
FACULTY YEARBOOK 2006

**FACULTY
OF
AGRICULTURE
AND
NATURAL RESOURCES
&
COLLEGES OF AGRICULTURE**



THE UNIVERSITY OF NAMIBIA

NOTE

This Faculty Prospectus is valid for 2006 only. Regulations and Curricula for 2006 may be amended. General regulations and information appear in the **General Prospectus: Information, Regulations & Fees**.

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 which may occur. The University retains the right to amend any regulation or condition without prior notice.

The information is correct up to 30 October 2006.

The fact that particulars of a specific course or field of study have been included in this Faculty Prospectus, does not necessarily mean that such a course or field of study will be offered in 2006 or any consecutive year.

This Faculty Prospectus must be read in conjunction with the **General Prospectus: Information, Regulations & Fees**.

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FACULTY MISSION

MISSION

The Mission of the Faculty of Agriculture and Natural Resources and Colleges of Agriculture 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 and Colleges of Agriculture 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.

CORE ACADEMIC DATES FOR 2006

FIRST SEMESTER

December 2005 – Feb 2006	Field Attachment (Senior Students: 3 rd and 4 th Year Degree and 2 nd and 3 rd Year Diploma students)
05 January	University opens
17 January	Lecturers (FANR) resume office duties
30 January - 10 February	Registration (Last day for Late Registration: 17 February 2006)
01 February	Lecturers resume office duties (College)
08 February	Arrival of all new students (Diploma and Degree) at Neudamm and Ogongo College
09 February	Orientation course
11 February	End of Orientation course
13 February	Lectures commence for FIRST SEMESTER
10 April	EASTER BREAK starts
18 April	Lectures resume after Easter Break
26 May	Lectures end for FIRST SEMESTER
30 May	First Opportunity Examinations (Semester 1 modules) commence
16 June	First Opportunity Examinations (Semester 1 modules) end
21 June	College recess
04 July	Second Opportunity Examinations (Semester 1 modules) commence
20 July	Second Opportunity Examinations (Semester 1 modules) end

SECOND SEMESTER

24 July	Lectures commence for SECOND SEMESTER
11 September	SPRING BREAK starts
18 September	Lectures resume after Spring Break
03 November	Lectures end for SECOND SEMESTER
08 November	First Opportunity Examinations (Semester 2 & Year modules) commence
28 November	First Opportunity Examinations (Semester 2 & Year modules) end
04 December	Supplementary Examinations commence
08 December	Supplementary Examinations end
14 December	Academic Year ends
14 December	University closes for recess (until 08 Jan 2007)
09 January	Second Opportunity Examinations (Semr 2 & Year modules) commence
26 January	Second Opportunity Examinations (Sem 2 & Year modules) end

DEADLINES FOR THE 2006 ACADEMIC YEAR

GENERAL

- Last day for Late Registration (*Late fee payable*) 17 February
- Last day for approval of exemption(s) 17 February
- Last day for approval of retention of continuous assessment mark 17 February
- Last day for approval of module(s) & qualification changes 17 February
- Last day to submit outstanding documentation 30 May
- Last day to cancel enrolment 13 October

CANCELLATIONS

- Last day to cancel Semester I modules 03 May
- Last day to cancel Semester II modules 13 October
- Last day to cancel Double modules 13 October

FINANCE

Semester I modules

- Last day to cancel with 100 % credit 28 February
- Last day to cancel with 50 % credit 31 March

Semester II modules

- Last day to cancel with 100 % credit 04 August
- Last day to cancel with 50 % credit 08 Sept

Double modules

- Last day to cancel with 100 % credit 28 February
- Last day to cancel with 50 % credit 24 May

PERSONNEL

OFFICE BEARERS AND ADMINISTRATIVE PERSONNEL

FACULTY OF AGRICULTURE AND NATURAL RESOURCES:

Dean:	Prof J P Msangi: B.A. Hons (University of East Africa); M.A., PhD (University of Dar es Salaam)
Deputy Dean:	Dr M B Schneider: M.Sc.,Dr.phil. (Frankfurt/Germany), SACNASP
Faculty Officer:	Mr E Nowaseb
Secretary:	vacant
Senior Researcher and Projects Coordinator:	Dr M B Schneider: M.Sc.,Dr.phil. (Frankfurt/Germany), SACNASP
Computer Technician:	Mr L Uiseb: A+ Service Technician, Microsoft Certificate Systems Engineer (NIIT)
Head: Faculty Library:	Ms M T M Tjituka
Faculty Librarian:	Ms S Katjepunda
Senior Library Assistant:	vacant
Senior Library Assistant:	Mr J Kambuta (Ogongo)
Library Assistant:	Mr E Thaniseb
Administrative Assistant:	Mr I Kalimba (Ogongo)

NEUDAMM AGRICULTURAL COLLEGE (MINISTRY OF AGRICULTURE, WATER & FORESTRY

(MAWF):

Principal:	Mr I P Mate
Farm Manager:	Mr E B Januarie
Principal Clerical Assistant:	Ms T N Andowa (Library)
Clerical Assistant:	Ms L Ockhuizen
Clerical Assistant:	Mr E Biwa
Clerical Assistant:	Ms A Beukes
Assistant Accountant:	Ms I W Brandt

OGONGO AGRICULTURAL COLLEGE (MAWF):

Principal:	Mr M M Mushabati
Vice-Principal:	Ms H Kandongo
Farm Manager:	Mr S Haifiku
Principal Clerical Assistant:	Ms A Negwila
Senior Clerical Assistant:	Ms T Abed
Senior Clerical Assistant:	Ms S Shiimbi
Senior Clerical Assistant:	Mr H Uupindi
Assistant Typist:	Ms M A N Mandumwa

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

For Degrees:

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

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

For Diploma Programmes:

The Principal
Neudamm Agricultural College
Private Bag 133188
WINDHOEK

Tel: (061) 206 4111
Fax: (061) 206 4027

Or

The Principal
Ogongo Agricultural College
Private Bag 5520
OSHAKATI

Tel: (065) 2235000
Fax: (065) 2235233

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

ACADEMIC PERSONNEL

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

Head of Department:	Dr E C Musaba
Lecturer:	Dr E C Musaba: B.Ag Sc (Zambia); M.Sc. (Guelph); PhD (Saskatchewan)
Lecturer:	Dr A Muwonge: B..A. (Econ, Makerere); M.Sc. (Bath); DipM-MCIM (Chartered Institute of Marketing, UK); PhD (Farington)
Lecturer:	Mr M M Eiseb: Dip Agric (Polytechnic); B.Sc, M.Sc. Agric Econ (Fort Hare)
Lecturer:	Ms M Nandi: Dip Agric (Polytechnic); B.AgricMgt (Natal); M.Sc.Dev Econ (Norway)
Lecturer:	Ms N Nghipondoka-Robiati: B.Sc. Agric (UNAM); M.A. Agric Econ (Univ. Sydney)
Senior Agric Training Officer:	Ms A Lubbe: B.A. (Orange Free State); HED (Orange Free State) (Neudamm, MAWF)
Agric Training Officer:	Mr S K Kalundu: NatDip Agric (Neudamm); B.Sc. Agric (University of Namibia); M.Sc. Agric Econ (Arkansas, USA) (Neudamm, MAWF)
Agric Training Officer:	Ms E R Sheehama: B.Sc. Agric (UNAM) (Neudamm, MAWF)
Agric Training Officer:	Mr M N Angula: B.Sc. Agric (UNAM) (Neudamm, MAWF)
Agric Training Officer:	vacant
Agric Training Officer:	Mr B Thomas: B.Sc. Agric (UNAM) (Ogongo, MAWF)
Agric Training Officer:	Ms M Hangula: B.Sc. Agric (UNAM) (Ogongo, MAWF)
Agric Training Officer:	Mr T Maharero: B.Sc. Agric (Natal) (Ogongo, MAWF)

DEPARTMENT OF ANIMAL SCIENCE

Head of Department:	Ms N P Petrus
Lecturer:	Ms N P Petrus: B.Agric (Nigeria); M.Sc.(CIRAD-France)
Lecturer:	Dr E Lutaaya: B.Sc. Agric (Makerere); M.Sc. (Texas A & M); PhD (Georgia)
Lecturer:	Ms T O Iitenge-Mweza: B.Sc. (Hons) Biomedical Science (Murdoch University, Western Australia); Postgraduate Certificate in Applied Science (Lincoln University, New Zealand)
Lecturer:	Mr S P Muteka: B.Sc. (Concordia), M.Sc. (Pretoria)
Lecturer:	Mr G T Kamupingene: B.Sc. Agric (UNAM); M.Sc. (Sokoine University of Agriculture, Tanzania)
Technician:	Mr L S Samunzala: National Dip. Agric. (Neudamm)
Principal Agric Training Officer:	vacant
Senior Agric Training Officer:	Mr A Rothauge: B.Sc Agric (Stellenbosch); B.Sc Agric (Hons) Stellenbosch; M.Sc. Agric (Pretoria) (Neudamm, MAWF)
Agric Training Officer:	Ms N Haindongo: B.Sc. Agric (UNAM) (Neudamm, MAWF)

Agric Training Officer: Ms B Claasen: B.Sc. Agric (UNAM) (Neudamm, MAWF) study leave
Principal Research Technician: Mr J Oberholster: National Dip, Agric (Neudamm); B Tech Agric: Animal Production (Pretoria) (Neudamm, MAWF)
Senior Research Technician: Mr E Beukes: National Dip, Agric (Tsumis) (Neudamm, MAWF)
Research Technician: Mr H Izaaks: National Dip, Agric (Neudamm) (Neudamm, MAWF)
Research Technician: Mr G V Kandjii: National Dip, Agric (Tsumis) (Neudamm, MAWF)
Senior Agric Training Officer: vacant
Agric Training Officer: Ms M Nepembe: M.Sc. Agric (Patrice Lumumba P F Univ) (Ogongo, MAWF)
Agric Training Officer: Mr C Mberema: B.Sc. Agric (UNAM); M.Sc. (Arizona) (Ogongo, MAWF)
Agric Training Officer: Ms L Shikongo: B.Sc. Agric (UNAM) (Ogongo, MAWF)
Agric Training Officer: G U Tjiho: B.Sc. Agric (UNAM) (Ogongo, MAWF)
Senior Agric Research Technician: Mr V Namwoonde: Dip Agric (OAC) (Ogongo, MAWF)
Agric Research Technician: vacant

