicals/week 2hrs/week (7 weeks)  
**Credits:** 12  
**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Prerequisites:** SPHY 3512 Physics for Life Science II; SMAT 3511 Basic Mathematics

**Module Description (Content):**

Marine geology and ocean floor processes. Coastal processes: accumulation; sediment transport. Tidal mechanisms. Eddy diffusion and turbulence. Waves. Coriolis force and Eckman transport. Wind driven and geostrophical currents, vertical water movement, oceanic gyres and meanders. Physical and oceanographical instrumentation. Remote Sensing.

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### H.5.2.3 ANRF 3711: FISH BIOLOGY AND MARINE ANIMAL PHYSIOLOGY

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**Module Title:** FISH BIOLOGY AND MARINE ANIMAL PHYSIOLOGY  
**Code:** ANRF3711  
**NQF level:** 07  
**Contact hours:** 04 lectures hours/week for 14 weeks; 02 practical hours (7 weeks)  
**Credits:** 16  
**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Pre-requisites:** None

**Module description (Content):**

General anatomy and physiology of agnatha, condrichthyes, osteichthyes and other marine animals: mechanisms dealing with respiration and circulation; feeding behaviour, thermoregulation; osmoregulation and excretion; skeleton, muscle and movement; central nervous system, endocrine system and integration.;

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### H.5.2.4 ANRF 3708: FIELD ATTACHMENT I

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**Module title:** FIELD ATTACHMENT I  
**Code:** ANRF 3708  
**NQF level:** 06  
**Contact hours:** 06 weeks Field Attachment  
**Credits:** 4  
**Module assessment:** 40% (Field Attachment Seminar Presentations). 60% (Field attachment Reports)  
**Prerequisites:** None

**Module description (Content):**

At the end of the Second year students will be attached to selected institutions or hands on experience. An attachment report and an oral presentation constitute the total assessment mark.

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### H.5.2.5 ANRF 3791: INTEGRATED COASTAL ZONE MANAGEMENT

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**Module Title:** INTEGRATED COASTAL ZONE MANAGEMENT  
**Code** ANRF 3791  
**NQF level** 07  
**Contact hours:** 03 hours Lectures/week (14 weeks); 03 hours Practicals/week (Alternate weeks - 14 weeks)  
**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites** ANRE 3601: Introduction to Environmental Science

**Module description (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.

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### H.5.2.6 ANRB 3781: BUSINESS MANAGEMENT

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**Module Title:** BUSINESS MANAGEMENT  
**Code:** ANRB 3781  
**NQF level:** 07  
**Contact hours:** 03 lectures hours/week for 14 weeks; 02 practical hours/week for 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Pre-requisites:** None

**Module description (Content):**

Nature of business and organization; The business environment; Agriculture as a business; The exploitation natural resources in business; Special factors affecting the decision making process in agriculture and natural resources exploitation; The function of management; Management styles; Financial



management and planning; Business analysis and control; Decision theory and decision planning; Measures of efficiency; Analytical sequences of problem solving; Corporate recovery; Employee compensation. Social and other social factors in management: Theories of motivation and group dynamics; Management of change; Communication in business, Business law.

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#### H.5.2.7 ACSC 3782: RESEARCH METHODS II

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**Module Title:** RESEARCH METHODS II  
**Code:** ACSC 3782  
**NQF level:** 07  
**Contact hours:** 03 lecture hours / week for 14 weeks; 3 tutorial hours / practical hours alternate weeks for 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Prerequisites:** ACSC 3781: RESEARCH METHODS I

**Module description (Content):**

Introduction / review of basic statistical methods; Comparison between non-parametric and parametric statistics. Non-parametric statistics (Goodness of fit tests; tests of association, Chi Square tests; paired comparisons, Wilcoxon's tests; rank correlation); regression and correlation; Multivariate methods (multiple regression, discriminant analysis, canonical analysis, multidimensional scaling, principal component analysis). Introduction to Statistical Computer packages.

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#### H.5.2.8 ANRF 3782: MICROBIOLOGY AND CHEMISTRY OF SEAFOOD

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**Module Title:** MICROBIOLOGY AND CHEMISTRY OF SEAFOOD  
**Code:** ANRF 3782  
**NQF level:** 07  
**Contact hours:** 04 lectures hours/week for 14 weeks; 03 practical hours/week for 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Pre-requisites:** AFST 3621 : General Microbiology and AASC 3612 : Biochemistry

**Module description (Content):**

Laboratory techniques for identification, enumeration and isolation of microorganisms (ie. molecular DNA technology). Proximal composition of fish and other types of seafood. Spoilage pattern of fish and seafood; food additives and contaminants. Nutritional indices of seafood.

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#### H.5.2.9 ANRF 3792: AQUATIC ECOLOGY

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**Module:** AQUATIC ECOLOGY  
**Module Code:** ANRF 3792  
**NQF Level:** 07  
**Contact hours:** 03hrs lecture/week (14 weeks total); 03 hours practical/week (7 weeks)  
**Credits:** 12  
**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Prerequisites:** None

**Module Description (Content):**

Abiotic parameters influencing productivity of aquatic systems. Diversity, structure and functioning of the various community structures: phytoplankton, zooplankton and benthos; direct and indirect interactions between the biotic and abiotic components of the aquatic systems. Functional webs. Influence of competition. Predation and symbiosis and commensalisms on community structure. Reproduction tactics, growth, survival and fecundity of producers and consumers.

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#### H.5.2.10 ANRC 3782: CHEMICAL AND BIOLOGICAL OCEANOGRAPHY

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**Module:** CHEMICAL AND BIOLOGICAL OCEANOGRAPHY  
**Module Code:** ANRC 3782  
**NQF Level:** 07  
**Contact hours:** 03hrs lecture/week (14 weeks total).02hours practical/week (7 weeks)  
**Credits:** 12  
**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Co-requisites:** ANRF 3781 Physical Oceanography

**Module Description (Content):**

Abiotic factors: Properties of sea water and sediment – sea water reactions. Dissolved nutrients, nutrient cycling and chemical – biological interactions. Physical – chemical interactions in oceanic and estuarine environment and marine system pollution scenario. Dissolved gases and interaction with atmosphere. Irradiance/UVR and heat flux. Oceanographic instrumentation and methods of measurement. 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. Types of biotopes: polar, temperate and tropical systems. Marine system carrying capacity. Sampling gear and methods of species biomass assessment.

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#### H.5.2.11 ANRC 3792: CONSERVATION BIOLOGY

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**Module Title:** CONSERVATION BIOLOGY  
**Code:** ANRC 3792  
**NQF level:** 07  
**Contact hours:** 03 lecture hours / week for 14 weeks; Field visits

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** ANRE 3601: Environmental Science

**Module description (Content):**

Application of principles from genetics and ecology to problems of conservation of biodiversity in aquatic environments: Fitness and viability of small populations, community processes and species richness, aquatic ecology and habitat deterioration; conservation strategies.

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#### **H.5.2.12 ANRA 3782: AQUATIC INVERTEBRATE BIOLOGY**

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**Module title:** AQUATIC INVERTEBRATE BIOLOGY

**Code:** ANRA 3782

**NQF level:** 07

**Contact hours:** 03 hours lecture/week (for 14 weeks); 02 hours practicals/week (for seven weeks)

**Credits:** 12

**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 1 x 3 hour examination paper

**Prerequisites:** None

**Module description (Content):**

The 'Bauplan' concept, definition of major animal phyla, basic biological functions and corresponding organs or organ systems, biology and functional morphology of major aquatic invertebrate phyla, evolutionary aspects.

### **H.5.3 FOURTH YEAR MODULES (Old Curriculum)**

#### **H.5.3.1 NRF 3410: RESEARCH PROJECT**

Lectures: 0 hours/week

Practicals: 3 hours/week for the Whole Year

An individually tailored research study in any of the fisheries and related subjects. With the assistance of an allocated supervisor, each student will be expected to write a research proposal, collect and analyze data, write up a report and make a presentation of their research project to fellow students and staff. Course assessment items: project write up and oral presentation will constitute total assessment mark.

#### **H.5.3.2 NRF 3491: POPULATION DYNAMICS FOR AQUATIC RESOURCES**

Lectures: 4 hours/week

Practicals: 2 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Concepts in fisheries science, estimation of age and growth parameters, estimation of mortality, gear selectivity, sampling, exponential decay model, stock-recruitment relationship, non-age structured and age-structured models, reference points and projection models.

#### **H.5.3.3 NRM 3411: MICROBIOLOGY AND CHEMISTRY OF FISH AND SEAFOOD**

Lectures: 4 hours/week

Practicals: 2 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Classification and taxonomy of microorganisms. Laboratory techniques for identification, enumeration and isolation of microorganisms. Molecular DNA technology for identification of microorganisms. Bioinformatics work on DNA sequences. Virology. DNA structure and transcription. Chemical water properties, chemical composition and constituents of fish and other types of seafood, spoilage pattern of fish and seafood; food additives and contaminants. Sensory Evaluation of seafood.

#### **H.5.3.4 NRA 3471: FIELD ATTACHMENT**

Six weeks of field attachment

At the end of the third year, students will be attached to selected institutions for hands on experience. An attachment report and an oral presentation will constitute the total assessment mark.

#### **H.5.3.5 NRE 3411: FISHERIES ECONOMICS**

Lectures: 4 hours/week

Practicals: 0 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests and Assignments 40%.

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.

#### **H.5.3.6 NRF 3471: INTEGRATED COASTAL ZONE MANAGEMENT**

Lectures: 4 hours/week

Practicals: 3 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

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.

#### **H.5.3.7 NRP 3472: FISH PROCESSING AND QUALITY CONTROL**

Lectures: 4 hours/week

Practicals: 2 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

Fish handling, processing and preservation, packaging - materials and analytical techniques, transportation and distribution of products. Fish quality, processing hygiene, food safety, HACCP systems, food poisoning and infection, types of toxicity and its biochemical aspects. Introduction to fish detailed and proximate: electrophoresis for species identification; analysis of fish and seafood for protein/nitrogen content, non-protein content, fat content, fat soluble vitamin content, ash and major minerals, fish protein and fatty acid profile, amino acid profile, effect of heat on fish muscle proteins; Structure of fish and other seafood, nutritional quality of fish and seafood. Sensory evaluation. Construction of HACCP systems in the Fishing Industry and Methods used for fish identification, content analysis and differential scanning calorimetry.

#### **H.5.3.8 NRS 3402: SEMINARS**

Lectures: 0 hours/week

Practicals: 1 hours /week

Seminars to acquaint students with information gathering, oral presentation and discussion of topics related

to Fisheries and Marine Sciences. A seminar write-up and oral presentation will constitute total assessment mark.

#### **H.5.3.9 NRF 3462: FISHING TECHNOLOGY**

Lectures: 2 hours/week

Practicals: 2 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests, Assignments and practicals 40%.

A historical overview of fishing technology, adaptation of appropriate technology, design and choice of vessel and gear technology, fish aggregating devices. Marine and Freshwater Fishing Technologies.

#### **H.5.3.10 NRL 3402: LAW OF THE SEA**

Lectures: 2 hours/week

Practicals: 0 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests and Assignments 40%.

Brief survey of historical development of the law of the sea to the present day with emphasis on the interaction between existing international legal order on the one hand and the economic and security needs of Namibia on the other hand.

#### **H.5.3.11 NRM 3472: FISHERIES MANAGEMENT**

Lectures: 4 hours/week

Practicals: 0 hours/week

Assessment: One Exam Paper (3 hrs ) 60%; Tests and Assignments 40%.

Introduction to theories of organization, planning, management and decision making; legislative framework for fisheries management; 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 Surveillance; other participatory methods); fish and seafood marketing; management costs; characteristics of subsistence artisanal vs. industrial and commercial fisheries; national laws (SADC).

# I. B.SC. NATURAL RESOURCES (INTEGRATED ENVIRONMENTAL SCIENCE) {New Curriculum – Ogongo Campus}

## I.1 FIRST YEAR

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

MODULE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
UCLC	3409	Computer Literacy	4	02/28	42	8
ULCE	3419	English Communication and Study Skills	4	04/56	0	16
UCSI	3109	Contemporary Social Issues	4	02/28	0	8
SBLG	3411	Introduction to Biology	4	04/56	42	16
SPHY	3401	Physics for Life Sciences I	4	02/28	42	8
SMAT	3511	Basic Mathematics	5	04/56	0	16
<b>TOTAL SEMESTER 1 CREDITS (L 4 = 56; L 5 = 60)</b>						<b>72</b>
Semester 2						
ULEA	3419	English for Academic Purposes	4	04/56	0	16
SCHM	3412	Chemistry for Life Sciences	4	04/56	42	16
SPHY	3412	Physics for Life Sciences	4	04/56	42	16
SBLG	3522	Diversity of Life	5	04/56	42	16
SMAT	3512	Pre-calculus	5	04/56	0	16
SSTS	3522	Introduction to Statistics	4	04/56	0	8
<b>TOTAL SEMESTER 2 CREDITS (L 4 = 40; L 5 = 48)</b>						<b>88</b>
<b>TOTAL FIRST YEAR CREDITS (L4 = 104; L5 = 108)</b>						<b>152</b>

For module descriptions please refer to section D.5

## I.2 SECOND YEAR

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AGEC	3681	Principles of Microeconomics	6	03/42	0	12
AGEC	3691	Rural Sociology	6	03/42	0	12
AASC	3601	Genetics	6	02/28	21	8
AIES	3601	Ecology	6	02/28	14	8
AIES	3621	Principles of Wildlife Management	6	02/28	14	8
ANRE	3601	Environmental Science	6	03/42	14	12
AFST	3602	General Microbiology	6	02/28	21	8
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>68</b>
Semester 2						
AGEC	3692	Principles of Macroeconomics	6	03/42	0	12
AASC	3612	Biochemistry	6	04/56	21	16
AIES	3682	Plant Physiology	6	03/42	14	12
AIES	3602	General Soil Science	6	02/28	21	8
ANRE	3602	Climatology and Hydrology	6	02/28	14	8
ANRF	3692	Natural Resource Economics	6	03/42	21	12
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>68</b>
<b>TOTAL SECOND YEAR CREDITS</b>						<b>136</b>

## I.3 THIRD YEAR

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AIES	3701	Botany of Economic Plants	7	02/28	28	8
AIES	3781	Population and Community Ecology	7	03/42	28	12
AIES	3791	Geo-informatics	7	03/42	28	12
AIES	3708	Field Attachment I	7	0	0	6
AIEE	3781	Eco-physiology	7	03/42	14	12
ANRO	3701	Agroforestry	7	02/28	21	8
ACSC	3781	Research Methods I	7	03/42	21	12
<b>TOTAL SEMESTER 1 CREDITS</b>						<b>70</b>
Semester 2						
AIES	3782	Natural Res Policies, Laws & Conventions	7	03/42	14	12
AIES	3702	Community Based Resource Mgt	7	02/28	14	8
AIES	3722	Issues in Cons & Sustainable Dev	7	02/28	14	8
AASC	3711	Animal Anatomy and Physiology	7	04/56	21	16
ANRC	3792	Conservation Biology	7	03/42	21	12
ACSC	3782	Research Methods II	7	03/42	21	12
<b>TOTAL SEMESTER 2 CREDITS</b>						<b>68</b>
<b>TOTAL THIRD YEAR CREDITS</b>						<b>138</b>