DEPARTMENT OF CROP SCIENCE

Head of Department: Dr L Kanyomeka
Professor: **Prof O D Mwandemele: B.Sc. Hons; M.Sc. (Dar-es-Salaam); PhD (Sydney); Elected Fellow (ISGPB), Member UNU/IMRA College of Res. Associates**
Senior Lecturer: Dr 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.(Arizona); PhD.(Arizona)
Lecturer: Ms S Niitembu: MSc., (Patrice Lumumba); Diploma Animal Health, (Torgau,Leipzig)
Lecturer: Mr J B Jonazi: Dip Agric, B.Sc. (Malawi); M.Sc. (New Zealand)
Lecturer: Mr U S K Kuvare: B.Sc. Agric (UNAM); M.Sc. (Stellenbosch)
Technician: Ms L Halueendo: B.Sc (UNAM) study leave
Technician: Ms A N Aluvil: National Dip. Agric (Polytechnic of Namibia); B.Sc. (Cape Technikon)
Agric Training Officer: Mr G Hatutale: B.Sc. Agric (UNAM) (Neudamm, MAWF) study leave
Agric Training Officer: Mr P I Nanhapo: B.Sc. Agric (UNAM) (Neudamm, MAWF)
Agric Training Officer: Ms B Mudamburi: Dip Agric (Chibero, Zimbabwe); B.Sc. Agric Tech Mgt (Cranfield, UK); M.Sc. Mgt of Agric Knowledge Systems, Wageningen, The Netherlands (Neudamm, MAWF)
Agric Training Officer: Mr J Chigariro: Dip Agric (Gwebi, Zimbabwe); Postgraduate Dip Agric (Greenwich, UK); M.Sc. Agric (Greenwich, UK) (Neudamm, MAWF)
Agric Training Officer: Mr P A Ausiku: National Dip Agric (Ogongo); B.Sc. Agric (UNAM) (Neudamm, MAWF)
Senior Agric Research Technician: Mr P Beukes: Dip Agric (Tsumis) (Neudamm, MAWRD)
Senior Agric Training Officer: Ms H Kandongo: B.Sc. Agric Mechanisation (Karl Marx University) (Ogongo, MAWF)
Senior Agric Training Officer: vacant
Agric Training Officer: Ms N Nghishitivali: M.Sc. Agric (Cuba) (Ogongo, MAWF)
Agric Training Officer: Mr F Shinombedi: M.Sc. Agric Eng (Czechelsovakia) (Ogongo, MAWF)
Agric Training Officer: Ms C Kamburona: B.Sc. Agric (UNAM) (Ogongo, MAWF)
Agric Training Officer: Ms O T Shivolo: Dip Agric (OAC); B.Sc. Agric (UNAM) (Ogongo, MAWF)

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

Head of Department: Ms N P Uusiku
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) study leave
Lecturer: Mr C Samundengu: B. Eng (Zambia); B. Eng Hons (Pretoria); M Eng (Pretoria)
Lecturer: Ms N P Uusiku: B.Sc. Agric (UNAM); M.Sc. Food Sc (Stellenbosch)
Lecturer: Ms P Hiwilepo: B.Sc. Agric (UNAM); M.Sc. Food Technology (Wageningen, The Netherlands)
Assistant Lecturer: Mr S Barrion: B.Sc. Agric (UNAM); B.Sc. Hons (Pretoria)
Technician: Mr T N Tjaronda: Dip Lab Tech (Botswana)

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

Head of Department:	Mr L Kandjengo
Associate Professor:	Prof J P Msangi : B.A. Hons (University of East Africa); M.A (Univ Dar es Salaam); PhD (Univ Dar es Salaam)
Lecturer:	Mr M Katjiua: B.Sc. (UNAM); Grad Dip Env. Mgt And Dev. (Australian National University); M.Sc. (Canberra).
Lecturer:	Mr K Stephanus: B.Econ (UNAM); M.Sc (University of Tromso)
Lecturer:	Mr L Kandjengo: B.Sc. (UNAM); B.Sc. (Hons) Univ Cape Town; M.Sc. (Univ Cape Town)
Lecturer:	Mr S K Mafwila: B.Sc. (UNAM); PGDE (UNAM); B.Sc.Hons (Rhodes); M.Sc. (UCT)
Lecturer:	Mr J A Esterhuizen: B.Sc. (UNAM); B.Sc. Hons (Rhodes); M.Sc. (Rhodes)
Staff Dev Fellow:	Mr A Samakupa: B.Sc (UNAM); Cert Quality Control (Univ Iceland) study leave
Technician:	Mr I K V Kauvee: National Dip. Agric (Neudamm); B.Sc. Hons (University of Western Cape) study leave
Agric Training Officer:	Mrs. E Ndeunyema: National Dip Agric (OAC); B.Sc. Forestry (Wales Univ, Bangor); M.Sc. Agroforestry (Wales Univ, Bangor) (Ogongo, MAWF)
Agric Training Officer:	Ms A Ndeinoma: National Dip Agric (OAC); B.Sc. Forestry (Univ of Stellenbosch) (Ogongo, MAWF)
Agric Training Officer:	Mr I Kaholong: Cert Forestry (OAC); B.Sc. Forestry (Stellenbosch) (Ogongo, MAWF)
Agric Training Officer:	Mr W V Kanguatjivi: B.Sc. Forestry (Wales Univ, Bangor) (Ogongo, MAWF)

A. REGULATIONS

The regulations of the Faculty of Agriculture and Natural Resources should be read in conjunction with and subject to the general regulations of the University of Namibia contained in the General Information and Regulations Prospectus.

A.1 COURSES OF STUDY

The Faculty of Agriculture and Natural Resources offers two separate undergraduate degree programmes and two diplomas leading to:

1. Bachelor of Science in Agriculture;
2. Bachelor of Science in Natural Resources;
3. Diploma in Agriculture; and
4. Diploma in Forestry.

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

Although the Faculty has not currently developed any curricula for postgraduate programmes, students will nevertheless still be able to register for postgraduate training within the Faculty. These programmes will be conducted in accordance with the General Regulations of the University of Namibia, but will only be offered on the basis of research and thesis. Students may be allowed to register in areas of study for which no expertise is available in the Faculty with the proviso that a competent and willing supervisor can be identified within the country. In such cases the Faculty will identify a co-supervisor from within the Faculty, or other Faculties to assist in the guidance of the student.

A.2 GENERAL ADMISSION CRITERIA FOR UNDERGRADUATE PROGRAMMES:

A.2.1 DEGREE PROGRAMMES

A.2.1.1 The University of Namibia General Regulations governing admission of students to first year undergraduate degree programmes shall apply.

A.2.1.2 Notwithstanding the above, candidates wishing to join the Faculty of Agriculture and Natural Resources must have obtained a grade "C" or higher in IGCSE, or its equivalent, in Biology, normally a "C" in Mathematics, and not less than a grade "D" in Physical Science, or Physics with Chemistry.

A.2.1.3 Candidates with a three-year Diploma in Agriculture, Forestry, Natural Resources or Fisheries and Marine 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 Natural Resources) degree programme. Upon successful completion of the first year, such students may be exempted from certain courses in the second and third year of the B.Sc. degree programme 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.2.2 DIPLOMA PROGRAMMES

A.2.2.1 The normal basic requirement for entrance to the diploma programmes shall be the International General Certificate of Secondary Education (IGCSE), or its equivalent, subject to performance using the following criteria:

A.2.2.1.1 Passes in:

- i) English with a score of "D" or higher;
- ii) Mathematics with a score of "E" or higher;
- iii) One science subject, e.g. Biology, Physical Science, or Agricultural Science with a "D" or higher; and
- iv) Any other three additional subjects with a "D" grade or higher.

A.3 MATURE AGE ENTRY SCHEME FOR 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 PROGRAMME

- A.4.1 First year students, admitted to the Faculty of Agriculture and Natural Resources, will spend the year doing basic science courses covering the following subjects: Biology, Mathematics, Physics, Statistics, Communication and Study Skills in English, Computer Literacy, Contemporary Social Issues, Chemistry and Principles of Agriculture and Natural Resources.
- A.4.2 These courses 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 courses 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 governing the conduct of lectures and examinations of the basic science courses to Agriculture and Natural Resources students shall apply. For details please consult the Faculty of Science Prospectus.
- A.4.3 Students will continue with their professional training in the Faculty of Agriculture and Natural Resources after their first year with the Faculty of Science. For each of the two degree programmes, nearly all courses in the second year shall be common to all students within the programme, and specialization will normally commence in the third year of the degree programme.
- A.4.4 In each programme students will be able to register for their field of interest. 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 and Extension
- Animal Science
- Crop Science
- Food Science and Technology

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

- Fisheries and Aquatic Sciences

For the Diploma programme the following options will be offered

- Diploma in Agriculture
- Diploma in Forestry

A.4.5 At the end of the second and third years all degree students will go for field attachment for a period of six weeks while diploma students will go at the end of the first and second year.

A.5 PASS REQUIREMENTS

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

- A.5.1 A student must have passed more than 50% of all the first year credits or modules.
- A.5.2 A student who has passed more than 1/3 but less than the 50% 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 (Biology 1A and Biology 1B) 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.6 DURATION OF STUDY

- 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 COURSE STRUCTURE AND CODING

- A.7.1 The Modular system has been used in the design of the courses in each programme. However, the Faculty of Agriculture and Natural Resources has gone further in weighting the courses using credit/units to put more meaning to the module. All courses 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 course consisting of 28 one-hour lectures and 14 two hour practical classes would be a three credit course.
- A.7.2 Courses are coded with three letter abbreviations denoting the area in which the course is offered. The letter abbreviations are: AEC (Agricultural Economics and Extension), AEN (Agricultural Engineering), ASC (Animal Science) CSC (Crop Science), NRE (Environmental Science), NRO (Forestry), NRF (Fisheries and Marine Sciences), FSC (Food Science and Technology), NRW (Wildlife Management). The latter abbreviations are followed by four digits corresponding to the Senate's approved coding system.
- A.7.3 A course may consist entirely of lectures, field work, project work or seminars. In addition to work during the term, a course 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 course option for which he/she is registered. As specified in the General Regulations, a student may not change courses or options later than the dates specified.
- A.7.5 A student may, with the approval of the Faculty and Department, take courses 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 second year of the Degree study to qualify for the first field attachment. Similarly, second year Diploma and third 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 courses 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 continuous assessment mark will constitute a weighting of 60% for the Diploma and 40% for the Degree, of the final mark, whilst examinations will constitute 40% for the Diploma and 60% for the Degree, of the final mark for courses consisting of lectures and practicals. Continuous assessment will include at least three tests, assignments and practical reports. For field attachment courses, an attachment report and an oral presentation shall constitute the total assessment mark.

A.9.3 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 courses. Alternatively, a student who failed to obtain a sub-minimum in a given paper, but who has a continuous assessment mark of 60% and higher may also be allowed to write a supplementary examination provided he/she has obtained at least 35% in the final examination. The maximum score awarded for a supplementary examination will be 50%. A student who fails a supplementary examination shall repeat the course.

A.9.4 A student

- 1) who has passed $\frac{1}{2}$ or more courses 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 courses in subsequent years if the pre-requisites have been passed.

A.9.5 To proceed to the second and subsequent years, a Diploma student must have passed 60% of the credits taken during the year.

A.9.6 To proceed to the second year, a Degree student must have passed more than 50% of all the first year credits or modules, including passes in Biology 1A and Biology 1B.

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

A.9.8 A 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 courses examined during the year;
- 2) After supplementary examinations, he/she has passed at least 75% of the credits taken during the year.

A.9.9 A student who fails in more than half of the credits taken in an academic year shall be discontinued.

A.10 REPEAT AND DISCONTINUATION

- A.10.1 A student who has passed more than a 1/3 [33%], 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 1/3 [33%], but less than 50% 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 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 2/3 [67%] (for degree) and 40% (for diploma) of the full academic year credits will be discontinued.

A.11 AWARDS OF DIPLOMA AND DEGREE

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

B. B.SC. IN AGRICULTURE (AGRICULTURAL ECONOMICS AND EXTENSION)

B.1 FIRST YEAR

All courses listed below, except Communication and Study Skills in English, Contemporary Social Issues and Principles of Agriculture and Natural Resources, will be offered by the Faculty of Science.

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
BLG	3101	Biology 1A	3.5	28	42	70
MTS	3101	Mathematics 1A	2	28	0	28
PHC	3101	Physics 1A	3.5	28	42	70
STS	3101	Statistics 1A	2	28	0	28
UCE	3119	Communication and Study Skills in English	4	56	0	56
UCC	3109	Computer Literacy	2.5	14	42	56
			17.5	182	126	308
Semester 2						
BLG	3112	Biology 1B	5.5	56	42	98
MTS	3112	Mathematics 1B	4.5	56	14	70
PHC	3112	Physics 1B	4	56	0	56
PHC	3192	LAB 1	1.5	0	42	42
CHM	3192	Chemistry for Life Sciences	4.5	56	14	70
UCA	3119	English for Academic Purposes	4	56	0	56
UCI	3109	Contemporary Social Issues	2	28	0	28
ACA	3112	Principles of Agriculture and Natural Resources	3	42	0	42
			29	350	112	462
TOTALS			46.5	532	238	770

For course descriptions please refer to section B.5

B.2 SECOND YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3231	Principles of Microeconomics	3.0	42	0	42
AEC	3251	Rural Sociology	2.0	28	0	28
ASC	3201	Genetics	2.75	28	21	49
CSC	3271	Biometrics	4.75	56	21	77
CSC	3231	Introduction to Plant Science	4.0	42	28	70
FSC	3201	Food and Human Nutrition	2.5	28	14	42
FSC	3231	General Microbiology	2.75	28	21	49
			22.75	252	105	357
Semester 2						
AEC	3212	Production Economics	3.0	42	0	42
AEC	3232	Principles of Macroeconomics	3.0	42	0	42
AEN	3202	Introduction to Agricultural Engineering	2.75	28	21	49
ASC	3232	Biochemistry	3.75	42	21	63
ASC	3202	Livestock Production Systems	2.75	28	21	49
CSC	3212	Introduction to Agronomy	4.50	42	42	84
FSC	3202	Introduction to Food Technology	2.75	28	21	49
			22.50	252	126	378
TOTALS			45.25	504	231	735

B.3 THIRD YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3311	Mathematics s for Agricultural Economics	3.75	42	21	63
AEC	3351	Farm Planning and Management	4.0	42	28	70
AER	3311	Research Methods in Agric Economics	3.75	42	28	70
AEA	3371	Field Attachment	3.0			
AEN	3321	Farm Mechanization	2.75	28	21	49
ASC	3411	Range and Pasture Management	4.0	42	28	70
CSC	3351	Field Crop Production	3.75	42	21	63
			26.0	238	147	385
Semester 2						
AEM	3312	Agricultural Marketing	3.75	42	21	63
AEA	3312	Econometrics for Agric Economists	4.50	42	42	84
AEC	3372	Agricultural Extension	4.75	56	21	77
AEF	3312	Agricultural Finance and Credit	2.75	42	14	56
ASC	3412	Small Ruminant Production	3.75	42	21	63
			19.50	224	119	343
TOTALS			45.50	462	2661	728

B.4 FOURTH YEAR

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
CSC	3461	Horticulture I	3.0	28	28	56
			24.25	196	175	371
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	28	28	56
ASB	3411	Beef Production	3.75	42	21	63
			19.50	196	154	350
TOTALS			43.75	392	329	721

B.5 COURSE DESCRIPTIONS

B.5.1 ACA 3112: PRINCIPLES OF AGRICULTURE AND NATURAL RESOURCES

Lectures: 42 Hours (3L/week)

Practicals 0 Hours/week

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

Content:

History of agriculture and scientific development of agriculture and natural resources.

Economic and social significance of agriculture and natural resources. Constraints to agricultural production and resource management in sub-Saharan Africa (climate, water, soil, etc). Resource use patterns and food security.

B.5.2 UCI 3109: CONTEMPORARY SOCIAL ISSUES

Contact time: 28 hours (2L / week)
Assessment: Continuous:100%
Pre-requisites: none

Aims and Objectives: To equip students with essential social skills in the areas of ethics, gender and HIV/AIDS.

Course content: The course will cover three topics of equal length, namely; Orientation in Ethics, Introduction to Gender Issues and HIV/AIDS.

Orientation in Ethics: Values, standards and attributes; roots of values, standards and attitudes; importance to agree on core values; "golden rule" (every human must be treated humanely); towards a culture of non-violence and respect for life; towards a culture of solidarity and just economic order; towards a culture of tolerance and life in truthfulness; towards a culture of equal rights and partnership; Plagiarism and academic honesty.

Introduction to Gender Issues: social perspectives and concepts relating to gender studies; basic theories of gender relations; historical/colonial aspects of gender relations; gender relations in contemporary Namibian society; negative aspects of gender relations; examining approaches to gender equality.

HIV/AIDS: Background status of HIV/AIDS – national and international, physiological approach of HIV/AIDS, stages, modes of transmission, cause and symptoms of HIV/AIDS; HIV testing and pre-and post-counseling – diagnosing HIV infection, HIV and antibody test, HIV infection, counseling; Primary prevention of HIV/AIDS and opportunistic infections – promoting safe sex protocols, reduce risk behaviours, promoting a healthy life style; primary care for symptomatic and asymptomatic HIV disease and AIDS – principle of management, anti-retroviral therapy, treatment of opportunistic infections, including nutritional care; Namibian HIV/AIDS Charter of rights; HIV/AIDS support systems on campus and within the community.

B.5.3 UCC 3109: COMPUTER LITERACY

Contact time: 56 hours (1L & 3PS / week)
Assessment: Continuous 100%
Pre-requisite: none

Content: The practical use of computers – Windows, Word processing, Spreadsheets, Databases and other common software.

B.5.4 UCE 3119: COMMUNICATION AND STUDY SKILLS IN ENGLISH

Contact time: 56 hours theory (4L / week)
Assessment: Continuous 60%
Examination 40% (1 x 2 hour exam)
Pre-requisite: C in IGCSE English

Content: Language functions (language use in various contexts); Basic reading: skimming and scanning; Writing sentences and coherent paragraphs; Listening to lectures and taking guided short notes; Giving oral presentations on general topics; Library information skills (LISC); Basic concepts of language usage; Dictionary skills; Vocabulary development.

B.5.5 UCA 3119: ENGLISH FOR ACADEMIC PURPOSES

Contact time: 56 hours theory (4L / week)
Assessment: Continuous 60%
Examination 40% (1 x 2 hour exam)
Pre-requisite: UCE 3119

Content: Academic reading, critical reading; Developing all reading skills; Academic listening and note taking; Academic speaking – individual presentations; Academic writing: library research-based essay, interpretation and explanation of graphics in writing and academic summaries.

*Law students will follow the course UCL 3112 (Communication and Study Skills for Law Students) in stead of UCA 3119 (English for Academic Purposes).

B.5.6 BLG 3101: BIOLOGY 1A

Contact time: 28hours (2L /week)
42hours practicals (I PS/week)
Assessment: Continuous 40% (tests)
Examination: 60%
Paper: 1x 3hour paper.
1x1hour practical exam 30%

Content:

The first part of the course will look at basic laboratory equipment used in biology and safety procedures. Basic techniques in Biology such as microscopy, drawing, the scientific process, in writing of scientific reports etc., will be covered. The second part of the course will consist of cell biology: prokaryotic and eukaryotic cells, ultrastructure of plant and animal cells, cell organelles and their functions: cellular transport; cellular reproduction and the cell cycle. The course will be concluded with an introduction to genetics: basic principles reproduction as the basis of heredity; principles of inheritance: Mendelian theory; chromosome variations: structure and mapping; linkage and cross-over.

B.5.7 BLG 3112: BIOLOGY 1B

Contact time: 56hours theory (4L /week)
42 hours practical (I PS/week)
Assessment: Continuous 40%
Examination 60%
Pre- requisite: IGCSE Biology
Paper: 1x3hour paper70%
1x1hour practical exam30%

Content:

This course is organised around five themes, namely diversity and classification of organisms organisation and maintenance of the organism, physiology, development of organism and continuity of life relationships of organisms with one another and their environment. While special emphasis is placed on the Plant and Animal kingdoms, including the human aspect of bacteriology and virology are also discussed. Students will be introduced to broad ecological microbiology. Molecular and physiological principles which will be expanded in later years. Concepts such as phylogeny of living organisms and identification of species relevant to Namibia will be carried through the course. Each theme will be supplemented with appropriate weekly practical sessions in the laboratory and the field, with both microscope and investigative experimental work being covered.