#### I.4 FOURTH YEAR

##### FORESTRY:

MODULE	CODE	TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AFOR	3810	Research Project (Forestry)	8	04/56	42	16
AFOR	3881	Principles of Silviculture	8	03/42	14	12
AFOR	3891	Forest Protection	8	03/42	14	12
AFOC	3881	Community Forestry	8	03/42	14	12
AFOF	3881	Forest Mensuration & Inventory	8	03/42	28	12
AFOR	3808	Field Attachment II	8	0	0	6

**TOTAL SEMESTER 1 CREDITS** 70

##### Semester 2

AFOR	3810	Research Project (Forestry)	8	04/56	42	16
AFOR	3812	Forest Economics & Marketing	8	04/56	28	16
AFOR	3832	Forest Harvesting	8	04/56	28	16
AGEC	3892	Entrepreneurship & Agric Bus Mgt	8	03/42	21	12

**TOTAL SEMESTER 2 CREDITS** 60

**TOTAL FOURTH YEAR CREDITS** 130

##### WIDLIFE ECOLOGY AND MANAGEMENT

MODULE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AWLM	3810	Research Project (Wildlife Ecol & Mgt)	8	04/56	42	16
AWLM	3801	Animal Behaviour	8	02/28	28	8
AWLM	3811	Ornithology and Mammalogy	8	04/56	28	16
AWLM	3831	Rangeland Management	8	04/56	21	16
AWLM	3808	Field Attachment	8	0	0	6
AASC	3781	Animal Nutrition	7	03/42	21	8

**TOTAL SEMESTER 1 CREDITS** 70

##### Semester 2

AWLM	3810	Research Project (Wildlife Ecol & Mgt)	8	04/56	42	16
AWLM	3882	Wildlife Diseases	8	03/42	21	12
AWLM	3892	Economics of Wildlife Resources	8	03/42	21	12
AWLW	3882	Wildlife Survey Techniques and Monitoring	8	03/42	14	12
AGEC	3892	Entrepreneurship & Agric Bus Mgt	8	03/42	21	12

**TOTAL SEMESTER 2 CREDITS** 64

**TOTAL FOURTH YEAR CREDITS** 134

##### ENVIRONMENTAL SCIENCE

COURSE	CODE	MODULE TITLE	NQF LEVEL	L	P	CREDITS
Semester 1						
AENV	3810	Research Project (Env Science)	8	04/56	42	16
AENV	3881	Environment and Development	8	03/42	28	12
AENV	3891	Environment Pollution Control	8	03/42	14	12
AENV	3801	Watershed Management	7	02/28	28	8
AENV	3808	Field Attachment II	8	0	0	6
AWLR	3831	Rangeland Management	8	04/56	28	16

**TOTAL SEMESTER 1 CREDITS** 70

##### Semester 2

AENV	3810	Research Project (Env Science)	8	04/56	42	16
AENV	3882	Management of Arid and Semi-Arid Lands	8	03/42	28	12
AENV	3892	Resource Planning and Management	8	03/42	28	12
AENE	3882	Environmental Impact Assessment	8	03/42	28	12
AGEC	3892	Entrepreneurship & Agric Bus Mgt	8	03/42	21	12

**TOTAL SEMESTER 2 CREDITS** 64

**TOTAL FOURTH YEAR CREDITS** 134

#### I.5 MODULE DESCRIPTORS: INTEGRATED ENVIRONMENTAL SCIENCE

##### I.5.1 SECOND YEAR MODULES

##### I.5.1.1 AIES 3601: ECOLOGY

Module Title: **ECOLOGY**  
 Code: AIES 3601  
 NQF level: 6

**Contact hours:** 2 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): 01 x 02 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Physical, chemical and biotic parameters; Community description, stability, diversity and patterns. Community dynamics. Ecosystems, energy flow, biomass, trophic levels and nutrient cycling. The concepts of autecology and synecology; classification of plant communities; biogeoclimatic classification (applied to Namibia), the concept of ecological succession and the various serial stages of plant communities. Keystone species

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#### I.5.1.2 AIES 3621: PRINCIPLES OF WILDLIFE MANAGEMENT

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**Module Title:** PRINCIPLES OF WILDLIFE MANAGEMENT

**Code:** AIES 3621

**NQF level:** 6

**Contact hours:** 02 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): (01 x 02 hour paper)

**Prerequisites:** None

**Module description (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.

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#### I.5.1.3 AIES 3682: PLANT PHYSIOLOGY

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**Module Title:** PLANT PHYSIOLOGY

**Code:** AIES 3682

**NQF level:** 8

**Contact hours:** 03 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least 3 assessments; Examination (60%): (01 x 03 hour paper)

**Prerequisites:** None

**Module description (Content):**

Plant water relations, diffusion and osmosis, drought tolerance, photosynthesis, C3, C4 and CAM plants, respiration, phloem transport, mineral nutrition, nitrogen fixation, plant growth and development, plant hormones and their adaptation to osmotic stress and herbivory.

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#### I.5.1.4 AIES 3602: GENERAL SOIL SCIENCE

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**Module Title:** GENERAL SOIL SCIENCE

**Code:** AIES 3602

**NQF level:** 6

**Contact hours:** 02 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): 01 x 02 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Concepts of soil, soil profile, soil type and structure: Soil formation factors and parent material; Soil texture, structure and consistency; Soil air, soil water and water movements, and their interactions with temperature, pH, soil organisms and soil organic matter; Basic soil/plant water relations; Major soil types and soil composition; Soil sampling techniques.

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### I.5.2 THIRD YEAR MODULES

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#### I.5.2.1 AIES 3701: BOTANY OF ECONOMIC PLANTS

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**Module Title:** BOTANY OF ECONOMIC PLANTS

**Code:** AIES 3701

**NQF level:** 7

**Contact hours:** 2 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least 2 assessments; Examination (60%): (01 x 02 hour paper)

**Prerequisites:** None

**Module description (Content):**

Useful and toxic plants, their origin and history of plant use; Plant products and derivatives used in nutrition, medicine, industry and clothing; their chemical and structural nature; Potential for new crop species; Role of plants in historical and modern civilization; Utilization of indigenous vs exotics..

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**I.5.2.2 AIES 3781: POPULATION AND COMMUNITY ECOLOGY**

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**Module Title:** POPULATION AND COMMUNITY ECOLOGY  
**Code:** AIES 3781  
**NQF level:** 7  
**Contact hours:** 03 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment 40% (Minimum 2 tests, 1 assignment; 14 practicals); Examination: 60% (1 x 3 hour examination paper)  
**Prerequisites:** None

**Module description (Content):**

Population analysis: Distributions, dispersal and migration. Estimating population numbers, life-tables analyses, survivorship, geometric and logistic population growth, density independent & density independent population regulation; competition, predation, herbivory, Habitat utilization

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**I.5.2.3 AIEE 3781: ECO-PHYSIOLOGY**

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**Module Title:** ECO-PHYSIOLOGY  
**Code:** AIEE 3781  
**NQF level:** 7  
**Contact hours:** 03 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Prerequisites:** IES 3682 Plant Physiology

**Module description (Content):**

Physical, chemical, biotic factors affecting organism growth and survival; physiological functions and adjustments underlining ecological observations from the viewpoint of growth, reproduction, survival, abundance and distribution. Effects of photosynthesis, respiration, transport of photosynthetic products, water economy, energy economy, nutrient economy, growth and carbon allocation; stress physiology, connection between structure and function and effects of environmental changes;

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**I.5.2.4 AIEG 3791: GEO-INFORMATICS**

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**Module Title:** GEO-INFORMATICS  
**Code:** AIEG 3791  
**NQF level:** 7  
**Contact hours:** 03 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Prerequisites:** None

**Module description (content):** Traditional survey methods; Linear and angular measurements; triangulation, traversing, mapping by plane tabling and chain surveys, profile and differential leveling, contours and contouring; Preparation of plans and maps, area and volume computations; Characteristics of photographic images; stereo viewing and construction of aerial mosaics. The concept and principles of remote sensing. The electromagnetic spectrum; types of sensors and plate forms. Principles of air-photo interpretation, satellite remote sensing and its application to natural resource mapping, meteorology, natural hazards detection and environmental degradation detection and monitoring. Digital image processing; Review of different types of geographic information and their use in GIS; Cartographic and data base procedures – spatial data structures, topography and analytical procedures. Database design.

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**I.5.2.5 ACSC 3791: RESEARCH METHODS I**

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**Module Title:** RESEARCH METHODS I  
**Code:** ACSC 3791  
**NQF level:** 07  
**Contact hours:** 03 lecture hours / week for 14 weeks; 3 tutorial / practical hours alternate weeks for 14 weeks  
**Credits:** 12  
**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper  
**Prerequisites:** None

**Module description (Content):**

Statistical packages, scientific research, objectives of experiments, principles of experimental design and experimental designs, Topics covered include: Analysis of Variance, standard experimental designs, factorial experiments, linear regression and correlation, transformations, non-parametric statistical techniques, mean comparisons. Procedures for implementing research project and presentation of research results. In addition, probability, Bayes' theorem, combinations and permutations, binomial, Poisson, T and normal distributions are reviewed.

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**I.5.2.6 AIES 3708: FIELD ATTACHMENT I**

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**Module Title:** FIELD ATTACHMENT I  
**Code:** AIES 3708  
**NQF level:** 7  
**Contact hours:** 0  
**Credits:** 6  
**Module Assessment:** 50 % Report presentation at a seminar; 50 % Written report

**Prerequisites** None

**Module description (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. An attachment report and oral presentation will constitute the total assessment mark.

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**I.5.2.7 ANRO 3701: AGROFORESTRY**

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**Module Title:** AGROFORESTRY

**Code:** ANRO 3701

**NQF level** 7

**Contact hours:** 2 lecture hours/ week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): 01 x 02 hour examination paper

**Prerequisites:** AIES 3601 Ecology I

**Module description (Content):**

Introduction to agroforestry: definition and principles of agroforestry, integrated land-use system, need for agroforestry, agroforestry and people, causes and consequences of deforestation. Land-use systems and possible agroforestry intervention. Multi-purpose tree species and their uses. Agroforestry systems. Agroforestry establishment techniques. Ecological and economic interactions. Bee keeping. Indigenous fruit trees. .

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**I.5.2.8 AIES 3782: NATURAL RESOURCES POLICIES, LAWS AND CONVENTIONS**

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**Module Title:** NATURAL RESOURCES POLICIES, LAWS AND CONVENTIONS

**Code** AIES 3782

**NQF level** 7

**Contact hours:** 03 Lecture hours/week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (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.

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**I.5.2.9 AIES 3702: COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT**

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**Module Title:** COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT

**Code:** AIES 3702

**NQF level** 7

**Contact hours:** 02 Lecture hours/week for 14 weeks; 02 practical hours, alternate weeks over 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): 01 x 02 hour examination paper

**Prerequisites:** AIES 3621 Principles of Wildlife Management

**Module description (Content):**

Rural development and livelihoods: concepts and principles. Principles of devolution, proprietorship, incentives, authority and responsibility over natural resources. Rural livelihood strategies. Local institutions (conservancies) for CBNRM. Governance, participation and communication. Community capacity building. Natural resource monitoring and adaptive utilization. Enterprise development and benefit sharing. Conflict management. Case studies: wildlife, environment and forestry.

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**I.5.2.10 AIES 3722: ISSUES IN CONSERVATION AND SUSTAINABLE DEVELOPMENT**

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**Module Title:** ISSUES IN CONSERVATION AND SUSTAINABLE DEVELOPMENT

**Code:** AIES 3722

**NQF level** 7

**Contact hours:** 02 Lecture hours/week for 14 weeks; 02 practical hours, alternate weeks for 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): 01 x 02 hour examination paper

**Prerequisites:** AIES 3621 Principles of Wildlife Management

**Module description (Content):**

Principles of sustainable development. Conservation and Sustainable Development Concepts; Cost-Benefit Analysis and Environmental conservation; Social Issues, Policies and Processes: Population; ethics and religion; conflict management and land disputes; Political Ecology; Participatory approaches. Sustainable Agriculture and Forestry: trade, development and the Environment, and pesticide use. Sustainable Conservation of Biological Diversity: Introduced species: cultural ecology; indigenous knowledge in the conservation of biodiversity, international treaties with regard to biodiversity, conservation of single species versus ecosystem conservation.

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**I.5.2.11 ACSC 3782: RESEARCH METHODS II**

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**Module Title:** RESEARCH METHODS II

**Code:** ACSC 3782

**NQF level:** 07

**Contact hours:** 03 lecture hours / week for 14 weeks; 3 tutorial hours / practical hours alternate weeks for 14 weeks



**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** ACSC 3782: RESEARCH METHODS I

**Module description (Content):**

Introduction / review of basic statistical methods; Comparison between non-parametric and parametric statistics. Non-parametric statistics (Goodness of fit tests; tests of association, Chi Square tests; paired comparisons, Wilcoxon's tests; rank correlation); regression and correlation; Multivariate methods (multiple regression, discriminant analysis, canonical analysis, multidimensional scaling, principal component analysis). Introduction to Statistical Computer packages.

### I.5.3 FOURTH YEAR MODULES

#### I.5.3.1 FORESTRY

##### I.5.3.1.1 AFOR 3810: RESEARCH PROJECT (FORESTRY)

**Module Title:** RESEARCH PROJECT (FORESTRY)

**Code:** AFOR 3810

**NQF level:** 8

**Contact hours:** Individual student consultation for 28 weeks: equivalent to 1 hour a week.

**Credits:** 32

**Module Assessment:** 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.

**Prerequisites:** CSC 3781: Research Methods I and CSC 3782: Research Methods II

**Module description (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.

##### I.5.3.1.2 AFOR 3881: PRINCIPLES OF SILVICULTURE

**Module Title:** PRINCIPLES OF SILVICULTURE

**Code:** AFOR 3881

**NQF level:** 8

**Contact hours:** 03 Lecture hours/week for 14 weeks; 02 practical hours, alternate weeks for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Definitions and relations with other disciplines. The ecosystem concept in a forestry context, ecological succession and its influences on silvicultural practice and systems. The effects of the physical environment on tree growth; the ecophysiology of tree growth. Flowering physiology, periodicity. Seed physiology including dormancy, seed collection, processing, storage and transport. Vegetation propagation. Nursery design, layout and practice. Silviculture systems.