B.5.8 MTS 3101: MATHEMATICS 1A

Contact time: 28hours (2L /week)
Assessment: continuous 50% (tests)
Examination: 50%
Pre- requisite: None
Paper: 1x 2hour paper.

Content:

Critical thinking skills: inductive reasoning, problem solving. Basic set theory: algebra of sets, Ven diagrams, infinite sets application of sets. Simple logic: statements of logical connection, truth tables negation, conjunction, disjunction, conditional Algebraic expressions and simplifications. Types of functions evaluation of functions: plotting and sketching of simple functions. The real numbers and their properties.

B.5.9 MTS 3112: MATHEMATICS 1B

Contact time: 56hours theory (4L /week)
14 hours practical (I hour/week)
Assessment: Continuous 50%
Examination 50%
Pre- requisite: Mathematics 1A (MTS 3101)
Paper: 1x3 hour paper

Content:

Matrix algebra. Systems of linear equations and their solutions of quadratic equations and their applications. Trigonometry: trigonometric ratios, trigonometric identities, radian measure. Solutions of simple trigonometric equations. Finite arithmetic and geometric series. Binomial expansion and applications of coordinate geometry: parallel and perpendicular lines, distance between points, angle between lines, dividing lines into ratios finding the equation of lines, polar coordinates, equation of circles; areas and volume.

B.5.10 PHC 3101: PHYSICS 1A

Contact time: 28hours (2L /week)
42hours practicals (1 PS/week)
Pre- requisite: IGCSE Physical Science
Co- requisite: MTS 3101 Mathematics I A; STS 3101 Statistics I A
Assessment: Continuous 50%
Examination: 50%
Paper: 1x 3hour paper.

Content:

Units and unit conversions: Vectors: Motions in one and two dimintions: Newton's laws of motion an applications; Static's; Gravitation; Work, energy and power; Introduction to momentum.

B.5.11 PHC 3112: PHYSICS 1B

Contact time: 56 hours theory (4L / week)
Assessment: Continuous 50%
Examination: 50% (1 x 3-hour paper)
Prerequisite: IGCSE Physical Science
Co-requisites: MTS 3101 Mathematics 1A; AND MTS 3112 Mathematics 1B or MTS 3132 Mathematics 2B; and STS 3101 Statistics 1A; and PHC 3192 Lab1

Contents: 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; Concept of magnetic fields; Alternating current; Transformers; Phenomenological approach to RL and RC circuits; Temperature, gas and thermal expansion; Basic geometrical optics; Radioactivity and its detection.

B.5.12 PHC 3192: LAB1

Contact time: 42 hours practical (1PS / week)
Assessment: Continuous 100% (minimum of 5 items)
Prerequisite: IGCSE Physical Science
Co-requisite: MTS 3101 (Mathematics 1A); and MTS 3112 (Mathematics 1B) or MTS 3132 (Mathematics 2B); and STS 3101 (Statistics 1A); and PHC 3112 (Physics 1B)

B.5.13 STS 3101: STATISTICS 1A

Contact time: 28hours (2L /week)
Assessment: Continuous 40% (tests)
Examination: 60%
Pre- requisite: credit in IGCSE Mathematics
Paper: 1x 2hour paper.

Content:

What is Statistics and who is the Statistician? Definition of the word data and information quantitative versus categorical, discrete versus continuous data. Variables: qualitative/ quantitative. Sources of data primary versus secondary sources, population versus sample. Sampling techniques: why sample? Probability versus non-probability sampling method: Simple Random Sampling, Stratified Sampling, Systematic sampling, Cluster Sampling use of random numbers tables. Types of measurement: nominal, ordinal, interval and ratio scales presentation of data :tabular forms – frequency tables , graphical methods – histograms. pie charts, compound bar chart, stem and leaf plot, box- and – whisker plot, frequency polygon etc. Measures of Central tendencies: Mean median and mode: Measures of dispersion – standard deviation and variance: inter- quartile range: skew and kurtosis identifying outliers: Sigma notation.

B.5.14 CHM3192: CHEMISTRY FOR LIFE SCIENCES (≠1 semester/module)

Course equivalent: CHE3122/3123

Pre-requisite: NONE

Contact time: 4L/T + 1PS per week 56 lectures/tutorials 14 practical sessions 1 x 3 hours exam paper
Continuous assessment: [60%]; minimum 2 tests; laboratory component: minimum 15% of CA final exam [40%].

Content: States of matter: physical and chemical properties; mixture and pure substances; elements and compounds. Measurements; significant figures; using units in problem solving; metric system; extensive and intensive properties. Atomic structure and the periodic table; Mendeleev's classification of elements; electron configuration; physical and chemical properties as predicted from groups. Ionic compounds: structure and

properties; types of bonds; formation of cations (oxidation) and anions (reduction); ionic bonds; names of ions and ionic compounds. Molecular elements and compounds: Lewis structure; bonds; resonance structures; molecular geometry; polarity of molecules. Chemical equations and reactions. Composition and stoichiometry: molecular and formula weights of compounds; percent composition. Avogadro's number of the mole concept; empirical formula and molecular formula; stoichiometry; percent yield; limiting reagent. Solutions: The nature of solutions; concentration; percent concentration; molarity; dilution of solutions; electrolytes and non-electrolytes; structure and solubility; osmosis and the cell. Acid-base equilibrium: acids and bases; 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; titration. Introduction to organic chemistry: organic compounds; structural formulae and conformations; functional groups; isomerism; organic reactions and mechanisms; acid-base reactions; oxidation-reduction reactions; Alkanes and cycloalkanes: classes of hydrocarbons; alkanes ; nomenclature; physical properties; oxidation; halogenation. Unsaturated hydrocarbons: Types of unsaturated hydrocarbons; nomenclature of alkenes and alkynes; oxidation and reduction; addition reactions; stereo-isomerism. Aromatic compounds: aromatic substitution reactions; polycyclic and heterocyclic compounds. Alcohol, phenols, thiols, ethers: organic compounds of oxygen; common alcohols and phenols; nomenclature and classification of alcohols; hydrogen bonding in alcohols; acid-base reactions; substitution reactions; dehydration reactions; oxidation and reduction of carbonyl compounds addition reactions. Carboxylic acids and esters: the carboxyl group; common carboxylic acids and their classification; IUPAC and common names; acidity; salts; hydrolysis and saponification of esters; addition and substitution reactions. Amines and amides: The amino and amide groups; nomenclature; basicity of amines; amino acids; peptides; proteins. Introduction to carbohydrates, lipids and porphyrins.

(Although the 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 Course Descriptions from the Faculty of Science.)

B.6 COURSE DESCRIPTIONS (AGRICULTURAL ECONOMICS AND EXTENSION)

B.6.1 AEC 3231: PRINCIPLES OF MICROECONOMICS

Lectures: 3 hours/week
Practicals: 0 hours /week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

The concept of scarcity and wants, Market organization of the economies. Demand and Consumer behaviour-utility analysis, law of diminishing marginal utility, indifference curve analysis, Demand, supply and elasticities, Theories of costs, Production and costs analysis, isocost curves, choice of input combination (isoquants), Short run and long run average costs, Market structures and firm behaviour-perfect competition, monopoly, monopolistic competition, oligopoly. General equilibrium, Efficiency (Production, Exchange) and Production Possibility curve.

B.6.2 AEC 3251: RURAL SOCIOLOGY

Lectures: 3 hours/week
Practicals: 0 hours /week
Assessment: One Exam Paper (3 hrs) 60%; Tests and assignments 40%.

Basic sociological concepts and their application; the significance of rural sociology to agricultural extension and Natural resources exploitation; Differences between rural and urban people/areas; Social theory; Innovation and Social change; Social institutions; Culture and society; Social structures of Namibian rural communities; the peasant Social structure; Rural-urban migration and its effects on agriculture and natural resources; Environmental impact of Economic and social activities - tragedy of the commons; Interactions of human groups/group dynamics. Socio-economic factors and gender differences; Gender and Power relations; Gender needs and analysis; Household analysis and resource management

B.6.3 AEC 3212: PRODUCTION ECONOMICS

Lectures: 3 hours/week
Practicals: 0 hours / week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

The scope of Production Economics; Production Function, Marginal product, average product, three stages of production and optimal input allocation criterion. Elasticity of production; Revenue functions and cost of production. Profit Maximization; Derived Demand for inputs. Cost Functions and Output Optimization. Average and marginal cost curves, Returns to scale. Duality of Production and Cost. Supply Function for the firm. Isoquants, Marginal rate substitution (MRS); Least cost criterion; isocosts, isoclines, the expansion path; Derived demand for inputs, Optimal product-mix, Product interactions (Competitive, supplementary, complementary, and joint product). Isorevenue

lines, constrained revenue maximization. Economies of Scale and economies of size in Agriculture. Risk and uncertainty and technical change.

B.6.4 AEC 3232: PRINCIPLES OF MACROECONOMICS

Lectures: 3 hours/week
Practicals: 0 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Exposes the student to choices in a modern economy, scarcity and choice, Price indices, Inflation, Real and Nominal values, national income accounting, Determination and fluctuations of average economic activities, aggregate supply and demand, Basic consumption, savings and investment functions, Fiscal and monetary policies. Government spending, taxation, budgets, interest rates, money and banking and balance of payments, inflation, employment and business cycles.

B.6.5 AEC 3311: MATHEMATICS FOR AGRICULTURAL ECONOMISTS

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

The Nature and scope of mathematics in economics; Mathematical models; Relations and Functions; Simultaneous linear equations; Set theory - Venn diagrams and Cartesian product; Stocks, Flows and Equilibrium in economics; The differentiation of functions of one variable; Higher Order derivatives; differentiation of functions of more than one variable; Total differentials and total derivatives; Homogeneous functions and Euler's theorem; integration - Rules for integration, Definite integrals; Introduction to matrix algebra - Vectors and Matrices, Inverting a matrix , Solution of equation systems by matrix inversion ; Input - Output analysis. Introduction to Linear programming, Simplex method.