##### I.5.3.1.3 AFOR 3891: FOREST PROTECTION

**Module Title:** FOREST PROTECTION

**Code:** AFOR 3891

**NQF level:** 8

**Contact hours:** 03 Lecture hours/week for 14 weeks; 02 practical hours, alternate weeks for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (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.

##### I.5.3.1.4 AFOC 3881: COMMUNITY FORESTRY

**Module Title:** COMMUNITY FORESTRY

**Code:** AFOC 3881

**NQF level:** 8

**Contact hours:** 03 Lecture hours/week for 14 weeks; 02 practical hours alternate weeks for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

History, definition and approaches; Interlinkages with other sectors. Aims and objectives of community forestry. Policy and strategies relevant to community forestry. Technical and management alternatives to integrated forest management. Case studies of community forestry.

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**I.5.3.1.5 AFOF 3881: FOREST MENSURATION AND INVENTORY**

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**Module Title:** FOREST MENSURATION AND INVENTORY**Code:** AFOF 3881**NQF level:** 8**Contact hours:** 02 Lecture hours/week for 14 weeks; 02 practical hours/week of 14 weeks**Credits:** 8**Module Assessment:** Continuous assessment (40%): at least TWO assessments; Examination (60%): 01 x 02 hour examination paper**Prerequisites:** None**Module description (Content):**

Introduction to forest mensuration: Mensuration systems, concepts and models of forest mensuration. Tree Measurements and Instruments; Tree characteristics; age, diameter and basal area, height, bark thickness, volume, mass, growth. Standard measurements: Stocking, basal area, stand volume, biomass, mean diameter distribution, mean height and dominant height, increment (CAI and MAI), relascope and ocular estimates. Forest Inventories; Inventory methods: compartment inventories, sampling, national forest inventory, precision/statistics. Inventories by circular sample plots; fieldwork, calculations, reporting. Introduction to Growth and Yield Modeling Trees.

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**I.5.3.1.6 AFOR 3808: FIELD ATTACHMENT II**

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**Module title:** FIELD ATTACHMENT II**Code:** FOR 3808**NQF level:** 08**Contact hours:** Six weeks of Field Attachment**Credits:** 6**Module assessment:** 40% (Field Attachment Seminar Presentations) 60% (Field attachment Reports)**Prerequisites:** IES 3708: Field Attachment**Module description (Content):**

At the end of the Third Year students will be attached to selected institutions or hands on experience. An attachment report and an oral presentation constitute the total assessment mark.

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**I.5.3.1.7 AFOR 3812: FOREST ECONOMICS AND MARKETING**

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**Module Title:** FOREST ECONOMICS AND MARKETING**Code:** AFOR 3812**NQF level:** 8**Contact hours:** 04 Lecture hours/week for 14 weeks; 02 practical hours for alternate weeks for 14 weeks**Credits:** 16**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper**Prerequisites:** None**Module description (Content):**

Forest economic concepts, economics of resource conservation. Methods of input costing – private versus social costs and private versus social benefits. Depreciation methods and determination of maintenance costs. Resource accounting procedures. Maximum sustainable yield and maximum economic yield. Work-study procedures. Principles of shadow pricing, economies and diseconomies of scale in forestry operations. Accounting techniques in forestry. Principles of marketing, market research and promotion.

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**I.5.3.1.8 AFOR 3832: FOREST HARVESTING**

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**Module Title:** FOREST HARVESTING**Code:** AFOR 3832**NQF level:** 8**Contact hours:** 04 Lecture hours/week for 14 weeks; 02 practical hours / week for 14 weeks**Credits:** 16**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper**Prerequisites:** None**Module description (Content):**

Definition and scope. Forest organization, the principles of sustained yield and normal forest. Yield regulation, estimation of allowable cuts, rotation. Felling plants and programme of work. Planning of logging operations, low-impact harvesting systems, integrated harvesting concepts and practices, harvesting systems analysis, logging production cost control. Stump area operations, terrain transport, terminal and underway operations. Transportation systems, forest roads, their design and maintenance. Ergonomics and work safety.

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**I.5.3.2 WILDLIFE ECOLOGY AND MANAGEMENT**

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**I.5.3.2.1 AWLM 3810: RESEARCH PROJECT (WILDLIFE ECOL & MGT)**

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**Module Title:** RESEARCH PROJECT (WILDLIFE ECOL & MGT)**Code:** AWLM 3810**NQF level:** 8

**Contact hours:** Individual student consultation for 28 weeks: equivalent to 1 hour a week.

**Credits:** 32

**Module Assessment:** 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.

**Prerequisites:** CSC 3781: Research Methods I and CSC 3782: Research Methods II

**Module description (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.

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#### I.5.3.2.2 AWLM 3801: ANIMAL BEHAVIOUR

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**Module Title:** ANIMAL BEHAVIOUR

**Code:** AWLM 3801

**NQF level:** 8

**Contact hours:** 02 lecture hours / week for 14 weeks; 02 tutorial / practical hours alternate weeks for 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): 01 x 02 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Simple and complex behaviour. Sign-stimuli, motivation. Conflict behaviour, orientation, learning, genes and behaviour. Feeding behaviour; Social and non-social behaviour; Aggression; Sexual behaviour, Effects of environment on breeding. Primate and Carnivore behaviour.

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#### I.5.3.2.3 AWLM 3811: ORNITHOLOGY AND MAMMALOLOGY

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**Module title:** ORNITHOLOGY AND MAMMALOLOGY

**Code:** AWLM 3811

**NQF level:** 8

**Contact hours:** 04 hours Lectures/week (14 weeks); 02 hours practical/week (14 weeks)

**Credits:** 16

**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Classification and phylogeny of mammals and birds; identification, anatomy, physiology, With emphasis on endangered species. Biogeography. Reproductive ecology; comparative anatomy and physiology. Natural and human threats to habitats of mammal and bird populations; Conservation strategies.

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#### I.5.3.2.4 AWLM 3831: RANGELAND MANAGEMENT

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**Module Title:** RANGELAND MANAGEMENT

**Code:** AWLW 3831

**NQF level:** 8

**Contact hours:** 04 lecture hours / week for 14 weeks; 03 tutorial / practical hours alternate weeks for 14 weeks

**Credits:** 16

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

The role of pasture and range in Namibia; Rangeland ecology, range succession and retrogression, climax vegetation; Taxonomy, nomenclature and morphology of common range plants; Principles and practices of range management; Range evaluation and monitoring devices; Telemetry and Capture anaesthesia; Inter-relationships between plant species, the grazing animal and grazing management systems. Control of poisonous plants; Establishment, management and utilization of cultivated pastures and fodders; Conservation of forage; Seeds and seed production.

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#### I.5.3.2.5 AWLM 3808: FIELD ATTACHMENT II

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**Module title:** FIELD ATTACHMENT II

**Code:** AWLM 3808

**NQF level:** 08

**Contact hours:** Six weeks of Field Attachment

**Credits:** 6

**Module assessment:** 40% (Field Attachment Seminar Presentations) 60% (Field attachment Reports)

**Prerequisites:** IES 3708: Field Attachment

**Module description (Content):**

At the end of the Third Year students will be attached to selected institutions or hands on experience. An attachment report and an oral presentation constitute the total assessment mark.

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**I.5.3.2.6 AWLM 3882: WILDLIFE DISEASES**

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**Module:** WILDLIFE DISEASES  
**Module Code:** AWLM 3882  
**NQF Level:** 8  
**Contact hours:** 03 Lectures/week (14 weeks total) Practicals/week 3hrs alternate weeks  
**Credits:** 12  
**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module Description (Content):**

Recent advances in immunology; major infectious diseases of captive and free-living wild animals (plagues, pathology, diagnosis, treatment and control); miscellaneous infectious and non-infectious diseases, reproductive disorders, neurodegenerative diseases; nutritional diseases; wildlife disease investigation; preventive medicine; physical and chemical restraint and anesthesia. Aspects of mammalian, avian and reptilian surgery.

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**I.5.3.2.7 AWLM 3892: ECONOMICS OF WILDLIFE RESOURCES**

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**Module:** ECONOMICS OF WILDLIFE RESOURCES  
**Module Code:** AWLM 3892  
**NQF Level:** 8  
**Contact hours:** 03 Lectures/week (14 weeks total) Practicals/week 3hrs alternate weeks  
**Credits:** 12  
**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module Description (Content):**

Typology of natural resources; exploitation rates of renewable resources with emphasis on wildlife cropping; The concept of common property and free access resources; wildlife on private and public land. The economics 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 species, e.g. tourist attractions, anesthetics, venison, aphrodisiac, etc.; future potential uses of wildlife.

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**I.5.3.2.8 AWLW 3882: WILDLIFE SURVEY TECHNIQUES AND MONITORING**

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**Module:** WILDLIFE SURVEY TECHNIQUES AND MONITORING  
**Module Code:** AWLW 3882  
**NQF Level:** 8  
**Contact hours:** 03 Lectures/week (14 weeks total) Practicals/week 2hrs/week (7weeks total)  
**Credits:** 12  
**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module Description (Content):**

The purpose of surveying. Sampling techniques: strip surveys, aerial surveys, waterhole counts, spoor counts. Reliability of survey results and sources of errors. Planning, analysis and cost of counting. Veldt management, and game farming. Game utilization.

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**I.5.3.3 ENVIRONMENTAL SCIENCE**

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**I.5.3.3.1 AENV 3810: RESEARCH PROJECT (ENV SCIENCE)**

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**Module Title:** RESEARCH PROJECT (ENV SCIENCE)  
**Code:** AENV 3810  
**NQF level:** 8  
**Contact hours:** Individual student consultation for 28 weeks: equivalent to 1 hour a week.  
**Credits:** 32  
**Module Assessment:** 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.

**Prerequisites:** CSC 3781: Research Methods I and CSC 3782: Research Methods II

**Module description (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.

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**I.5.3.3.2 AENV 3881: ENVIRONMENT AND DEVELOPMENT**

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**Module:** ENVIRONMENT AND DEVELOPMENT  
**Module Code:** AENV 3881  
**NQF Level:** 8  
**Contact hours:** 03 Lectures/week (14 weeks total); Practicals/week 2hrs/week (14 weeks total)  
**Credits:** 12

**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module Description (Content):**

Links between environment and development; International principles and approaches; Triple bottom line: ecological, social and financial effects of development. International events: Rio, Rio + 10, CSD; international treaties: BDC, CCD, CCC etc. National approaches and tools for sustainable development: EIA, state of the Environment Reporting, National Strategy.

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**I.5.3.3.3 AENV 3891: ENVIRONMENTAL POLLUTION AND CONTROL**

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**Module title:** ENVIRONMENTAL POLLUTION AND CONTROL

**Code:** AENV 3891

**NQF level:** 8

**Contact hours:** 03 hours lecture/week (14 weeks) 2 hours practicals/week (Alternate weeks – 14 weeks)

**Credits:** 12

**Module assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (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).

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**I.5.3.3.4 AENV 3801: WATERSHED MANAGEMENT**

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**Module Title:** WATERSHED MANAGEMENT

**Code:** AENV 3801

**NQF level:** 07

**Contact hours:** 02 lecture hours / week for 14 weeks; 02 tutorial / practical hours per week for 14 weeks

**Credits:** 8

**Module Assessment:** Continuous assessment (40%): at least two assessments; Examination (60%): 01 x 02 hour examination paper

**Prerequisites:** None

**Module description (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. Perennial and ephemeral rivers. Watershed analysis including techniques, collection of field data and sources of information. Underground water sources and their management in Namibia. Water harvesting.

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**I.5.3.3.5 AENV 3808: FIELD ATTACHMENT II**

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**Module title:** FIELD ATTACHMENT II

**Code:** AENV 3808

**NQF level:** 08

**Contact hours:** Six weeks of Field Attachment

**Credits:** 6

**Module assessment:** 40% (Field Attachment Seminar Presentations) 60% (Field attachment Reports)

**Prerequisites:** IES 3708: Field Attachment

**Module description (Content):**

At the end of the Third Year students will be attached to selected institutions or hands on experience. An attachment report and an oral presentation constitute the total assessment mark.

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**I.5.3.3.6 AENV 3892: MANAGEMENT OF ARID AND SEMI-ARID LANDS**

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**Module Title:** MANAGEMENT OF ARID AND SEMI-ARID LANDS

**Code:** AENV 3892

**NQF level:** 8

**Contact hours:** 03 lecture hours / week for 14 weeks 02 tutorial / practical hours per week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Prerequisites:** None

**Module description (Content):**

Characteristics of arid and semi-arid lands, hydrology, agrometeorology and water resource and utilization; Water harvesting for agricultural development. Land use practices; Desertification and land degradation in marginal lands; Traditional land use practices and prevention of land degradation. Biodiversity conservation, reclamation and sustainable economic exploitation of arid and semi-arid lands.

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**I.5.3.3.7 AENR 3892: RESOURCE PLANNING AND MANAGEMENT**

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**Module Title:** RESOURCE PLANNING AND MANAGEMENT

**Code:** AENR 3892

**NQF level:** 8

**Contact hours:** 03 lectures hours/week for 14 weeks; 02 practical hours/week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Pre-requisites:** None

**Module description (Content) :**

Theory in planning and theory of current theories of planning and their relevant application; planning tools and process; resource survey and analysis; methods of assessing a resource base and its socio-economic relations; physical, human and institutional resources; techniques of survey, analysis and classification of physical resources.

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**I.5.3.3.8 AENE 3882 : ENVIRONMENTAL IMPACT ASSESSMENT**

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**Module Title:** ENVIRONMENTAL IMPACT ASSESSMENT

**Code:** AENE 3882

**NQF level:** 8

**Contact hours:** 03 lectures hours/week for 14 weeks; 02 practical hours/week for 14 weeks

**Credits:** 12

**Module Assessment:** Continuous assessment (40%): at least three assessments; Examination (60%): 01 x 03 hour examination paper

**Pre-requisites:** None

**Module description (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 of their application, Choosing an appropriate methodology. Policy and Framework in Namibia: monitoring and quality control, role of Departmental Affairs; EIA in Namibia.

## **J. M. SC. RANGELAND RESOURCES AND MANAGEMENT**

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### **J.1 ADMISSION**

- J.1.1 The University of Namibia general regulations regarding admission of students to Masters Degree programmes shall apply.
- J.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.

### **J.2 ASSESSMENT**

The following were adopted to ensure high standards and competitive degree quality:

- J.2.1 A 3-hour theory examination at the end of each module;
- J.2.2 A pass mark of 60% for all modules, including the thesis;
- J.2.3 A weighting of 50:50 for continuous assessment (CA) and the final examination;
- J.2.4 At least 3 different continuous assessments for each module for core modules and 5 for generic modules;
- J.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 50% can write the final examination;
- J.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.
- J.2.7 A student can remain registered for a maximum of 4 years.
- J.2.8 Student will only be awarded MSc degree in Range Resource Management upon completion of all required modules with a pass mark of 60% or higher, including the thesis component.