B.6.6 AEC 3351: FARM PLANNING AND MANAGEMENT

Lectures: 3 hours/week
Practicals: 2 hours /week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.
Prerequisite: Production Economics (AEC 3212)

Scope and functions of farm management. Farm Records, Developing enterprise budgets and partial budgets, costs of machinery services, estimating seasonal input requirements. Labour management and labour incentive plans. Whole-farm planning and capital budgeting. Farm planning with linear programming. Consideration of risk and uncertainty in decision analysis. Trend analysis and projecting future farm business plans using budgeting and computerized tools. Applications to communal and commercial farms in Namibia. (The course will include farm management field trips and case studies).

B.6.7 AER 3311: RESEARCH METHODS IN AGRICULTURAL ECONOMICS

Lectures: 3 hours/week
Practicals: 1.5 hours /week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

An introduction to research methods in agricultural economics, and survey of the various quantitative and qualitative tools commonly used in agricultural economics. Includes an introduction to economic data and the use of computers in data collection, included will be an introduction to sampling, survey design, and basic statistical inference. Data manipulation and methods for describing and displaying data and survey report writing will be covered. The course will prepare the student to undertake the Research Project Course in the 4th year. It will include 1 week of fieldwork on applied research tools.

B.6.8 AEA 3371: FIELD ATTACHMENT

Six Weeks of Field Attachment

At the end of the second 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 oral presentation will constitute the total assessment mark.

B.6.9 AEM 3312: AGRICULTURAL MARKETING

Lectures:	3 hours/week
Practicals:	1½ hours /week
Assessment:	One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.
Prerequisite:	Principles of Microeconomics (AEC 3231)

Study of marketing: Introduction, Definition and functions. Market Research; consumer behaviour. Approaches to the study of marketing. Estimation of supply and demand; elasticities of agricultural commodities. Marketing alternatives and strategies. Determining Prices of agricultural products and price fluctuations. Risk Management and future markets. Market Structures, Institutions and policies for Marketing. Marketing. Marketing in developing nations. Marketing systems of agricultural products (livestock, cereal grains, horticultural products and agricultural inputs).

B.6.10 AEA 3312: ECONOMETRICS FOR AGRICULTURAL ECONOMISTS

Lectures:	3 hours / week
Practicals:	3 hours / week
Prerequisite:	Biometrics (CSC 3271)

Definition and scope of econometrics: statistical inference – estimation and hypotheses testing; tests concerning means for large and small samples – t and z tests; time series analysis; index numbers; correlation analysis – simple and rank correlation; simple and multiple regression – assumptions of ordinary least squares method, estimates of parameters, R squared (R²), standard error and test of significance; production function analysis – Cobb Douglas and CES production functions; dummy variables, violations of assumptions of CLRM, multicollinearity, autocorrelation, heteroscedasticity, use of dummy variables. Students will be exposed to estimation of demand and supply functions using econometric computer software packages.

B.6.11 AEC 3372: AGRICULTURAL EXTENSION

Lectures:	4 hours/week
Practicals:	1½ hours /week
Assessment:	One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Extension concepts, principles and philosophies; The role of agricultural extension in sustainable agricultural development; Agricultural extension as adult learning; Extension methods; Audio-visual aids in extension; Extension teaching methods; Designing extension programmes; Agricultural extension approaches; Agricultural knowledge system and the transformation cycle; Applying learning theory in extension; Science-based and indigenous knowledge systems; Effective management of knowledge systems – some case studies (Zimbabwe, Israel, Netherlands, Switzerland); Research-Farmer-Extension linkages; knowledge system The evolution of agricultural extension perspectives.

The concepts of planning and management; The project cycle; Management functions; The structure of organisations; Participatory monitoring and evaluation; Effective supervision and leadership in extension; Personality and management styles. Participatory methodologies toolbox for planning.

Concepts related to FSR&E; Design of FSR/E programmes for livestock, poultry and crop enterprises; Participatory technology development techniques; On-Farm research; FSR/E and sustainable agriculture; Integrated bio-systems; The FSR/E approach as applied in Namibia.

B.6.12 AEF 3312: AGRICULTURAL FINANCE AND CREDIT

Lectures:	3 hours / week
Practicals:	2 hours / week
Co-requisite:	Farm Planning and Management (AEC 3351)

Application of financial management concepts in evaluating investing options and risk in farm and agribusiness decision-making. Agricultural lending and borrowing, financial capital markets. Role of credit in Agricultural development. Credit institutions, Agricultural loans, Use of credit in the farm business, cost of credit, and credit repayment plans. Credit requirements – collateral. The analysis and interpretation of basic farm accounting records and the use of this information in farm planning and in financing. Skills taught will include an analysis of financial statements and ratios. Loan default and other repayment problems. Credit policies and incentives. Land acquisition and management (Renting, leasing, purchases), and land improvement and conservation.

B.6.13 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.

B.6.14 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.

B.6.15 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.

B.6.16 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

B.6.17 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.

B.6.18 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.

B.6.19 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.

B.6.20 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.

B.6.21 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.

B.6.22 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.

C. B.SC. IN AGRICULTURE (ANIMAL SCIENCE)

C.1 FIRST YEAR

All courses listed below, except Communication and Study Skills in English, Contemporary Social Issues and Principles of Agriculture and Natural Resources, will be offered by the Faculty of Science.

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
BLG	3101	Biology 1A	3.5	28	42	70
MTS	3101	Mathematics 1A	2	28	0	28
PHC	3101	Physics 1A	3.5	28	42	70
STS	3101	Statistics 1A	2	28	0	28
UCE	3119	Communication and Study Skills in English	4	56	0	56
UCC	3109	Computer Literacy	2.5	14	42	56
			17.5	182	126	308
Semester 2						
BLG	3112	Biology 1B	5.5	56	42	98
MTS	3112	Mathematics 1B	4.5	56	14	70
PHC	3112	Physics 1B	4	56	0	56
PHC	3192	LAB 1	1.5	0	42	42
CHM	3192	Chemistry for Life Sciences	4.5	56	14	70
UCA	3119	English for Academic Purposes	4	56	0	56
UCI	3109	Contemporary Social Issues	2	28	0	28
ACA	3112	Principles of Agriculture and Natural Resources	3	42	0	42
			29	350	112	462
TOTALS			46.5	532	238	770

For course descriptions please refer to section B.5

C.2 SECOND YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3231	Principles of Microeconomics	3.0	42	0	42
AEC	3251	Rural Sociology	2.0	28	0	28
ASC	3202	Genetics	2.75	28	21	49
CSC	3271	Biometrics	4.75	56	21	77
CSC	3231	Introduction to Plant Science	4.0	42	28	70
FSC	3201	Food and Human Nutrition	2.5	28	14	42
FSC	3231	General Microbiology	2.75	28	21	49
			22.75	252	105	357
Semester 2						
AEC	3212	Production Economics	3.0	42	0	42
AEC	3232	Principles of Macroeconomics	3.0	42	0	42
AEI	3202	Introduction to Agricultural Engineering	2.75	28	21	49
ASC	3232	Biochemistry	3.75	42	21	63
ASC	3202	Livestock Production Systems	2.75	28	21	49
CSC	3212	Introduction to Agronomy	4.50	42	42	84
FSC	3202	Introduction to Food Technology	2.75	28	21	49
			22.50	252	126	378
TOTALS			45.25	504	231	735

C.3 THIRD YEAR

COURSE	CODE	TITLE	CREDITS	L	P	T	(HRS)
Semester 1							
ASC	3311	Animal Nutrition	3.75	42	21		63
ASC	3321	Parasitology	2.75	28	21		49
ASC	3301	Animal Reproduction	2.75	28	21		49
ASC	3371	Animal Anatomy and Physiology	4.75	56	21		77
ASA	3371	Field Attachment	3.0				
ASB	3311	Animal Breeding	3.75	42	21		63
AEC	3351	Farm Planning and Management	4.0	42	28		70
			22.75	210	105		315
Semester 2							
ASC	3312	Feeds and Feeding	3.75	42	21		63
ASH	3312	Animal Health	5.0	42	28		70
ASC	3302	Game Ranching	2.75	28	21		49
ASC	3352	Pig and Rabbit Production	3.75	42	21		63
AEC	3372	Agricultural Extension	4.75	56	21		77
AEM	3312	Agricultural Marketing	3.75	42	21		63
			22.75	238	133		371
TOTALS			45.50	448	238		686

C.4 FOURTH YEAR

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	56	21		77
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
			26.25	224	175		399
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	28	21		49
ASC	3432	Meat Science and Livestock Products	3.75	42	21		63
AEB	3412	Entrepreneurship & Agric Business Management	4.0	42	28		70
			15.75	154	133		287
TOTALS			42.0	378	308		686

C.5 COURSE DESCRIPTIONS

C.5.1 ASC 3201: GENETICS

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

Mendelian genetics, extension of Mendelian Analysis, Linkage; Chromosome variation and sex determination; DNA – the basis of heredity: replication, synthesis, organization in genes and chromosomes, mutations, repair and transposable elements; Storage and expression of genetic information, regulation of gene expression, extra-nuclear inheritance; Examples from viruses, prokaryotic and eukaryotic organisms shall be used.

C.5.2 ASC 3232: BIOCHEMISTRY

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

Surface chemistry, chromatography, spectroscopy; Colloids in biological systems; Important reaction types in biochemistry; Structure and function of macro-molecules: polysaccharides, proteins including enzymes; nucleic acids and lipids; Basic enzymology with emphasis on kinetics; Mechanisms of control, metabolic pathways and energy relationships (ATP, ADP) in the metabolism and synthesis of carbohydrates, fats and protein; Photosynthesis; The role of DNA and RNA in protein synthesis; Metabolism of minerals and vitamins; Biochemical degradation of plant poisons and pesticides

C.5.3 ASC 3202: LIVESTOCK PRODUCTION SYSTEMS

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

The role of livestock in agriculture and the national economy; Potentials and constraints to livestock production; Systems of production: communal and commercial, intensive and extensive; 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; Health issues in livestock production.

C.5.4 ASC 3311: ANIMAL NUTRITION

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

Nutrients and the basic characteristics of feeds; Analytical methods for chemical and metabolite determination; Comparative digestion of feeds and absorption of nutrients in ruminants and non-ruminants; Nutritive evaluation of feedstuffs including digestibility and systems of describing energy value; Mineral and vitamin nutrition: occurrence, function and deficiency symptoms of major and minor minerals and water and fat soluble vitamins; The role of water in animal nutrition.

C.5.5 ASC 3321: PARASITOLOGY

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

Definition of the concepts of parasitism, symbiosis and commensalism; Evolution of parasitism; Structural, physiological and behavioural adaptations of parasites; Classification of parasites: arthropods, protozoa and helminths; Important genera and species of internal and external parasites (including vectors) in Namibia and southern Africa: morphology, habitat, distribution, life cycles; The role of parasites in causing and transmitting diseases of economic and socio-cultural importance in domestic animals; Methods of control and eradication.

C.5.6 ASC 3301: ANIMAL REPRODUCTION

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

Factors affecting male and female fertility; Reproductive efficiency; Semen quality; Heat detection; Fertilization and embryo loss; Placentation, pregnancy and pregnancy diagnosis, parturition; Manipulation of reproduction; Artificial insemination and embryo transfer in biological and practical aspects of reproduction technology; Control of sex ratios; Recombinant DNA: cloning and other practical applications of genetic engineering; Reproductive disorders.

C.5.7 ASC 3371: ANIMAL ANATOMY AND PHYSIOLOGY

Lectures: 4 hours/week
Practicals: 3 hours alternate weeks
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Morphology and function of the circulatory, respiratory, nervous, skeletal and locomotory systems of farm animals; Early embryonic development in animals; Digestive physiology of ruminant and non-ruminant animals; Physiology of reproduction; The endocrine system; Environmental physiology; Homeostasis and control mechanisms; Introduction to immuno response mechanisms.

C.5.8 ASA 3371: FIELD ATTACHMENT

Six weeks of Field attachment

At the end of the second year, students will be attached to farms and agro-industries to introduce them to the operations therein. An attachment report and an oral presentation will constitute the total assessment mark.

C.5.9 ASB 3311: ANIMAL BREEDING

Lectures: 3 hours/week
Practicals: 3 hours alternate weeks
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.
Prerequisite: Genetics (ASC 3201)

Principles of population genetics; The Hardy-Weinberg Law; Genetic change through selection, mutation, migration, mating systems and genetic drift; Beneficial mutations; Theory of quantitative traits: repeatability, heritability, genetic correlation, estimating breeding value; Phenotypic and genotypic variations and interactions; Selection methods and genetic response through crossbreeding and in-breeding; Improving traits of economic importance; Livestock recording systems and application of production records in breeding; Introduction to cytogenetics, molecular genetics and biotechnology; Gene mapping, breed characterization and conservation; Breeding for disease resistance.

C.5.10 ASC 3312: FEEDS AND FEEDING

Lectures: 3 hours/week
Practicals: 3 hours alternate weeks
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.
Co-requisite: Animal Nutrition (ASC 3311)

Livestock feeds and feed resources; Phenolic compounds and their effect on the nutritional value of feeds; Improving the feeding value of low quality forages; Nutrient requirements and feeding standards; Requirements of farm animals for maintenance, growth, reproduction and other productive purposes; Ration formulation; Feed intake regulation and problems in livestock feeding; Common metabolic disorders.

C.5.11 ASH 3312: ANIMAL HEALTH

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

Concepts of health and disease; Disease development and body response; Common diseases of cattle, sheep, goats, pigs, poultry and game animals in Namibia: aetiology, prevention, control and economics; Zoonoses; Plant and chemical poisonings; Basic on-farm treatments; Public health in relation to animal health; Legislations for animal disease control.

C.5.12 ASC 3302: GAME RANCHING

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

Objectives and ecological principles in establishment of game ranching; Game species of interest and their interaction with other livestock farming systems; Game capture, transport and adaptation; Veld management, monitoring, nutrition; Legislative aspects of game farming; Game utilization: consumptive and non-consumptive

C.5.13 ASC 3352: PIG AND RABBIT PRODUCTION

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

Pigs and rabbits as sources of animal protein; Breeds of pigs and rabbits; Pig and rabbit production systems; Nutrition, breeding, reproduction, housing and health management of pigs and rabbits; Marketing of rabbits and of pig meat and skin.

C.5.14 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.

C.5.15 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.

C.5.16 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.

C.5.17 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.

C.5.18 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.

C.5.19 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.

C.5.20 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.

C.5.21 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.

C.5.22 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.

D. B.SC. IN AGRICULTURE (CROP SCIENCE)

D.1 FIRST YEAR

All courses listed below, except Communication and Study Skills in English, Contemporary Social Issues and Principles of Agriculture and Natural Resources, will be offered by the Faculty of Science.

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
BLG	3101	Biology 1A	3.5	28	42	70
MTS	3101	Mathematics 1A	2	28	0	28
PHC	3101	Physics 1A	3.5	28	42	70
STS	3101	Statistics 1A	2	28	0	28
UCE	3119	Communication and Study Skills in English	4	56	0	56
UCC	3109	Computer Literacy	2.5	14	42	56
			17.5	182	126	308
Semester 2						
BLG	3112	Biology 1B	5.5	56	42	98
MTS	3112	Mathematics 1B	4.5	56	14	70
PHC	3112	Physics 1B	4	56	0	56
PHC	3192	LAB 1	1.5	0	42	42
CHM	3192	Chemistry for Life Sciences	4.5	56	14	70
UCA	3119	English for Academic Purposes	4	56	0	56
UCI	3109	Contemporary Social Issues	2	28	0	28
ACA	3112	Principles of Agriculture and Natural Resources	3	42	0	42
			29	350	112	462
TOTALS			46.5	532	238	770

For course descriptions please refer to section B.5

D.2 SECOND YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3231	Principles of Microeconomics	3.0	42	0	42
AEC	3251	Rural Sociology	2.0	28	0	28
ASC	3201	Genetics	2.75	28	21	49
CSC	3271	Biometrics	4.75	56	21	77
CSC	3231	Introduction to Plant Science	4.0	42	28	70
FSC	3201	Food and Human Nutrition	2.5	28	14	42
FSC	3231	General Microbiology	2.75	28	21	49
			22.75	252	105	357
Semester 2						
AEC	3212	Production Economics	3.0	42	0	42
AEC	3232	Principles of Macroeconomics	3.0	42	0	42
AEN	3202	Introduction to Agricultural Engineering	2.75	28	21	49
ASC	3232	Biochemistry	3.75	42	21	63
ASC	3202	Livestock Production Systems	2.75	28	21	49
CSC	3212	Introduction to Agronomy	4.50	42	42	84
FSC	3202	Introduction to Food Technology	2.75	28	21	49
			22.50	252	126	378
TOTALS			45.25	504	231	735

D.3 THIRD YEAR

COURSE	CODE	TITLE	CREDITS	L	P	T	(HRS)
Semester 1							
CSC	3351	Field Crop Production	3.75	42	21	63	
CSC	3331	Weed Science	3.75	42	21	63	
CSA	3371	Field Attachment	3.0				
CSE	3311	Crop Ecophysiology	3.75	42	21	63	
AEC	3351	Farm Planning and Management	4.0	42	28	70	
			19.25	168	91	259	
Semester 2							
CSC	3332	Plant Breeding & Seed Technology	4.25	42	35	77	
AEN	3332	Farm Mechanization & Crop Storage	4.50	42	42	84	
NRO	3302	Agroforestry	2.75	28	21	49	
AEC	3372	Agricultural Extension	4.75	56	21	77	
AEM	3312	Agricultural Marketing	3.75	42	21	63	
			23.75	252	161	413	
TOTALS			43	420	252	672	

D.4 FOURTH YEAR

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	
			25	196	196	392	
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	
			16.75	168	133	301	
TOTALS			41.75	364	329	693	

D.5 COURSE DESCRIPTIONS

D.5.1 CSC 3271: BIOMETRICS

Lectures: 4 hours/week
Practicals: 3 hours alternate weeks
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Introduction to statistical packages for computers. Probability, Bayes' theorem, combinations and permutations. Binomial, Poisson and normal distributions. Standard deviation of the mean. Comparing two population or sample means. Comparing with a standard. Scientific Research. Objectives of Experiments. Principles of experimental design. Concept of experimental error. Replication and randomization. Experimental designs, Analysis and Inference. Analysis of variance, single factor and two factor designs with replication. Multiple comparisons. Linear regression, correlation. Transformations. Non-parametric techniques. Procedures for Implementing a Research Project. Presentation of Research Results.

D.5.2 CSC 3231: INTRODUCTION TO PLANT SCIENCE

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

Plant anatomy: organelles, cell types, tissues, Morphology and anatomy of roots, stems, leaves, flowers, fruits. Taxonomy: binomial system, use of taxonomic keys. Plant physiology: photosynthesis (processes and factors), respiration (processes and factors), plant-water relations (importance, uptake, transpiration), translocation, plant growth regulators.

D.5.3 CSC 3212: INTRODUCTION TO AGRONOMY

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

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.

D.5.4 CSC 3351: FIELD CROP PRODUCTION

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

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, yield, uses and production practices. Areas where grown, limitations to production. Potential crops (sisal).

D.5.5 CSC 3331: WEED SCIENCE

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

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. Weed management of important crops of Namibia.

D.5.6 CSA 3371: FIELD ATTACHMENT

Six weeks of attachment

Attachment to a suitable farm, research station, extension unit or agro-allied industry. A report and oral presentation will constitute the total assessment mark.

D.5.7 CSE 3311: CROP ECOPHYSIOLOGY

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

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 & stem growth, branching. Flowering. Maturation and ripening. Senescence and abscission. Physiology of stress – abiotic (heat, acidity, water) & biotic stresses.

Photoperiodism. Allelopathy. Competition.

D.5.8 CSC 3332: PLANT BREEDING AND SEED TECHNOLOGY

Lectures: 3 hours/week
Practicals: 2 hours alternate weeks
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.
Prerequisite: Genetics (ASC3201)

Breeding and Seed Technology (importance); Selection theory; Breeding procedure; Pollination: process, methods, inbreeding, out breeding, inbreeding depression, hybrid vigour, male sterility. Cultivar evaluation; Germplasm sources, wild ancestors and relatives. Germless collection and storage; Variety breeding: selection methods, evaluation and release. DUS-test. Seed multiplication: organization, suitable areas, and agronomy. Processing; Storage; Seed quality control; Marketing and distribution.

D.5.9 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.

D.5.10 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.

D.5.11 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.

D.5.12 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.

D.5.13 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).