### **J.3 DEGREE STRUCTURE**

The following will be the structure of the degree.

- J.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.
- J.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.
- J.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.
- J.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.
- J.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.
- J.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.
- J.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.
- J.3.8 Six core modules will be taught each semester with a week's break between the core teaching blocks.
- J.3.9 Core module examinations will be written immediately after the module, during the inter-block break.
- J.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.

### **J.4 TEACHING MODE**

This will include; lectures, field work, discussion seminars, case studies, group projects etc.

### **J.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.

J.6 PROGRAMME SCHEDULE

**M.SC. IN RANGELAND RESOURCES MANAGEMENT (M SC RR & M)**

J.6.1 FIRST YEAR

COURSE	CODE	COURSE TITLE	NQF LEVEL	L	P	CREDITS
<b>Semester 1</b>						
AASC	5910	Research/ Exp Design & Analysis	9	2	0.3	8
AASC	5930	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

**TOTAL SEMESTER 1 CREDITS 112**

**Semester 2**

AASC	5910	Research/ Exp Design & Analysis	9	2	0.3	8
AASC	5930	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

**TOTAL SEMESTER 2 CREDITS 100**

**TOTAL FIRST YEAR CREDITS 160**

J.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**

<b>YR 1</b>	<b>Semester 1</b>	
	<b>Subject</b>	<b>Comment</b>
	ASC 5910: Research / Exp Design & Analysis	Compulsory
	ASC 5930: 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
	<b>Semester 2</b>	
	ASC 5910: Research / Exp Design & Analysis	Compulsory
	ASC 5930: 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

## J.7 MODULE DESCRIPTORS: RANGELAND RESOURCES MANAGEMENT

### J.7.1 FIRST YEAR MODULES

#### J.7.1.1 AASC 5910: RESEARCH / EXPERIMENTAL DESIGN AND ANALYSIS

<b>Module Title</b>	<b>RESEARCH / EXPERIMENTAL DESIGN AND ANALYSIS</b>
<b>Code</b>	AASC 5910
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	
<b>Lecturers /week:</b>	
<b>Practicals/week:</b>	28 weeks (64 Contact Hours) compulsory

<b>Credits</b>	16
<b>Modules Assessment:</b>	Assessment: CA [50%] at least 5 assessment opportunities (e.g. tests; written assignments; reports; oral presentations). Final Exam [50%]: One 3 hour written examination.

<b>CA:</b>	50%
<b>Exam:</b>	50%

#### 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.

#### J.7.1.2 AASC 5930: GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING

<b>Module Title:</b>	<b>GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING</b>
<b>Code</b>	AASC5930
<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

**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** 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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### J.7.1.3 AASC 5981: INTRODUCTION TO INTEGRATED RESOURCES MANAGEMENT

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**Module Title** INTRODUCTION TO INTERGRATED RESOURCES MANAGEMENT

**Code** AASC5981

**NQA Level** 9

**National Professional 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.

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### J.7.1.4 AASC 5991: RANGELAND ECOSYSTEM STRUCTURE AND FUNCTION

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**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.

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#### J.7.1.5 AASD 5981: SOIL DYNAMICS

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<b>Module Title</b>	<b>SOIL DYNAMICS</b>
<b>Code</b>	AASD5981
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<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

##### 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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#### J.7.1.6 AASW 5981: WATER DYNAMICS

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<b>Module Title</b>	<b>WATER DYNAMICS</b>
<b>Code</b>	AASW 5981
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<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

##### 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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#### J.7.1.7 AASE 5981: ENVIRONMENTAL PHYSIOLOGY

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<b>Module Title</b>	<b>ENVIRONMENTAL PHYSIOLOGY</b>
<b>Code</b>	AASE 5981
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<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

#### **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.

### **J.7.1.8 AASL 5981: LAND USE PLANNING**

<b>Module Title</b>	<b>LAND USE PLANNING</b>
<b>Code</b>	AASL 5981
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	4 weeks (40 Contact Hours) elective
<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

#### **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.

### **J.7.1.9 AASF 5981: FODDER FLOW**

<b>Module Title</b>	<b>FODDER FLOW</b>
<b>Code</b>	AASF5981
<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

#### **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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#### J.7.1.10 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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#### J.7.1.11 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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#### J.7.1.12 AASC 5992: RANGELAND DEGRADATION AND ITS MITIGATION

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**Module Title** RANGELAND DEGRADATION AND ITS MITIGATION  
**Code** AASC 5992  
**NQA Level** 9  
**National Professional Standards Competencies** N/A  
**Contact Hours:** 4 weeks (40 Contact Hours) compulsory  
**Lecturers /week:**  
**Practicals/week:**  
**Credits** 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)**

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.

**J.7.1.13 AASN 5982: NUTRITION OF FORAGING ANIMALS**

<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

**Module Description (content)**

Nutritional diversity of rangeland forage. Define the term rangeland in its broad sense and give an overview of the feeding and nutrition of animal; discuss the species and diversity of range forages and their nutritive value. Discuss biotic factors including plants anatomy, differences in plant parts, plant age, stage of growth; and biotic factors including season of growth, range site conditions, stocking rate, livestock and wildlife species. Animal foraging behavior and diet selection: Diet selection and foraging behavior; wildlife feeding nutrition; factors affecting food availability, quantity and quality. Review the classification of range forage base, on their functional attributes and the types of foods eaten including bulk/ roughages grazers, concentrate selectors and intermediate feeders. Factors which influence diet selection of foraging animals. Determination of the amounts and quality of nutrients derived from grazing animal's diets. Foraging behavior of range animals including foraging tactics of range animals. Establish forage quality effects on foraging behavior of animals; Present and discuss the inherent factors which affect diet selection by foraging animals.

Range land animal nutritional requirements: The concept of animal nutritional requirements to support metabolic activities for normal health and vigor, growth rate, reproduction and or normal lactation levels; the roles and requirements of the most important nutrients essential for the metabolic activities of foraging animals. Discuss the three protein fractions when considering the protein requirements , soil and plant factors which affect mineral content of pastures; the important major minerals required for grazing stock production , role of anti – nutritional factors and their effects on nutritive value of forages.

**J.7.1.14 AASS 5982: SUSTAINABLE LIVELIHOODS**

<b>Module Title</b>	<b>SUSTAINABLE LIVELIHOODS</b>
<b>Code</b>	AASS 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>	

**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.

**J.7.1.15 AASR 5982: RANGE BIODIVERSITY AND CONSERVATION**

<b>Module Title</b>	<b>RANGE BIODIVERSITY AND CONSERVATION</b>
<b>Code</b>	AASR 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

#### **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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#### **J.7.1.16 AASE 5982: NATURAL RESOURCE ECONOMICS**

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<b>Module Title</b>	<b>NATURAL RESOURCE ECONOMICS</b>
<b>Code</b>	AASE5982
<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)**

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. RRM 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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#### **J.7.1.17 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

## J.7.2 SECOND YEAR: THESIS COMPONENT

### J.7.2.1 AASC 6910: RESEARCH PROJECT / THESIS

<b>Module Title</b>	<b>RESEARCH PROJECT/THESIS</b>
<b>Code</b>	AASC 6210
<b>NQA Level</b>	9
<b>National Professional Standards Competencies</b>	N/A
<b>Contact Hours:</b>	Second Year; compulsory
<b>Lecturers /week:</b>	
<b>Practicals/week:</b>	
<b>Credits</b>	128

#### **Modules Assessment:**

##### Thesis component

Only students who have successfully passed all coursework shall be allowed to undertake research in Range Resource Management. Each student is required to propose a topic and write a proposal for research before the end of the first year. The official registration for the thesis will depend upon acceptance of her/ his proposal by Postgraduate Students Committee.

Two (2) supervisors are recommended per student and the main supervisor must be from UNAM and must be a PhD holder. All 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.



**K. DIPLOMA IN AGRICULTURE (Old curriculum) {Neudamm & Ogongo Campus}****K.1 FIRST YEAR**

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
ACA	2100	Farm Duties	1.0			
ACB	2111	Computer Skills	2.25	14	35	49
ACB	2121	Mathematics	3.75	42	21	63
ACB	2131	Biology	2.25	21	21	42
ACB	2141	Chemistry	2.75	28	21	49
ACB	2151	English and Communication Skills	3.5	21	56	77
ACB	2161	Physics	1.5	14	14	28
AEN	2111	Surveying	1.75	14	21	35
ASC	2111	Animal Anatomy and Physiology	2.25	21	21	42
			<b>21.0</b>	<b>175</b>	<b>210</b>	<b>385</b>
Semester 2						
AEC	2112	Basic Concepts in Economics and Management	4.0	42	28	70
ASC	2112	Animal Nutrition	2.5	21	28	49
ASC	2122	Animal Reproduction and Breeding	2.5	21	28	49
ASC	2132	Introduction to Ecology	1.75	14	21	35
AEN	2112	Workshop Technology	2.5	14	42	56
CSC	2112	Principles of Crop Production	2.75	28	21	49
CSC	2122	Soil Science	3.5	28	42	70
			<b>19.5</b>	<b>168</b>	<b>210</b>	<b>378</b>
<b>TOTALS</b>			<b>40.5</b>	<b>343</b>	<b>420</b>	<b>763</b>

Field Attachment (six weeks)

**K.2 SECOND YEAR**

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
ACA	2200	Farm Duties	1.0			
ASC	2211	Range Management	2.25	21	21	42
ASC	2221	Animal Health I	2.0	14	28	42
CSC	2211	Crop Protection	3.5	28	42	70
NRO	2211	Introduction to Agroforestry	2.0	14	28	42
AEN	2211	Farm Power and Machinery	3.5	28	42	70
AEC	2221	Research Methodology	3.0	28	28	56
AEC	2221	Indigenous Resource Management and Rural Sociology	3.0	28	28	56
			<b>19.25</b>	<b>147</b>	<b>217</b>	<b>364</b>
Semester 2						
AEC	2212	Financial Management	3.0	28	28	56
ASC	2212	Range Management II	1.75	14	21	35
ASC	2222	Animal Health II	2.0	14	28	42
ASC	2232	Small Ruminant Production	1.75	14	21	35
ASC	2242	Dairy Production	1.5	14	14	28
CSC	2212	Vegetable and Fruit Production	4.0	28	56	84
AEN	2212	Land Use Planning	2.0	14	28	42
AEC	2212	Introduction to Extension	2.0	14	28	42
			<b>19.0</b>	<b>154</b>	<b>224</b>	<b>378</b>
<b>TOTALS</b>			<b>38.25</b>	<b>301</b>	<b>441</b>	<b>742</b>

Field Attachment (six weeks)

**K.3 THIRD YEAR**

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
ACA	2300	Farm Duties	1.0			
AEC	2311	Marketing Policy and Trade	2.75	28	21	49
ASC	2311	Beef Production	1.75	14	21	35
ASC	2321	Pelt and Fibre Production	1.75	14	21	35
ASC	2331	Pig Production	1.5	14	14	28
CSC	2311	Field Crops Production	3.5	28	50	78
AEN	2311	Animal Draft Power Technology	2.5	14	42	56
AEC	2341	Communications and Information Systems	2.0	14	28	42
AEN	2321	Soil and Water Management	3.5	28	42	70
			<b>20.25</b>	<b>154</b>	<b>239</b>	<b>393</b>
Semester 2						
AEC	2312	Extension System Approaches	2.0	14	28	42
AEC	2322	Personnel Management	1.5	14	14	28
AEC	2332	Introduction to Entrepreneurship	1.75	14	21	35
AEC	2342	Project Management	2.75	28	21	49
ASC	2312	Ostrich Production	1.5	14	14	28
ASC	2322	Game Farming	1.5	14	14	28
ASC	2332	Sustainable Resource Management	1.75	14	21	35
ASC	2342	Poultry Production	1.5	14	14	28
AEN	2312	Farm Structures	2.0	14	28	42
AEN	2322	Irrigation and Drainage	2.0	14	28	42
			<b>18.25</b>	<b>154</b>	<b>203</b>	<b>357</b>
<b>TOTALS</b>			<b>38.50</b>	<b>308</b>	<b>442</b>	<b>750</b>

## **K.4 MODULE DESCRIPTORS (BASIC STUDIES)**

### **K.4.1 ACB 2111: COMPUTER SKILLS**

Lectures: 1 hour/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Conduct in computer labs and neatness; Define a computer, describe a computer hardware, Types of computers; The international role players; Disk operating systems and application programmes; Description of the operating system in use ( Windows 9X and NT); Word processors; Spreadsheets; Presentations; Quick tasks; Desktop Publishing; Using the internet; Working with e- mail; Proper behavior and handling of equipment; Basic web page design; Winfeed; Rationmixer; Studmaster; Spreadsheets.

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### **K.4.2 ACB 2121: MATHEMATICS**

Lectures: 3 hours/week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Numbers, operations, percentages and conversion of fractions and decimals. Ratio, rate, proportion and scale. Measurements and conversion of units. Algebraic representation and formulae, equations. Geometrical terms and relationships. Indices. Mensuration. Bearings. Tables and graphs in practical situations. Trigonometry. Basic statistics: population and sampling, variation, regression, correlation.

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### **K.4.3 ACB 2131: BIOLOGY**

Lectures: 1½ hours / week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Classification and characteristics of living organisms, structure and organization of plant and animal cells, basic concepts of genetics. External and internal plant morphology, basic plant anatomy and physiology. Tissues, organs and systems in animals. Ecology and the balance of nature.

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### **K.4.4 ACB 2141: CHEMISTRY**

Lectures: 2 hours/ week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

The properties of matter, elements, atoms and molecules. Electronic bonding and stoichiometry. Acids and bases. Water, air and solutions. Redox reactions. Simple organic compounds and functional groups, introductory biochemistry.

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### **K.4.5 ACB 2151: ENGLISH AND COMMUNICATION SKILLS**

Lectures: 1½ hours/week  
Practicals: 4 hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Grammar: nouns, pronouns, verbs, tenses, articles, punctuation, sentence construction. Vocabulary, agricultural terminology. Using a dictionary, library and other sources of information. Communication: listening, speaking, reading, writing and studying skills.

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### **K.4.6 ACB2161: PHYSICS**

Lectures: 1½ hours/week  
Practicals: 1 hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Motion and friction, pressure, forces. Simple machines and devices: levers, pulleys, gears, velocity ratios. Heat, fuel and combustions. Basic principles of electricity. Introduction to engineering materials.

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## **K.5 MODULE DESCRIPTORS (AGRICULTURAL ECONOMICS)**

### **K.5.1 ACA 2100: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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#### **K.5.2 AEC 2112 : BASIC CONCEPTS IN ECONOMICS AND MANAGEMENT**

Lectures: 3 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition and scope of economics; Micro and Macro economics; Economic systems; Factors influencing demand and supply; Elasticity of demand and supply; establishing equilibrium prices; Price determination under different market structures; Production functions; cost concepts; optimal level of output; Four kinds of risk, sources of risk and uncertainty; National accounts; components of national income; Government taxation in Namibia; Money; Banking; Concepts of interest, inflation and deflation; The contribution of agriculture to the national economy; Distinction between the different types of agriculture

Management and the tasks of a manager; The eight functions of management; sole proprietorship; Partnership; Companies; Cooperatives; Close Corporations; The management of people; Managing the financial aspects of a farming enterprise; The concept of marketing; The role and importance of marketing; The cost aspects related to marketing; Government and the marketing of agricultural products; The production process; Establishment of production facilities; Productivity and quality control in production; Managing inventories. (students to be exposed to available computer soft ware).

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#### **K.5.3 ACA 2200: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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#### **K.5.4 AEC 2212: FINANCIAL MANAGEMENT**

Lectures: 2 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Management principles; Management functions; Objectives of financial management; The need for planning; Budget and record keeping; Economic efficiency and productivity; Insurance as a means of covering risk; Use of insurance premiums and benefits as cost items; The principle of the time value of money; Nominal and effective interest rates; Compounding and Discounting; Capital requirements; Credit Others means of financing; Positive and negative financial leverage; Leasing and renting of equipments or assets; Income tax; Cash flow statement; The balance statement; The income statement; The need for financial analysis of statements; The ratios used; The transfer of property; Different types of wills; The requirement of a business plan to obtain financing; The vision, mission and the strategy of the business.

#### **K.5.5 AEC 2222: RURAL SOCIOLOGY AND INDIGENOUS RESOURCE MANAGEMENT**

Lectures: 2 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition of Sociology and Rural Sociology; Relation of Anthropology to Rural Sociology; Types of communities in Namibia; Leadership structures in Namibian communities; Family types, marriages, marriage contracts, religious institutions, kinships; traditional healers, witchcraft – influence on development; Community based organizations (CBOs); non governmental organizations (NGOs), regional, national; The Namibia Land Tenure System, common resources; Property rights e.g land rights, inheritance; Legal status of groups and institutions; Land Reform policies and other agricultural policies; Characteristics of rural and urban areas; The interdependence between rural and urban communities; Rural –urban migration; Discuss the causes of rural-urban migration; Discuss the implications of rural – urban migration – socio-economic, cultural, demographic trends, environmental; Define HIV/AIDs, explain modes of transmission – impacts on agricultural production; Define agricultural extension – explain the significance of Rural Sociology to Agricultural Extension.

Definitions and concepts related to indigenous management system; Examples of indigenous agricultural and natural resources knowledge and management systems; Similarities and differences based on ethnic groups; Gender roles in agricultural and natural resources use; Cultural and socio-economic factors affecting agricultural and natural resources use; Comparison of the different institutions which influence sustainability of management systems both indigenous and non-indigenous; Incorporation of indigenous and non-indigenous systems in the management of natural resources.

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#### **K.5.6 AEC 2232: INTRODUCTION TO AGRICULTURAL EXTENSION**

Lectures: 1 hour/week  
Practicals: 2 hours /week

Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition of extension; Review of the historical background to extension; Functions of extension; The basic principles of extension; The concept of adult learning; Characteristics of adults as learners; Concepts of adoption and diffusion of innovations; Factors affecting adoption of innovations; The role of the extension worker in adoption and diffusion of innovations; Adoption and diffusion theory. Teaching methods and their descriptions: The concept of group dynamics and its importance in extension work; The "audio visual aid" concept; use of common types of audio visual aids; The gender concepts; The linkages between gender and extension Gender analysis framework; Gender as a development issue in agricultural extension How the extension worker can bring about change; The knowledge, personal and professional qualities and attitudes required of an extension officer.

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#### **K.5.7 AEC 2221: RESEARCH METHODOLOGY**

Lectures: 2 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition of research and 'agricultural research'; The need for and importance of research work; Types of research in agriculture; Definition of socio-economic indicators, rural communities; The composition of rural household, Data collection and the main types of data: Plan for data collection. Data collection methods: Concepts in surveys including sampling and non-sampling errors, advantages and disadvantages of surveys. Case studies; characteristics, advantages and disadvantages of case studies; Participant observation studies; Longitudinal studies; Diagnostic studies: The principles of a census; advantages and disadvantages of using a census; Participatory methods currently used in Namibia: PRA, FSR/E and how they are used. Data collection tools: questionnaires, interviews / schedules, attitude scales, PRA tools; the main principles of questionnaire design; pre-testing; Interview schedules; PRA tools commonly used in Namibia and their use. Phases of data processing. Linkage between questionnaire design and data processing. Analysis and interpretation of data. Report and presentation format. Release and circulation of reports;

The structure and organization of the research in Namibia; the National Agricultural Research Policy in the context of the overall national Agricultural Policy; the FSR/E and technology development. The setting the National Research Agenda in Namibia. The need for micro research and on-station and on-farm trials; The link between "FSR/E" and the national extension system. Methods used in estimating crop and livestock yields. Indigenous technical knowledge (ITK) approach and its value in research work; The Farmer Participatory Research (FPR) and Participatory Technology Development (PTD) approaches and their utility.

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#### **K.5.8 ACA 2300: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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#### **K.5.9 AEC 2321: INTRODUCTION TO ENTREPRENEURSHIP**

Lectures: 1 hour/week  
Practicals: 1½ hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

The characteristics of an entrepreneur; The management functions; Sources of capital (money); The type of business organizations; Strategic management as an approach to managing a business; The different dimensions of strategic issues; The three levels of strategy; The characteristics of SM decisions; The benefits and risks of SM; The components of the SM model; The SWOT analysis as a management tool; The remote environment; Industry environment; Operating environment; Components of the internal environment; Long term objectives; The three generic strategies; The grand strategies;; Business strategies; The feasibility study; Action plans and short term objectives; Functional tactics; Organizational structures; Organizational leadership New technology; Strategic controls.

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#### **K.5.10 AEC 2312 : PERSONNEL MANAGEMENT**

Lectures: 1 hour/week  
Practicals: 1 hour /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Personnel management in Namibia under the labour act; Traits of the personnel manager; Links between personnel management and the other management functions; The role and importance of organizational structures; staff requirements; Staff recruitment and selection; Labour contracts; Motivational theories; The link between motivation and compensation; Functions and responsibilities of leaders; Different styles of leadership; Delegating tasks and authority; Handling conflict in the work situation; Reasons for reducing staff; Possible reactions to dismissals.

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#### **K.5.11 AEC 2311: MARKETING, POLICY AND TRADE**

Lectures: 2 hours/week  
Practicals: 1½ hours /week

Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to agricultural marketing; Marketing objectives; The study of marketing; The marketing function; Marketing systems; Marketing agricultural and forestry products; Determining prices of agricultural and forestry products; Price fluctuations; Marketing alternatives and strategies; Market structures; The role of government in the past and the present; National marketing; Regional and international marketing; Futures markets in agriculture and forestry.

Definition of a policy; The general policy framework; The National Agricultural Policy; The national agricultural objectives; International trade and how it works; Differences between domestic, regional and international trade;

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#### **K.5.12 AEC 2322: PROJECT MANAGEMENT**

Lectures: 2 hours/week  
Practicals: 1½ hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Projects as means of developing rural areas; The project cycle; Managing the project cycle; Project appraisal-definition and objectives; Project review through main project elements; Technical, institutional, and managerial abilities; Management styles; Social; political; environmental Financial and economic; commercial; legal; gender; Project design and implementation; Timing; Responsibility; participants; Target group; Management structure; Resources; Training Handing over;; Definition of Project monitoring; efficiency indicators; Project evaluation –types, importance of project evaluation; Projects evaluation against. Impacts of projects; Examples of projects; Levels of planning of projects in Namibia; Sectoral planning and its links with the above; Project as related to programme and National Plans.

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#### **K.5.13 AEC 2341: COMMUNICATION AND INFORMATION SYSTEMS**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition of communication; SMCRE model of communication; The communication process; Writing and application of different types of reports and other forms of communication in the public service; Writing informative articles for local publications; Writing and designing of information sheets; and pamphlets for farmers; Writing of formal letters; Writing of CVs; Scientific writing; Guidelines for making an oral report for a particular audience; Rules of debating; Vertical and horizontal patents of communication in the public service; The interviewing technique; Library information search; on interviews, newspaper articles, magazines journals and internet; Extension campaigns; Organization of agricultural shows; and farmers days; Keeping of a filing system; The use of a telephone, fax machine, e- mail ; Handling of visitors; Planning , chairing and conducting of meetings; Compiling an agenda; Minutes taking and meeting follow up actions.

#### **K.5.14 AEC 2322: AGRICULTURAL EXTENSION SYSTEMS / APPROACHES**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Define the concept "agricultural extension system"; Define the concept 'Agricultural extension approach'; Define: model, system, approach, strategy; Discuss the use of the terms 'systems' and 'approaches'; List the different systems/approaches: conventional agricultural extension, commodity, training and visit, farming systems, project, cost sharing, community based organization (CBO); For each of the approaches describe: history, general principles, characteristics, strengths and weaknesses, main beneficiaries, applicability, types and linkages.

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### **K.6 MODULE DESCRIPTORS (ANIMAL PRODUCTION)**

#### **K.6.1 ACA 2100: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

#### **K.6.2 ASC2111: ANIMAL ANATOMY AND PHYSIOLOGY**

Lectures: 1 ½ hours/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Terminology. Histology of epithelial, connective, muscular, nervous and lipid tissues. Pre- and post-natal growth and development. Body systems of ruminant and mono-gastric animals: skeletal, muscular, integumentary, cardiovascular, respiratory, gastro-intestinal and digestive, reproductive, endocrine, urinary and nervous systems. Avian anatomy, digestive and reproductive systems and physiology.

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**K.6.3 ASC2112: ANIMAL NUTRITION**

Lectures: 1 ½ hours/week  
Practicals: 2 hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Nutrients and the composition of feeds: water, carbohydrates, lipids, proteins, vitamins and minerals. Feeds and feedstuffs: roughage, concentrates, supplements, feed additives, growth promotants and performance manipulants. Farm processing of feeds. Basic feed formulation. Practical feeding of farm animals for production objectives: feeding and supplementing the grazing ruminant, fertility, growth, feedlot-finishing, draught power, milk, egg, pelt and fibre production, drought feeding. Nutrition and product quality, ethical considerations and consumer preferences.

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**K.6.4 ASC2122: ANIMAL REPRODUCTION AND BREEDING**

Lectures: 1 ½ hours/week  
Practicals: 2 hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Review of basic genetic concepts in farm animals. The phenotype of farm animals: traits of economic importance, genotype and the effect of environment, genotype-environment interactions, heritability and correlated traits. Selection methods and breeding systems. Breeding strategies for farm animals. Body condition scoring and its effect on reproduction. Reproduction technology: artificial insemination, multiple ovulation and embryo transfer, genetic engineering and other techniques.

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**K.6.5 ASC2132: INTRODUCTION TO ECOLOGY**

Lectures: 1 hour/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Components of the natural environment. Ecosystems of arid zones: terrestrial, freshwater and marine. Ecosystem processes: the food chain, water cycle, nutrient and energy cycles. Biomes of southern Africa, characteristics of savannas, veld types of Namibia. Vegetation dynamics: vegetation change, plant succession, retrogression and disequilibrium theories, and deforestation. Wild and domestic animals in the ecosystem: competition, predation, facilitation and ecological separation. Plant-animal interaction. Biodiversity. Conservation in Namibia.

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**K.6.6 ACA 2200: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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**K.6.7 ASC2211: RANGE MANAGEMENT I**

Lectures: 1 ½ hours/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Objectives of range management, current condition of Namibia's range. Rangeland terminology. Identification of the major forage species. Growth cycle of plants. Natural, traditional and modern defoliation systems, defoliation habits of wild and domestic animals. Rangeland degradation and rehabilitation. Management during a drought.

**K.6.8 ASC2221: ANIMAL HEALTH I**

Lectures: 1 hour/week  
Practicals: 2 hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Animal health in Namibia. Common parasites of livestock: morphology, life cycle, symptoms, treatment and control of blood, internal and external parasites. Poisoning by chemicals and plants. Active and passive immunity, vaccination. Drugs: types, management, residues, legislation. Clinical and post mortem examination of animals.

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**K.6.9 ASC2212: RANGE MANAGEMENT II**

Lectures: 1 hour/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Carrying capacity: techniques and calculations. Range and grazing records. Range inventory, monitoring techniques. Integrated fodder flow planning.

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#### **K.6.10 ASC2222: ANIMAL HEALTH II**

Lectures: 1 hour/week  
Practicals: 2 hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Techniques of treatment and sterilization. First aid to farm animals. Reproduction disorders and diseases including peri-natal diseases. Diseases caused by internal parasites in ruminants, pigs, equines and poultry. Infectious diseases of livestock, including mastitis. State control (notifiable diseases). Disease prevention and herd health programs.

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#### **K.6.11 ASC2232: SMALL RUMINANT PRODUCTION**

Lectures: 1 hour/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of small ruminant production in Namibia. Breeds. Products and byproducts. Facilities and handling. Management: sexual activity and fertility, flock composition, management targets and calendar, herd health, diversification. Product quality. Factors affecting slaughter lamb production. Record keeping, future prospects.

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#### **K.6.12 ASC2242: DAIRY PRODUCTION**

Lectures: 1 hour/week  
Practicals: 1 hour/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of dairying in Namibia. Breeds. Production systems, management of lactating and dry cows, rearing replacement heifers. Metabolic diseases and herd health. Facilities and handling. Milk extraction, quality and processing. Record keeping and future prospects.

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#### **K.6.13 ACA 2300: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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#### **K.6.14 ASC2311: BEEF PRODUCTION**

Lectures: 1 hour/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of beef production in Namibia. Breeds. Production systems and management. Management targets and calendar. Slaughtering process, farm processing of products, product quality. Facilities and handling. Record keeping and future prospects.

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#### **K.6.15 ASC2321: PELT AND FIBRE PRODUCTION**

Lectures: 1 hour/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of pelt and fibre production in Namibia, historical review. Breeds. Histology of the skin, fibre and fleece properties, lamb and pelt description, photography and judging. Genetic and environmental factors affecting pelt, fibre and fleece properties. Management of small ruminants for fleece and pelt production. Product quality. Facilities and handling. Record keeping and future prospects.

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#### **K.6.16 ASC2331: PIG PRODUCTION**

Lectures: 1 hour/week  
Practicals: 1 hour/week

Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of pig production in Namibia. Breeds. Production systems and management. Facilities, handling, slaughtering and product quality. Record keeping and future prospects.