D.5.14 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, CO₂ 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.

D.5.15 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

D.5.16 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

D.5.17 CSC 3452: PLANT BIOTECHNOLOGY

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

D.6 COURSE DESCRIPTIONS (AGRICULTURAL ENGINEERING)

D.6.1 AEN 3202: INTRODUCTION TO AGRICULTURAL ENGINEERING

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

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.

D.6.2 AEN 3332: FARM MECHANIZATION AND CROP STORAGE

Lectures: 3 hours/week
Practicals: 3 hours alternate weeks

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

Fundamental quantities and units. Fundamentals of Engineering: Architectural drawing with emphasis on plans. 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). 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: (combine harvester-types and operation). Farm Machinery Management: Machine Capacity, performance and costs. Machinery cost and selection. 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. Milling. Oil expression. Handling and Storage of Horticultural and perishable Crops

D.6.3 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.

D.6.4 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.

E. B.S.C. IN AGRICULTURE (FOOD SCIENCE AND TECHNOLOGY)

E.1 FIRST YEAR

All courses listed below, except Communication and Study Skills in English, Contemporary Social Issues and Principles of Agriculture and Natural Resources, will be offered by the Faculty of Science.

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
BLG	3101	Biology 1A	3.5	28	42	70
MTS	3101	Mathematics 1A	2	28	0	28
PHC	3101	Physics 1A	3.5	28	42	70
STS	3101	Statistics 1A	2	28	0	28
UCE	3119	Communication and Study Skills in English	4	56	0	56
UCC	3109	Computer Literacy	2.5	14	42	56
			17.5	182	126	308
Semester 2						
BLG	3112	Biology 1B	5.5	56	42	98
MTS	3112	Mathematics 1B	4.5	56	14	70
PHC	3112	Physics 1B	4	56	0	56
PHC	3192	LAB 1	1.5	0	42	42
CHM	3192	Chemistry for Life Sciences	4.5	56	14	70
UCA	3119	English for Academic Purposes	4	56	0	56
UCI	3109	Contemporary Social Issues	2	28	0	28
ACA	3112	Principles of Agriculture and Natural Resources	3	42	0	42
			29	350	112	462
TOTALS			46.5	532	238	770

For course descriptions please refer to section B.5

E.2 SECOND YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3231	Principles of Microeconomics	3.0	42	0	42
AEC	3251	Rural Sociology	2.0	28	0	28
ASC	3201	Genetics	2.75	28	21	49
CSC	3271	Biometrics	4.75	56	21	77
CSC	3231	Introduction to Plant Science	4.0	42	28	70
FSC	3201	Food and Human Nutrition	2.5	28	14	42
FSC	3231	General Microbiology	2.75	28	21	49
			22.75	252	105	357
Semester 2						
AEC	3212	Production Economics	3.0	42	0	42
AEC	3232	Principles of Macroeconomics	3.0	42	0	42
AEN	3202	Introduction to Agricultural Engineering	2.75	28	21	49
ASC	3232	Biochemistry	3.75	42	21	63
ASC	3202	Livestock Production Systems	2.75	28	21	49
CSC	3212	Introduction to Agronomy	4.50	42	42	84
FSC	3202	Introduction to Food Technology	2.75	28	21	49
			22.50	252	126	378
TOTALS			45.25	504	231	735

E.3 THIRD YEAR

COURSE	CODE	TITLE	CREDITS	L	P	T (HRS)
Semester 1						
FSC	3311	Food Chemistry	3.75	42	21	63
FSM	3311	Meat Science and Technology	3.75	42	21	63
FSA	3371	Field Attachment	3.0			
FSP	3311	Post Harvest Technology	3.75	42	21	63
FSF	3311	Food Processing Technology	3.75	42	21	63
			18.0	168	84	252
Semester 2						
FSC	3332	Food Analysis, Instrumentation & Sen Eva	3.75	42	21	63
FSC	3342	Workshop Technology	4.0	28	42	70
FSC	3352	Food Microbiology	3.75	42	21	63
FSC	3362	Principles of Food Engineering	3.75	42	21	63
AEC	3372	Agricultural Extension	4.75	56	21	77
AEM	3312	Agricultural Marketing	3.75	42	21	63
			23.75	252	147	399
TOTALS			41.75	420	231	651

E.4 FOURTH YEAR

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	28	21	49
FSA	3471	Field Attachment	3.0			
			21.5	168	182	350
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
			17.75	154	203	357
TOTALS			39.25	322	385	707

E.5 COURSE DESCRIPTIONS

E.5.1 FSC 3201: FOOD AND HUMAN NUTRITION

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

Food locally available: nutrients, digestion, and functions of the nutrients in the body. Formulation of balanced ration for each group of people. Anthropometrics measurements: Body Mass Index (BMI), Basal Metabolic Rate (BMR) and Physical Activity Level (PAL). Nutritional disorders resulting from deficiencies and excesses. Food micro-organisms and food spoilage; Symptoms of diseases caused by pathogens and their control; food hygiene; Physical food spoilage and Chemical food spoilage. Food additives including drugs. Toxicity – Chemical, Biological and Bacteriological in different foodstuffs. Food preservation and processing methods. Nutraceuticals and functional foods. Food Tolerance and Food Allergies.

E.5.2 FSC 3231: GENERAL MICROBIOLOGY

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

Major groups of microorganisms and their environment: Classification, structure chemical composition and biology of bacteria, fungi, algae, protozoa and viruses. Effect of antibiotics on microorganisms; important pathogens of plants and animals: bacterial, viral and fungal. The role of microorganisms in: general industry, food industry and in soils. Concepts of Microbiology with special reference to microscopy, staining procedure, sterilization, aseptic and pure culture techniques, media preparation.

E.5.3 FSC 3202: INTRODUCTION TO FOOD TECHNOLOGY

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

An introduction to the food industry in Namibia and SADC region; Principles of food handling; Food processing and preservation; Food packaging and labelling. 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.

E.5.4 FSC 3311: FOOD CHEMISTRY

Lectures: 3 hrs/week
Practicals: 3 hr/alternate week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.
Prerequisite: Biochemistry (ASC 3232)

Water chemistry in food processing and technology. The chemistry of important carbohydrates in foods: monosaccharides, oligosaccharides polysaccharides and related compounds: 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 and emulsifiers: 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.

E.5.5 FSM 3311: MEAT SCIENCE AND TECHNOLOGY

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

The meat Industry in Namibia and the region. Handling of slaughter animals. Slaughtering procedures. Selected topics related to animal anatomy. Grading and pricing of carcasses. Slaughterhouse hygiene. Carcass composition, characteristics and quality. Wholesale and retail cuts of meat. Structure and composition of meat. Meat proteins and their functionality. 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.

E.5.6 FSA 3371: FIELD ATTACHMENT

Six weeks of Field attachment

At the end of the second year, B.Sc Agriculture students specializing in Food Science & Technology will be attached to farms and agro-industries to introduce them to the operations therein. An attachment report and an oral presentation will constitute the total assessment mark.

E.5.7 FSP 3311: POSTHARVEST TECHNOLOGY

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

Post harvest and Nutritional losses. Physiological and biochemical characteristics of agricultural products with respect to maturation, ripening and storage life. Manipulation of pre and post harvest environment to influence ripening and quality. Postharvest handling of agricultural products. Postharvest handling of meat and seafoods. Traditional and modern methods of drying of grain in Namibia.

E.5.8 FSF 3311: FOOD PROCESSING TECHNOLOGY

Lectures: 3 hrs/week/14 weeks
Practicals: 3 hrs/alternate week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Food preparation processes. Handling of raw materials: cleaning, sorting and grading. Conversion and separation processes: mixing, emulsification, homogenisation, extrusion, distillation, crystallization, filtration, size reduction and grading-sieving and sorting. Preservation techniques: heating, refrigeration, dehydration, concentration and irradiation. Shelf life and sensory quality of processed food products.

E.5.9 FSC 3332: FOOD ANALYSIS, INSTRUMENTATION & SENSORY EVALUATION

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

The scope of food analysis; analytical methods and procedures; assessment and validation of analytical data: precision, accuracy, sensitivity, specificity, standard deviation, coefficient of variation; good laboratory practice and quality assurance: health and safety, AOAC; conventional analytical methods; analytical techniques: titrimetry, gravimetry; separation techniques: chromatography, electrophoresis; introduction to analytical spectroscopy: atomic spectroscopy, molecular spectroscopy; radiochemical methods; application of sensory evaluation; types of panels, types of tests and the specific functions; statistical analysis and interpretation of data. SACCP. Product development.

E.5.10 FSC 3342: WORKSHOP TECHNOLOGY

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

Measurement and measuring instruments. Machine tools. Heat effects. Engineering drawing application. Engineering materials, treatment and properties. Joining components and methods. Workshop safety. Freehand sketching: lettering, projections, pictorials. Multiview drawing and drawing equipments. Architectural drawing with emphasis on plans. Working drawing and details of farm and factory buildings. Technical drawing of machine parts.

E.5.11 FSC 3352: FOOD MICROBIOLOGY

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

Microorganisms of interest in food. Laboratory techniques used in the isolation, enumeration and identification of microorganisms in food. Kinetics of multiplication of microorganisms. Microbiological principles of food processing and preservation. Food toxicology. Sampling and sampling plans. Indices of sanitation in food. Biochemical reactions of microorganisms in food. Application of genetic engineering to food.

E.5.12 FSP 3312: PRINCIPLES OF FOOD ENGINEERING

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

Dimensions and units. Unit operation calculations. Thermodynamics related to food processing operations Heat and Ass transfer. Thermal processing design. Heat exchanger design. Refrigeration. Fluid dynamics; fluid statics; manometry. Rheology of foods both liquid and solids. Condensation psychometrics.

E.5.13 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.

E.5.14 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.

E.5.15 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

E.5.16 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.

E.5.17 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.

E.5.18 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.

E.5.19 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.

E.5.20 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.

E.5.21 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.

E.5.22 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.

E.5.23 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.

E.5.24 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.

E.5.25 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.

F. B.SC. IN NATURAL RESOURCES (FISHERIES AND AQUATIC SCIENCES)

F.1 FIRST YEAR

All courses listed below, except Communication and Study Skills in English, Contemporary Social Issues and Principles of Agriculture and Natural Resources, will be offered by the Faculty of Science.