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#### **K.6.17 ASC2312: GAME RANCHING**

Lectures: 1 hour/week  
Practicals: 1 hour/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Potential and constraints of game ranching in Namibia. Identification, ecology and management of suitable game species. Management of the game ranch: game populations, environment, production, financial and marketing management. Product diversity and quality control. Conservancies. Future prospects.

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#### **K.6.18 ASC2322: OSTRICH PRODUCTION**

Lectures: 1 hour/week  
Practicals: 1 hour/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of ostrich production in Namibia, historical review. Production systems and management of ostriches for egg, skin, meat and feather production. Diversification options, product quality. Flock health and biosecurity. Facilities and handling. Record keeping and future prospects.

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#### **K.6.19 ASC2332: POULTRY PRODUCTION**

Lectures: 1 hour/week  
Practicals: 1 hour/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of poultry production in Namibia. Breeds. Production systems, management of broilers and layers. Product quality. Facilities and handling. Record keeping, future prospects.

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#### **K.6.20 ASC2342: SUSTAINABLE RESOURCE MANAGEMENT**

Lectures: 1 hour/week  
Practicals: 1 ½ hour/week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Principles of sustainable environmental and resource management: sustainable utilization, preservation of resources, social acceptability, and economic feasibility. The chain of production. Investigating the sustainability of current agricultural resources and practices in Namibia. Land and resource use policies. Resource economics: valuation, product development, quality control, developing markets and niche markets, marketing of products.

### **K.7 MODULE DESCRIPTORS (CROP SCIENCE)**

#### **K.7.1 ACA 2100: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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#### **K.7.2 CSC 2112: PRINCIPLES OF CROP PRODUCTION**

Lectures: 2 hours/week  
Practicals: 1½ hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Crop environment in Namibia; Botany of crops – plant cells, structure and function of plants, growth processes, plant competition, botanical classification of plants; Crop improvement:- breeding methods; tillage practices; Crop establishment practices- land preparation, sowing,; crop nutrition, soil classification; soil fertility and physical factors; cropping systems: harvesting, handling and storage.

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#### **K.7.3 CSC 2122: SOIL SCIENCE**

Lectures: 2 hours/week



Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition and importance of soil; Soil formation: types of rocks, weathering processes; Soil physical properties: sampling, profile, texture, structure, effects of cultivation, soil compaction, consistency, aeration, soil/plant/water relationship, soil temperature, soil colour. Organic components of soil. Soil nutrients and plant growth. Manure and fertilizers.

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#### **K.7.4 ACA 2200: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

#### **K.7.5 CSC 2211: CROP PROTECTION**

Lectures: 2 hour/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition of pests: production pests, storage pests. Importance in crop production, characteristics and classification of insects; Fungi; Bacteria; Viruses; nematodes. Weeds: definition; characteristics, effects of weeds on crops, common weeds. Methods of crop protection and their application. Integrated pest management (IPM); Crop protection legislation.

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#### **K.7.6 CSC 2212: VEGETABLE AND FRUIT PRODUCTION**

Lectures: 2 hours/week  
Practicals: 4 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Importance of vegetables, nursery practices. Kinds of vegetables: leafy, root, and fruit vegetables; legumes, runner crops and indigenous vegetables: environmental requirements, selection of suitable cultivars, establishment and management practices, methods of weed, pest and disease control, harvesting and handling. Economic and dietary importance of fruits. Nursery practices/technology: nursery establishment, soil sterilization, and propagation methods. Different fruit trees: grapes, peaches, figs, citrus, dates, mangos, pawpaws. Indigenous trees (embe, marula, makalani): environmental requirements, planning, establishment, management practices, harvesting, post harvest technology, marketing.

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#### **K.7.7 ACA 2300: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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#### **K.7.8 CSC 2311: FIELD CROP PRODUCTION**

Lectures: 2 hours/week  
Practicals: 3 hours /week (Plus 8 hours outing practical)  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Cereals (maize, millet, sorghum, wheat, rice), legumes (bambara nuts, cowpeas); fibre (cotton), oilseed (groundnuts, soyabeans, castor), root crops (Irish potato, sweet potato, cassava). Importance of these crops, Description, botanical names, morphological features, cultivars. Ecology: environmental requirements. Production practices: Land preparation, cropping systems; weed, pest and disease control, harvesting and post harvest technology.

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### **K.8. MODULE DESCRIPTORS (AGRICULTURAL ENGINEERING)**

#### **K.8.1 ACA 2100: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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**K.8.2 AEN2111: SURVEYING**

Lectures: 1 hour/week  
Practicals: 1½ hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Measurements: linear, angular; Types of Surveys: Baseline, tape and offset, basic triangulation, planimeter; Area/Volume Measurements; Leveling: Instruments, procedures, booking methods; Leveling methods: Longitudinal, sections, contour, grid; Positioning and orientation systems: GPS, gyroscope, prismatic, traverse.

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**K.8.3 AEN2112: WORKSHOP TECHNOLOGY**

Lectures: 1 hour/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction; Workshop safety; Hand tools; Workshop materials; Basic Technical Drawing; Workshop Equipment (vices, shears, lifting devices, benders – usage, care, handling, safety); Power Tools (drills, grinders, power saw, compressors, lathe and milling machines); Joining and assembly of metals and non metals (welding – gas/arc, soldering, threading – nuts/bolts, fasteners- rivets, glues, screws, bolts and nuts).

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**K.8.4 ACA 2200: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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**K.8.5 AEN 2211: FARM POWER AND MACHINERY**

Lectures: 2 hours/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Sources of Farm Power; Internal Combustion Engine; Engine Systems; Tractor Systems; Tractor Operation; General Tractor Maintenance, Tractor operation and safety; Soil Tillage; Primary Tillage; Secondary Tillage; Planting Equipment; Soil Improvement Equipment; Crop Protection Equipment; Harvesting Equipment; Handling, Processing and Storage Equipment; Farm Machinery Management.

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**K.8.6 AEN 2212: LAND USE PLANNING**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Overview of land use planning; land tenure systems; factors affecting land use; Land capability assessment (methodologies, data collection techniques – transects, images, questionnaires, aerial photos etc); Land suitability classification, land use planning; environmental impact assessment.

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**K.8.7 ACA 2300: FARM DUTIES**

Fourteen weeks of Farm Duties

At the beginning of the First Year, all Diploma students will undertake one hour farm duties per week for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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**K.8.8 AEN 2311: ANIMAL DRAFT POWER TECHNOLOGY**

Lectures: 1 hour/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Overview of DAP, DAP adoption and use, selection of draft animals (selection criteria, screening stages); Training of DAP (trainers approach, training procedures); Harnesses and harnessing; Equipment and Implements for DAP; Field Practical in the use, operation and management of DAP.

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**K.8.9 AEN 2321: SOIL AND WATER MANAGEMENT**

Lectures: 2 hour/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

The hydrological cycle, water sources, water uses and requirement; water harvesting and storage; Hydraulic principles; open channel flow, pipes and pipe system; pumps and pumping; principles of soil erosion; water erosion process; Soil loss estimation; water erosion control; wind erosion processes and control; social, economical and institutional factors in soil conservation planning.

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**K.8.10 AEN 2312: FARM STRUCTURES**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Farmstead planning; plans and drawings; Construction materials; Building procedures and tools (setting out, excavation, construction elements, bricklaying, plastering) structures for specific purposes (farmstead, livestock, crop storage, green houses); Buildings economics and standards (bill of quantities, specifications).

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**K.8.11 AEN 2322: IRRIGATION AND DRAINAGE ENGINEERING PRINCIPLES AND PRACTICES**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Overview of irrigation in Namibia; Soil/Plant/Water relationships (review); suitability of land for irrigation; Crop water requirements (review); irrigation methods (surface, sprinkler, drip); Irrigation water management; Irrigation delivery systems; Drainage of irrigated land; Field visit.

**L. DIPLOMA IN FORESTRY (Old Curriculum) {Ogongo Campus}****L.1 FIRST YEAR**

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
ACA	2100	Farm Duties	1.75	0	49	49
ACB	2121	Computer Skills	2.5	14	42	56
ACB	2131	Agricultural Mathematics and Statistics	4.0	42	28	70
ACB	2111	English Communication and Study Skills	3.5	21	56	77
NRO	2111	Introduction to Ecology and Climatology	2.75	21	35	56
ASC	2121	Rangeland Ecology	2.25	21	21	42
AEN	2111	Surveying	1.75	14	21	35
CSC	2111	Principles of Crop Production	3.0	28	28	56
AEN	2121	Fundamentals of Agricultural Engineering	1.5	14	14	28
			19.5	183	286	469
Semester 2						
ACA	2100	Farm Duties	1.75	0	49	49
AEC	2122	Basic Concepts in Economics	3.0	28	28	56
CSC	2111	Principles of Crop Production	3.0	28	28	56
ASC	2112	Animal Production	1.5	14	14	28
AEC	2112	Rural sociology and Indigenous Resource Mgt	3.0	28	28	56
NRO	2112	Silviculture I	4	28	56	84
CSC	2112	Soil Science	3.5	28	42	70
NRO	2122	Wildlife Ecology and Management	1.75	14	21	35
			18.75	140	238	378
<b>TOTALS</b>			<b>38.25</b>	<b>323</b>	<b>524</b>	<b>847</b>

Field Attachment (six weeks)

**L.2 SECOND YEAR**

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
ACA	2100	Farm Duties	1.75	0	49	49
NRO	2211	Plant Taxonomy	2.25	14	35	49
NRO	2221	Forestry Entomology and Pathology	3	28	28	56
NRO	2231	Silviculture II	3	38	25	63
ASC	2221	Range Management	2.25	21	21	42
AEC	2211	Personal Management	1.5	14	14	28
NRO	2211	Introduction to Agroforestry	3.0	28	28	56
AEC	2221	Research Methodology	3.0	28	28	56
NRO	2241	Ergonomics and Forestry Equipment	2.25	14	35	49
AEN	2211	Basic Motor Mechanics	2.25	14	35	49
			21.75	185	291	476
Semester 2						
ACA	2100	Farm Duties	1.75	0	49	49
AEC	2212	Financial Management	3.0	28	28	56
AEC	2222	Principles of Extension Systems and Approaches	3.0	28	28	56
NRO	2212	Forest and Range Fires	3.25	28	35	63
NRO	2232	Forest Mensuration and Inventory	2.5	14	42	56
NRO	2242	Structure and Properties of Wood	2	14	28	42
			13.75	112	210	322
<b>TOTALS</b>			<b>35.5</b>	<b>297</b>	<b>501</b>	<b>798</b>

Field Attachment (six weeks)

**L.3 THIRD YEAR**

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
ACA	2100	Farm Duties	1.75	0	49	49
ACA	2300	Special study Project	1.25	0	35	35
AEC	2321	Communication and Information Systems	3.0	28	28	56
NRO	2311	Community Forestry	2	27	18	45
AEN	2311	Soil and Water Management	3.5	28	42	70
AEN	2321	Farm Structures	2.0	14	28	42
NRO	2321	Forest Harvesting	2.25	14	35	49
NRO	2331	Forest Economics	2	14	28	42
NRO	2331	Forest Economic	2	14	28	42
			16.25	139	277	416
Semester 2						
ACA	2102	Farm Duties	1.75	0	49	49
ACA	2300	Special study Project	1.25	0	35	35
AEC	2341	Forest Utilization	4	28	56	84
AEC	2312	Introduction to Entrepreneurship	1.75	14	21	35
AEC	2322	Project Management	2.0	14	28	42
NRO	2312	Integrated Forest Management	3.5	28	56	84
NRO	2322	Forest Policy and Law	2.5	28	14	42
			15.5	112	259	371
<b>TOTALS</b>			<b>31.75</b>	<b>251</b>	<b>536</b>	<b>787</b>

## L.4 MODULE DESCRIPTORS (BASIC STUDIES)

### L.4.1 ACB 2111: COMPUTER SKILLS

Lectures: 1 hour/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Conduct in computer labs and neatness; Define a computer, describe a computer hardware, Types of computers; The international role players; Disk operating systems and application programmes; Description of the operating system in use (Windows 9X and NT); Word processors; Spreadsheets; Presentations; Quick tasks; Desktop Publishing; Using the internet; Working with e- mail; Proper behavior and handling of equipment; Basic web page design; Winfeed; Rationmixer; Studmaster; Spreadsheets.

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### L.4.2 ACB 2121: MATHEMATICS AND STATISTICS

Lectures: 3 hours/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Numbers, operations, percentages and conversion of fractions and decimals. Ratio, rate, proportion and scale. Measurements and conversion of units. Algebraic representation and formulae, equations. Geometrical terms and relationships. Indices. Mensuration. Bearings. Tables and graphs in practical situations. Trigonometry. Basic statistics: population and sampling, Measures of central tendency: mean, mode, median, range, standard deviation, variation, regression, correlation.

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### L.4.3 ACB 2131: BIOLOGY

Lectures: 1½ hours / week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Classification and characteristics of living organisms, structure and organization of plant and animal cells, basic concepts of genetics. External and internal plant morphology, basic plant anatomy and physiology. Tissues, organs and systems in animals. Ecology and the balance of nature. Ecosystem process: food chain, water cycle, nutrient and energy cycle. Biodiversity

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### L.4.4 ACB 2141: ENGLISH AND COMMUNICATION SKILLS

Lectures: 1½ hours/week  
Practicals: 4 hours/week  
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practical 60%.

Grammar: nouns, pronouns, verbs, tenses, articles, punctuation, sentence construction. Vocabulary, agricultural terminology. Using a dictionary, library and other sources of information. Communication: listening, speaking, reading, writing and studying skills.

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## L.5 MODULE DESCRIPTORS (FORESTRY)

### L.5.1 ACA 2100: FARM DUTIES

Lectures: 0 hour/week  
Practicals: 1 hour /week  
Assessment: Pass or Fail

At the beginning of the First Year, all Diploma students will undertake fourteen hours of farm duties per academic year for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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### L.5.2 NRO 2111: INTRODUCTION TO ECOLOGY AND CLIMATOLOGY

Lectures: 2 hours/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to ecology: role of forests in the environment. Concepts of ecology. Ecosystems of arid zones: terrestrial, freshwater and marine. Constituents of the ecosystem: Abiotic and biotic components. Nutrient cycles: Food chain, Nitrogen cycle, Phosphorus cycle and carbon cycle. Plant succession. Ecosystem disturbance. Ecosystem maintenance/conservation. Introduction to climatology. Elements of climate. Ocean currents and air masses. Climatic classification. Climate of Namibia. Microclimate. Hydrological cycle. Climate and vegetation. Climatic changes.

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**L.5.3 NRO 2112: SILVICULTURE I**

Lectures: 2 hours/week  
Practicals: 4 hours /week  
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

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. Nursery tending operation. Nursery protection. Seedling distribution. Nursery records. Nursery planning, work organization and administration.

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**L.5.4 NRO 2122: WILDLIFE ECOLOGY AND MANAGEMENT**

Lectures: 1 hour/week  
Practicals: 3 hours alternate weeks  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to Wildlife management, Wildlife in Namibia, Wildlife and range management, Wildlife ethology, Wildlife surveys, Population dynamics, Wildlife utilization, Wildlife and other land uses and Wildlife conservation. Wild and domestic animals in the ecosystem; competition, predation, facilitation and ecological separation. Plant animal interaction. Conservation in Namibia.

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**L.5.5 NRO 2132: FIELD ATTACHMENT**

Six weeks of field attachment

At the end of the second semester students will be attached to selected institutions for hands on experience. An attachment report and an oral presentation will constitute the total assessment mark.

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**L.5.6 ACA 2200: FARM DUTIES**

Lectures: 0 hour/week  
Practicals: 1 hour /week  
Assessment: Pass or Fail

All Diploma students will undertake fourteen hours of farm duties per academic year for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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**L.5.7 NRO 2211: PLANT TAXONOMY (DENDROLOGY)**

Lectures: 1 hour/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (2 hrs) 40%; Tests, Assignments and practicals 60%.

Introduction to plant taxonomy. Taxonomy: taxonomic concepts, plant classification, nomenclature. Tree identification. Botanical keys: types and use. Specimen collection. Important families: Fabaceae (3 sub-families), Euphorbiaceae, Rubiaceae, Combretaceae.

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**L.5.8 NRO 2221: FOREST ENTOMOLOGY AND PATHOLOGY**

Lectures: 2 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Introduction to Forest Entomology, General insect biology, Insect classification, Insects as pests, Beneficial insects, Insects in Namibian Forests, Preventive and control measures, Introduction to Forest Pathology, Non-infectious agents and diseases, Infectious agents and diseases, Diseases caused by fungi, Beneficial fungi and Disease prevention and control.

**L.5.9 NRO 2231: SILVICULTURE II**

Lectures: 2 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Importance of trees and forests. Land preparation. Establishment techniques. Weeding operation: Pruning operation. Thinning operation: reasons for thinning, thinning intensity and timing, thinning regimes, methods of thinning. Protection. Introduction to silvicultural systems. Silvicultural systems: high forest systems, coppice systems and agroforestry systems. Factors affecting the selection of a silvicultural system. Introduction to tree breeding: Species trial selection, provenance trial (with specific reference to the performance of trials in Namibia), clones for genetic improvement, progeny testing.

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#### **L.5.10 NRO 2241: ERGONOMICS & FOREST EQUIPMENTS**

Lectures: 1 hour/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to ergonomics and safe working techniques. Safety laws and regulations. Basic first Aid. Introduction to tools and machinery: General description of forestry tools and machinery. Basic hand tools and accessories: Edged tools, handsaws, other tools and accessories. Forestry machines: chain saw, farm tractors, forestry tractors and hi-tech machinery.

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#### **L.5.11 NRO 2212: FOREST AND RANGE FIRES**

Lectures: 2 hours/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to forest and range fires: Significance of 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, Fire prevention, Fire detection, Fire suppression, Uses of fire in forest management, Fire control organization and Safety and survival methods.

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#### **L.5.12 NRO 2222: AGROFORESTRY**

Lectures: 2 hours/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

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. Agroforestry establishment techniques. Ecological and economic interactions. Bee keeping. Indigenous fruit trees. Research in agroforestry. Agroforestry project work: Case studies

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#### **L.5.13 NRO 2232: FOREST MENSURATION AND INVENTORY**

Lectures: 1 hour/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to forest mensuration and inventory. Forest mensuration system, concepts and models. Tree measurement: measurement and computation of tree characteristics. Stand measurement. Forest inventory: inventory methods and designs, sampling, result reporting. Inventories in large forest areas: national forest inventory. Growth and yield.

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#### **L.5.14 NRO 2242: STRUCTURE AND PROPERTIES OF WOOD**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction: Importance and consumption of wood in the world and in Namibia. Gross and cellular structure of wood. Molecular and chemical structure of wood. Variability in structure of wood. Wood identification. Properties of wood and their influence on structure and utilization: Wood appearance, wood density, wood moisture relationship, and dimensional changes. Properties of Wood: physical, mechanical and thermal and electrical properties.

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#### **L.5.15 NRO 2252: FIELD ATTACHMENT**

Six weeks of field attachment

At the end of every second semester in first and second year of study, students will be attached to selected institutions for hands on experience. An attachment report and an oral presentation will constitute the total assessment mark.

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**L.5.16 ACA 2300: FARM DUTIES**

Lectures: 0 hour/week  
Practicals: 1 hour /week  
Assessment: Pass or Fail

All Diploma students will undertake fourteen hours of farm duties per academic year for the next three years. These duties will be undertaken on the campus farms at Neudamm and Ogongo, involving all activities undertaken at the two farms. The farm duties will be geared toward developing students' manual dexterity and skills, and will be assessed on a pass-fail basis. One credit hour will be awarded for this work. Assessment will be based on attendance at duty stations, participation/completion of tasks and attitudes towards work.

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**L.5.17 NRO 2311: COMMUNITY FORESTRY**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Rural development concepts and principles, community forestry history, definition and approaches, interlinkages with other sectors. Rural livelihood strategies. Aims and objectives of community forestry. Policy/strategies frame relevant to community forestry. Technical and management alternatives in integrated forest management. Conflict management in community forestry. Case studies of community forestry. Introduction to community based management of natural resources.

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**L.5.18 NRO 2321: FOREST HARVESTING**

Lectures: 1 hour/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to forest harvesting: Objectives, methods and systems in forest harvesting. Planning the technology and the logging site in exotic plantations and indigenous forests: Planning, technical, economic and environmental factors. Harvesting operations: Use of chain saws and Hand tools in the different phases of logging operations. Timber measurement. Logging costs. Extraction. Transport. Introduction to forest construction. Construction of roads: planning, construction techniques. Maintenance of roads

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**L.5.19 NRO 2331: FOREST ECONOMICS**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Review of economic principles: Costs of production, price formation, capital and interest, depreciation. Economic analysis: Investment analysis, productivity, economic efficiency. Forest management economics: value of the land, value of the forest. Marketing: products, marketing conditions, marketing strategy and marketing in the forest industry.

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**L.5.20 NRO 2341: WOOD UTILIZATION**

Lectures: 2 hours/week  
Practicals: 4 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to wood processing & utilization in Namibia and in the world. Charcoal production. Sawmilling. Wood based materials. Wood products. Pulp and paper industry. Carpentry. Deterioration of wood. Wood preservation: preservatives, principles and methods of preserving wood. Wood seasoning: principles, methods of drying and seasoning defects. Introduction to non-wood forest products. Importance of forest for traditional and non-wood products. Non-wood products: products and uses. Management: sources of non-wood products, markets.

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**L.5.21 NRO 2322: FOREST POLICY AND LAW**

Lectures: 2 hours/week  
Practicals: 1 hour /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to Forest Policy and Law: definition, objectives and strategies of formulating the policy, Introduction to natural resources policies, laws and international conventions. National development forest policy for namibia, forest policy and law. Forest policy. Principal legislation. Subsidiary legislation. Forest act and other related acts. Legal procedures. Indigenous laws of Namibia related to environment conservation.



### **L.5.22 NRO 2312: INTEGRATED FOREST MANAGEMENT**

Lectures: 2 hours/week  
Practicals: 4 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to forest management: definition and approaches. Forest resources and data, objective formulation of forest management plan, modules used. Planning concepts and methods in forest management: sustainability, rotation, normal forest, growth and yield, operational planning. Components of integrated forest management and their integration. Integrated forest management processes. Methodologies for integrated forest management plan formulation. Integrated forest management plan.

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### **L.5.23 NRO 2300: SPECIAL STUDY PROJECT**

Lectures: 0 hours/week  
Practicals: 2 hours / week for the whole year

Students will carry out a project work in any area of interest under the supervision of a competent academic staff. Project write-up and oral presentation will constitute total assessment mark

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## **L.6 MODULE DESCRIPTORS (AGRICULTURAL ECONOMICS)**

### **L.6.1 AEC 2112: BASIC CONCEPTS IN ECONOMICS**

Lectures: 2 hours/ week  
Practicals: 2 hours/week  
Assessment: One Exam Paper (3 hours) 40%: Tests, Assignment and Practical 60%

Definition and scope of economics; Micro and Macro economics; Economic systems; Factors influencing demand and supply; Elasticity of demand and supply; establishing equilibrium prices; Price determination under different market structures; Production functions; Cost concepts; optimal level of output; Four kinds of risk, sources of risk and uncertainty; National accounts; components of national income; Government taxation in Namibia; Money; Banking; concepts of interest, inflation and deflation; The contribution of agriculture to the national economy; Distinction between the different types of agriculture.

The production process; Establishment of production facilities; Productivity and quality control in production; Managing inventories (Students to be exposed to available computer soft ware).

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### **L.6.2 AEC 2212: FINANCIAL MANAGEMENT**

Lectures: 2 hours/ week  
Practicals: 2 hours/week  
Assessment: One Exam Paper (3 hours) 40%: Tests, Assignment and Practical 60%

Management principles; Management functions; Objectives of financial management; The need for planning; Budget and record keeping; Economic efficiency and productivity; Insurance as a means of covering risk; Use of insurance premiums and benefits as cost items; The principle of time value of money, Nominal and effective interest rates; Compounding and Discounting; Capital requirement; Credit Others means of financing; Positive and negative financial leverage; Leasing and renting of equipment or assets; Income tax; Cash flow statement; The balance statement; The income statement; The need for financial analysis of statements; The ratios used; The transfer of property; Different types of wills; The requirement of a business plan to obtain financing; The vision, mission and the strategy of the business.

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### **L.6.3 AEC 2212: RURAL SOCIOLOGY AND INDIGENOUS RESOURCE MANAGEMNT**

Lectures: 2 hours / week  
Practical: 2 hours/week  
Assessment: One Exam Paper (3 hrs) 40%, Test, Assignments and practical 60%

Definition of sociology and Rural Sociology, Relation of Anthropology to Rural Sociology, Types of communities in Namibia, Leadership structures in Namibia communities, Family types, marriages, marriage contracts, religious institutions, kinships, traditional healers, traditional beliefs and their influence on development, community based organizations (CBOs), non governmental organizations (NGOs), regional, national; The Namibia Land Tenure System, common resources, Property rights e.g. land rights, inheritance, legal status of groups and institutions, Land Reform policies and other agricultural policies, characteristics of rural and urban areas; The interdependence between rural and urban communities; Rural-urban migration; Discuss the causes of rural-urban migration; Discuss the implications of rural –urban migration –socio-economic, cultural , demographic trends, environmental; Define HIV/AIDS, explain modes of transmission- impacts on agricultural production ; Define agricultural extension- explain the significance of Rural Sociology to Agricultural Extension.

Definitions and concepts related to indigenous management systems, examples of indigenous agricultural and natural resources knowledge and management systems, similarities and differences based on ethnic groups; gender roles in agricultural and natural resources use , cultural and socio-economic factors affecting agricultural and natural resources use; comparison of the different institutions which influence sustainability of management systems both indigenous and non- indigenous; incorporation of indigenous and non-indigenous systems in the management of natural resources.

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#### **L.6.4 AEC 2232: AGRICULTURAL EXTENSION AND APPROACHES**

Lectures: 2 hours / week  
Practical: 2 hours/week  
Assessment: One Exam Paper (3 hrs) 40%, Test, Assignments and practical 60%

Definition of extension; Review of the historical background to extension; Functions of extension; the basic principles of extension; The concept of adult learning; Characteristics of adults as learners; Concepts of adoption and diffusion of innovations; Factors affecting adoption of innovations; The role of the extension worker in adoption and diffusion of innovations; Adoption and diffusion theory. Teaching methods and their descriptions: The concept of group dynamics and its importance in extension work; The "audio visual aid" Concept; use of common types of audio visual aids; The gender concepts; The linkages between gender and extension Gender analysis framework; Gender as a development issue in agricultural extension how the extension worker can bring about change; The knowledge; personal and professional qualities and attitudes required of an extension officer.

Define the concept "agricultural extension system" Define the concept Agricultural Extension approach; define: system, approach, strategy; list the different systems/ approaches: commodity, farming systems, project, community based organization (CBO) For each of the approaches describe: history, general principal, characteristics, strengths and weakness, main beneficiaries, applicability, types and linkages.

#### **L.6.5 AEC 2221: RESEARCH METHODOLOGY**

Lectures: 2 hours / week  
Practical: 2 hours/week  
Assessment: One Exam Paper (3 hrs) 40%, Test, Assignments and practical 60%

Definitions of research and agricultural research The need for and importance of research work; Types of research in agriculture; Definition of socio-economic indicators, rural communities; The composition of rural household, Data in agriculture, Definition of socio-economic indicators, rural communities; The composition of rural household, Data collection and the main types of data: Plan for data collection. Data Collection. Data collection methods: Concepts in surveys including sampling and non-sampling errors, advantages and disadvantages of surveys. Case studies; characteristics, advantages and disadvantages of case studies, Participant observation studies; longitudinal studies; Diagnostic studies: The principles of a census; advantages and disadvantages of suing a census; participatory methods currently used in Namibia: PRA, FSR/E and how they are used. Data collection tools: questionnaires, interviews; schedules, attitudes scales, PRA tools, the main principles of questionnaire design; presetting; Interview schedules, PRA tools commonly used in Namibia and their use. Phases of data processing. Linkage between questionnaire design and data processing. Analysis and interpretation of data. Report and presentation format. Release and circulation of reports.

The structure and organization of the research in Namibia; the National Agricultural Research Policy in the context of the overall national Agricultural policy; The FSR/E and technology development. The setting of the National Research Agenda in Namibia. The need for on-station and on-farm trials; The link between FSR/E and the national extension system. Methods used in estimating crop and livestock yields. Indigenous technical knowledge (ITK) approach and its value in research work; The Farmer Participatory Research (FPR) and participatory Technology Development (PTD) approaches and their utility.

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#### **L.6.6 AEC 2321: INTRODUCTION TO ENTREPRENEURSHIP**

Lectures: 1 hours / week  
Practical: 2 hours/week  
Assessment: One Exam Paper (3 hrs) 40%, Test, Assignments and practical 60%

The characteristics of an entrepreneur, The management functions; Sources of capital (money); The type of business organizations; Strategic management as an approach to managing a business; The different dimensions of strategic issues; The three levels of strategy; The characteristics of SM decisions; The benefits and risks of SM; The components of the SM model; The SWOT analysis as a management tools; The remote environment; Industry environment; Operating environment; Components of the internal environment ; Long term objectives; The three generic strategies; The grand strategies; Business strategies; The feasibility study; Action plans and short term objectives; Functional tactics; organizational structures; Organizational leadership New technology, strategic controls.

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#### **L.6.7 AEC 2312: PERSONNEL MANAGEMENT**

Lectures: 1 hours / week  
Practical: 1 hours/week  
Assessment: One Exam Paper (3 hrs) 40%, Test, Assignments and practical 60%

Personnel management in Namibia under the labour act, Traits of the personnel manger, Links between personnel management and the other management function; The role and importance of organizational structure; staff requirements; Staff recruitment and selection; Labour contracts; Motivational theories; The link between motivation and compensation; Functions and responsibilities of leaders; different styles of leadership, Delegating task and authority, Handling conflicts in the work situation; Reasons for reducing staff, Possible reactions to dismissals.

#### **L.6.8 AEC 2322: PROJECT MANAGEMENT**

Lectures: 2 hours / week  
Practical: 1 1/2 hours/week  
Assessment: One Exam Paper (3 hrs) 40%, Test, Assignments and practical 60%

Projects as means of developing rural areas; The project cycle; Managing the project cycles; ;Project appraisal definition and objectives; project review through main project elements; Technical, institutional, and managerial abilities; Management styles; social; political; environmental Financial and economic; commercial; legal; gender; Project design and implementation; timing; responsibility; participants; Target group; Management structure; Resources; Training Handing over; Definition of Project monitoring; efficiency indicators; Project evaluation-types; importance of project evaluation; Projects evaluation against. Impact of projects, Examples of projects; levels of planning of projects in Namibia; Sectoral planning and its links with the above; Project as related to programmer and national plans.

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#### **L.6.9 AEC 2341: COMMUNICATION AND INFORMATION SYSTEMS**

Lectures: 1 hours / week  
Practical: 2 hours/week  
Assessment: One Exam Paper (3 hrs) 40%, Test, Assignments and practical 60%

Definition of communication; SMCRE model of communication; The communication process; writing and application of different types of reports and other forms of communication in the public service; writing informative articles for local publications; writing and designing of information sheets; and pamphlets for farmers; writing of formal letters; writing of CVs ; scientific writing; Guidelines for making an oral report for a particular audience; rules of debating ; vertical and horizontal patents of communication in the public service; the interviewing technique; Library information search; on interviews, newspaper articles magazines journals and internet; extension campaigns; organization of agricultural shows and farmers days; keeping of s filing systems the use of a telephone fax machine e-mail handling of visitors; planning ;chairing and conducting of meetings; compiling an agenda; minutes taking and meeting follow up actions.

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### **L.7 MODULE DESCRIPTORS (ANIMAL PRODUCTION)**

#### **L.7.1 ASC 2112: INTRODUCTION TO ANIMAL PRODUCTION**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to animal production. Animal feeds and feeding. Reproduction and fertility. Climate and animal production. System of livestock production, farm records. Facilities for handling farm animals. Animal health.

#### **L.7.2 ASC 2211: RANGE ECOLOGY**

Lectures: 1 ½ hours/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Objectives of range management, current condition of Namibia's range. Rangeland terminology. Identification of the major forage species. Growth cycle of plants. Natural, traditional and modern defoliation systems, defoliation habits of wild and domestic animals. Biomes of southern Africa, characteristics of savannas, veld types of Namibia. Vegetation dynamics: vegetation change, plant succession, retrogression and disequilibrium theories, and deforestation.

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#### **L.7.3 ASC2212: RANGE MANAGEMENT**

Lectures: 1 hour/week  
Practicals: 1 ½ hours/week  
Assessment: One Exam Paper (2 hrs) 40%; Tests, Assignments and practicals 60%.

Carrying capacity: techniques and calculations. Range and grazing records. Range inventory, monitoring techniques. Integrated fodder flow planning. Rangeland degradation and rehabilitation. Management during a drought.

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### **L.8 MODULE DESCRIPTORS (CROP SCIENCE)**

#### **L.8.1 CSC 2112: PRINCIPLES OF CROP PRODUCTION**

Lectures: 2 hours/week  
Practicals: 1½ hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Crop environment in Namibia; Botany of crops – plant cells, structure and function of plants, growth processes, plant competition, botanical classification of plants; Crop improvement:- breeding methods; tillage practices; Crop establishment practices- land preparation, sowing,; crop nutrition. cropping systems: harvesting, handling and storage.

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## **L.8.2 CSC 2122: SOIL SCIENCE**

Lectures: 2 hours/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Definition and importance of soil; Soil formation: types of rocks, weathering processes; Soil physical properties: sampling, profile, texture, structure, effects of cultivation, soil compaction, consistency, aeration, soil/plant/water relationship, soil temperature, soil colour. Soil classification; soil fertility and physical factors. Organic components of soil. Soil organisms. Soil reaction: acidity and alkalinity. Soil nutrients, uptake and plant growth. Soil colloids. Organic manure and fertilizers. Soil sampling and processing. Instruction used in soil laboratories. Reclamation of problem soil.

## **L.9. MODULE DESCRIPTORS (AGRICULTURAL ENGINEERING)**

### **J.9.1 AEN 2111: SURVEYING**

Lectures: 2 hour/week  
Practicals: 1½ hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Measurements: linear, angular; Types of Surveys: Baseline, tape and offset, basic triangulation, planimeter; Area/Volume Measurements; Leveling: Instruments, procedures, booking methods; Leveling methods: Longitudinal, sections, contour, grid; Positioning and orientation systems: GPS, gyroscope, prismatic, traverse.

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### **L.9.2 AEN 2251: BASIC MOTOR MECHANIC**

Lectures: 1 hour/week  
Practicals: 2½ hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Power: Types of engines. Internal combustion for diesel and petrol engines, Cooling system, Lubrication system. Fuel system. Air cleaner. Storage and handling of fuel. Electrical system. Transmission system. Car driving.

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### **L.9.3 AEN 2321: SOIL AND WATER MANAGEMENT**

Lectures: 2 hour/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

The hydrological cycle, water sources, water uses and requirement; water harvesting and storage; Hydraulic principles; open channel flow, pipes and pipe system; pumps and pumping; principles of soil erosion; water erosion process; Soil loss estimation; water erosion control; wind erosion processes and control; social, economical and institutional factors in soil conservation planning.

## M. DIPLOMA IN FORESTRY (FOR CERTIFICATE IN FORESTRY HOLDERS) {Old Curriculum}

### M.1 FIRST YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
ACB	2111	Computer Skills	2.0	14	28	42
ACB	2121	Biology	2.25	21	21	42
ACB	2161	Physics	1.5	14	14	28
NRO	2111	Ecology	3.5	28	42	70
		Statistics	1.5	14	14	28
NRO	2121	Forest Entomology and Pathology	3.0	28	28	56
NRO	2222	Agroforestry	2.5	14	42	56
AEC	2221	Research Methodology	3.0	28	28	56
			<b>19.25</b>	<b>161</b>	<b>217</b>	<b>378</b>
Semester 2						
AEC	2312	Extension Systems and Approaches	2.0	14	28	42
NRO	2312	Integrated Forest Management	1.5	14	14	28
NRO	2261	Basic Motor Mechanics	2.0	14	28	42
NRO	2321	Forest Harvesting	1.5	14	14	28
AEC	2212	Building	3.0	28	28	56
AEC	2212	Financial Management	3.0	28	28	56
AEC	2222	Indigenous Resource Management and Rural Sociology	3.0	28	28	56
		Science	3.0	20	30	50
			<b>19.0</b>	<b>160</b>	<b>198</b>	<b>358</b>
<b>TOTALS</b>			<b>38.25</b>	<b>321</b>	<b>415</b>	<b>736</b>

### M.2 SECOND YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
NRO	2331	Forest Economics	2.0	14	28	42
AEC	2332	Introduction to Entrepreneurship	1.75	14	21	35
NRO	2342	Forest Management Plan	4.0	28	56	84
NRO	2332	Forest Policy and Law	2.5	28	14	42
NRO	2241	Regional Study Tour	2.0			
CRS	3359	Pasture Science	3.5	30	15	45
			<b>15.75</b>	<b>114</b>	<b>134</b>	<b>248</b>

## M.3 MODULE DESCRIPTORS (UPGRADING COURSE FOR CERTIFICATE HOLDERS IN FORESTRY)

### M.3.1 NRO 2111: ECOLOGY

Lectures: 2 hours/week  
 Practicals: 3 hours /week  
 Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Environmental impact assessment. Climatic classification. Microclimate. Climate and vegetation. Hydrological cycle: surface run-off, ground water flow, evapo-transpiration and water balance. Ocean currents. Soils: soil sampling, soil profile, soil reactions and soil fertility and plant nutrition.

### M.3.2 NRO 2121: STATISTICS

Lectures: 1 hour/week  
 Practicals: 1 hour /week  
 Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to statistics. Population and sample. Frequency distribution. Measures of dispersion. Introduction to probability theory. Analysis of variance

### M.3.3 NRO 2131: COMPUTER SKILLS 11

Lectures: 1 hour/week  
 Practicals: 2 hours /week  
 Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Computer hardware. Computer software: windows 98/2000, Windows NT, MS Office 2000, database on CDs, typing software. Introduction to networks. Uses of Internet and e-mail.

### **M.3.4 NRO 2141: FOREST ENTOMOLOGY & PATHOLOGY**

Lectures: 2 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to Forest Entomology, General insect biology, Insect classification, Insects as pests, Beneficial insects, Insects in Namibian Forests, Preventive and control measures, Introduction to Forest Pathology, Non-infectious agents and diseases, Infectious agents and diseases, Diseases caused by fungi, Beneficial fungi and Disease prevention and control.

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### **M.3.5 NRO 2151: AGROFORESTRY**

Lectures: 1 hour/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Vegetative propagation. Indigenous fruits. Indigenous trees and shrubs. Indigenous technical knowledge (ITK). Status of research in agroforestry. Case studies in different agroforestry systems. Agroforestry project.

### **M.3.6 NRO 2112: INTEGRATED FOREST MANAGEMENT**

Lectures: 2 hours/week  
Practicals: 3 hours /week  
Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to integrated forest management: definition and approaches. Components of integrated forest management and their integration. Integrated forest management processes. Methodologies for integrated forest management plan formulation.

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### **M.3.7 NRO2122: BASIC MOTOR MECHANICS**

Lectures: 1 hour/week  
Practicals: 1 hour /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Power, Internal combustion, Cooling system, Lubrication system. Fuel system. Air cleaner. Storage and handling of fuel. Electrical system. Transmission system. Car driving.

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### **M.3.8 NRO 2132: FOREST HARVESTING**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to Forest Harvesting: general description of objectives, methods and systems. Planning the technology and the logging site: Planning of forest harvesting operation, technical factors, economic and environmental factors. Harvesting operations. Timber measurement. Logging costs. Extraction. Transport.

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### **M.3.9 NRO 2142: BUILDING**

Lectures: 1 hour/week  
Practicals: 1 hour /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Building plans and specifications. Building materials and foundations. Water supplies and sewage system. Building costs. Alternate building systems.

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### **M.3.10 NRO 2211: FOREST ECONOMICS**

Lectures: 1 hour/week  
Practicals: 2 hours /week  
Assessment: One Exam Paper (2 hrs ) 40%; Tests, Assignments and practicals 60%.

Review of economic principles. Economic analysis. Forest management economics: value of the land, value of the forest. Marketing: products, marketing conditions, marketing strategy and marketing in the forest industry.

### **M.3.11 NRO 2221: FOREST MANAGEMENT PLAN**

Lectures: 2 hours/week  
Practicals: 4 hours /week

Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to Forest Management Plan: forest resources and data, objective formulation of forest management plan, modules used. Planning concepts and methods in forest management: sustainability, rotation, normal forest, growth and yield, operational planning. Forest management plan.

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**M.3.12 NRO 2231: FOREST POLICY AND LAW**

Lectures: 2 hours/week

Practicals: 1 hour /week

Assessment: One Exam Paper (3 hrs ) 40%; Tests, Assignments and practicals 60%.

Introduction to Forest Policy and Law: definition, objectives and strategies of formulating the policy, natural resources law, forest policy and law. Forest policy. Principal legislation. Subsidiary legislation. Forest act and other related acts. Legal procedures. Indigenous laws of Namibia.

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**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 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					ULEA 3419	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						
SMAT 3512	Precalculus					SMAT 3512	Precalculus			
SSTS 3522	Introduction to Statistics					SSTS 3522	Introduction to Statistics			
2nd Year			2nd Year			2nd Year				
1st Semester			1st Semester			1st Semester				



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
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		
			AASC 2611	Intensive Animal Production and		
			AASC 2612	Extensive Animal Production		
ACSC 3682	Agronomy	Exemption through:	ACSC 2602	Crop Production and		
			ACSC 2611	Vegetable + Fruit Production		
AFST 3602	Food Technology				AFST 3602	Food Technology

**TABLE 2**

ARTICULATION						
					B.Sc Degree Structure for Diploma Students having completed the new curriculum and joining the FANR Degree Programme as of 2012:	
FANR B.Sc. Degree Programme (Natural Resources)			New Diploma in Natural Resource Management (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 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				ULEA 3419	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 Manag. + 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		
			AASC 2411	Physical Science		
			AIES 2511	Plant Entomology and Pathology		
			AIES 2532	Silviculture		
			AIES 2532	Introduction to Agroforestry		
SMAT 3512	Precalculus				SMAT 3512	Precalculus
SSTS 3522	Introduction to Statistics				SSTS 3522	Introduction to Statistics

ARTICULATION						
					B.Sc Degree Structure for Diploma Students having completed the new curriculum and joining the FANR Degree Programme as of 2012:	
FANR B.Sc. Degree Programme (Natural Resources)			New Diploma in Natural Resource Management (Ogongo Campus)			
Course Code	Title		Course Code	Title	Course Code	Title
<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
AIES	Ecology				AIES	Ecology
AIES 3621	Principles of Wildlife Management				AIES 3621	Principles of Wildlife Management
ANRE 3601	Environmental Science	Exemption through:	AIES 2622	Nat. Resource Policies+Administration		
			AIES 2612	Integr. Nat. Resource Mgt.+Planning		
AFST 3621	General Microbiology				AFST 3621	General Microbiology
<b>2nd Semester</b>			<b>2nd Semester</b>		<b>2nd Semester</b>	
AGEC 3692	Principles of Macroeconomics				AGEC 3692	Principles of 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
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>	
OLD GRN CURRICULUM	NEW UNAM CURRICULUM
<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

MODULE EQUIVALENTS	
OLD GRN CURRICULUM	NEW UNAM CURRICULUM
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
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
MODULE EQUIVALENTS	
OLD GRN CURRICULUM	NEW UNAM CURRICULUM
<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

<b>MODULE EQUIVALENTS</b>	
<b>OLD GRN CURRICULUM</b>	<b>NEW UNAM CURRICULUM</b>
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