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
BLG	3101	Biology 1A	3.5	28	42	70
MTS	3101	Mathematics 1A	2	28	0	28
PHC	3101	Physics 1A	3.5	28	42	70
STS	3101	Statistics 1A	2	28	0	28
UCE	3119	Communication and Study Skills in English	4	56	0	56
UCC	3109	Computer Literacy	2.5	14	42	56
			17.5	182	126	308
Semester 2						
BLG	3112	Biology 1B	5.5	56	42	98
MTS	3112	Mathematics 1B	4.5	56	14	70
PHC	3112	Physics 1B	4	56	0	56
PHC	3192	LAB 1	1.5	0	42	42
CHM	3192	Chemistry for Life Sciences	4.5	56	14	70
UCA	3119	English for Academic Purposes	4	56	0	56
UCI	3109	Contemporary Social Issues	2	28	0	28
ACA	3112	Principles of Agriculture and Natural Resources	3	42	0	42
			29	350	112	462
TOTALS			46.5	532	238	770

For course descriptions please refer to section B.5

F.2 SECOND YEAR

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3231	Principles of Microeconomics	3.0	42	0	42
AEC	3251	Rural Sociology	2.0	28	0	28
ASC	3201	Genetics	2.75	28	21	49
NRE	3271	Introduction to Environmental Science	4.75	56	21	77
NRW	3271	Biosystematics	4.75	56	21	77
FSC	3231	General Microbiology	3.75	42	21	63
			20.0	238	84	322
Semester 2						
AEC	3212	Production Economics	3.0	42	0	42
AEC	3232	Principles of Macroeconomics	3.0	42	0	42
ASC	3202	Biochemistry	3.75	42	21	63
NRE	3222	Climatology and Hydrology	2.50	28	14	42
NRF	3272	Water Chemistry	4.75	56	21	77
NRF	3292	Natural Resource Economics	4.75	56	21	77
			21.25	230	128	357
TOTALS			41.25	468	212	679

F.3 THIRD YEAR

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
NRF	3391	Biostatistics I	3.75	42	21	63
NRA	3391	Aquaculture	3.75	42	21	63
NRP	3371	Physical Oceanography	3.75	42	21	63
NRB	3311	Fish Biology and Marine Animal Physiology	4.75	56	21	77
NRA	3371	Field Attachment	3.0			
NRF	3371	Aquatic Invertebrate Biology	3.75	42	21	63
			22.75	224	105	329
Semester 2						
AEC	3332	Business Management	4.5	42	42	84
NRF	3392	Biostatistics II	3.75	42	21	63
NRA	3372	Aquatic Ecology	3.75	42	21	63
NRC	3372	Chemical and Biological Oceanography	4.75	56	21	77
NRC	3392	Conservation Biology	3.75	42	21	63
			20.5	224	126	350
TOTALS			43.25	448	231	679

F.4 FOURTH YEAR

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			
NRF	3491	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
			30.0	266	182	448
Semester 2						
NRF	3410	Research Project	3.0	0	42	42
NRP	3471	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
			18.5	168	126	294
TOTALS			48.5	434	308	742

F.5 COURSE DESCRIPTIONS

F.5.1 NRE 3271: INTRODUCTION TO ENVIRONMENTAL SCIENCE

Lectures: 4 hours/week
 Practicals: 2 hours/week
 Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

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.

F.5.2 NRW 3271: BIOSYSTEMATICS

Lectures: 4 hours/week
 Practicals: 2 hours/week
 Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Principles and practices of animal and plant taxonomy with emphasis on the phylogenic relationships and evolutionary features in classification. Detailed study of selected locally important families of plants and animals. Use of experimental methods in taxonomy. Biology of tropical fishes with emphasis on species from marine and freshwater ecosystems: Ecology, taxonomy, bio-geography and evaluation of the fish faunas of tropical marine and freshwaters.

F.5.3 NRE 3222: CLIMATOLOGY AND HYDROLOGY

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

Weather parameters, their definitions and measurement. World weather systems and their effects on Namibian conditions. Climate classification and interpretation of climatic data. Weather forecasting. Effects of topography and other factors. Climatological zones of Namibia. Elements of hydrological cycle and their estimation. Groundwater hydrology and exploration. Water quality.

F.5.4 NRF 3272: WATER CHEMISTRY

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Introduction to water chemical structure. Water characteristics. Thermodynamic and chemical equilibrium of ions. Le Chatelier's principle. Types of reactions: acid-base, precipitation, complexation, potentiometric, oxidation-reduction. Mass balance equations and electro-neutrality. Chemical composition of water. Activity coefficient and concentration effects of ions on chemical reactions. Comparison between freshwater and seawater, pH, dissolved carbon dioxide and oxygen dynamics, nitrogen and phosphorus ions and cycles. The sulphur dynamics. Analysis of selected chemicals. Analysis of atmospheric samples-pollutants; Radioactivity and radionuclides in water.

F.5.5 NRF 3292: NATURAL RESOURCE ECONOMICS

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Natural resources: renewable and non-renewable; natural capital and man-made capital: Conservation vs development. Sustainability: resource scarcity and population growth; ecocentric vs. anthropocentric approach; Resource use; the precautionary use-pay principle; economic growth and sustainable development; Brundtland Report. Market failures: public goods; externalities; Valuing natural resources: surrogate market techniques; travel time; contingent valuation methods; non-use values; opportunity cost.

F.5.6 NRF 3391: BIostatISTICS I

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Variables; Distributions; Populations and samples; Random and Collection of data; Presentation; Summarization and characterization of data; Measures of Central Tendency; Measures of dispersion; Standard deviation of means; Coefficient of variability; Probability; Sampling from a normal distribution; Comparison involving two sample means; Principles of Experimental design; Principles and Procedures of laying an experiment and collecting data; Single-factor experiments; Completely randomized designs; Randomized complete block designs; Latin Squares; Two-factor Experiments; Split-plot designs.

F.5.7 NRA 3391: AQUACULTURE

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

A consideration of the biological, engineering and economic factors involved in the establishment and operations of different marine and freshwater aquaculture systems: Systems and practices currently in use both overseas and in Africa; Regulations Governing Aquaculture Practices in Africa and in Namibia; Appraisal of advances in fish farming

technology that may have particular application in Africa and other tropical regions; Integrated Agriculture - Aquaculture Systems; The Impact of Aquaculture Systems on the Environment; Fish Diseases and parasites.

F.5.8 NRP 3371: PHYSICAL OCEANOGRAPHY

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Marine geology and ocean floor processes. Water properties. Coastal processes: accumulation; freshwater runoff, sediment transport. Tidal mechanisms. Eddy diffusion and turbulence. Waves. Coriolis and Ekman transport. Wind driven and geostrophical currents, vertical water movement, rings and meanders. Physical and oceanographical instrumentation. Remote Sensing.

F.5.9 NRB 3311: FISH BIOLOGY AND MARINE ANIMAL PHYSIOLOGY

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

Diversity and evolution of fishes, General anatomy and physiology of fish: mechanisms dealing with respiration and circulation; feeding behaviour, nutrition, energy and growth; thermoregulation; osmoregulation and excretion; skeleton, muscle and movement; central nervous system, endocrine system and integration; reproduction. Other marine animals.

F.5.10 NRA 3371: FIELD ATTACHMENT

Six weeks of field attachment

At the end of the second 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.

F.5.11 NRF 3371: AQUATIC INVERTEBRATE BIOLOGY

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

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

F.5.12 NRF 3392: BIostatISTICS II

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

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

F.5.13 NRA 3372: AQUATIC ECOLOGY

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

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 abiotic and biotic components of the aquatic systems. Functional webs. Influence of competition. Predation and symbiosis and commensalisms on community structure. Reproductive tactics, growth, survival and fecundity of producers and consumers. Trophic structures and organisms found in the Benguela Current Ecosystem; Seaweeds in the Benguela Ecosystem.

F.5.14 NRC 3372: CHEMICAL AND BIOLOGICAL OCEANOGRAPHY

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

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.

F.5.15 NRC 3392: CONSERVATION BIOLOGY

Lectures: 4 hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 60%; Tests, Assignments and practicals 40%.

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.

F.5.16 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.

F.5.17 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.

F.5.18 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.

F.5.19 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.

F.5.20 NRF 3491: 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.

F.5.21 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.

F.5.22 NRP 3471: 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.

F.5.23 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.

F.5.24 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.

F.5.25 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.

F.5.26 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).

F.5.27 NRO 3302: 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, 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. Research in forestry. Case study. Agroforestry project work.

G. B.SC. NATURAL RESOURCES (INTEGRATED ENVIRONMENTAL SCIENCE)

G.1 FIRST YEAR

All courses listed below, except Communication and Study Skills in English, Contemporary Social Issues and Principles of Agriculture and Natural Resources, will be offered by the Faculty of Science.

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
BLG	3101	Biology 1A	3.5	28	42	70
MTS	3101	Mathematics 1A	2	28	0	28
PHC	3101	Physics 1A	3.5	28	42	70
STS	3101	Statistics 1A	2	28	0	28
UCE	3119	Communication and Study Skills in English	4	56	0	56
UCC	3109	Computer Literacy	2.5	14	42	56
			17.5	182	126	308
Semester 2						
BLG	3112	Biology 1B	5.5	56	42	98
MTS	3112	Mathematics 1B	4.5	56	14	70
PHC	3112	Physics 1B	4	56	0	56
PHC	3192	LAB 1	1.5	0	42	42
CHM	3192	Chemistry for Life Sciences	4.5	56	14	70
UCA	3119	English for Academic Purposes	4	56	0	56
UCI	3109	Contemporary Social Issues	2	28	0	28
ACA	3112	Principles of Agriculture and Natural Resources	3	42	0	42
			29	350	112	462
TOTALS			46.5	532	238	770

For course descriptions please refer to section B.5

G.2 SECOND YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
AEC	3251	Rural Sociology	2.0	28	0	28
ASC	3202	Genetics	2.75	28	21	49
CSC	3271	Biometrics	4.75	56	21	77
IES	3211	Ecology I		28	14	42
IES	3221	Introduction to Wildlife Management		28	14	42
FSC	3231	General Microbiology	2.75	28	21	49
NRE	3211	Introduction to Environmental Science	4.75	56	21	77
			21.75	252	112	364
Semester 2						
AEC	3222	Communications and Info Systems	2.75	28	21	49
ASC	3232	Biochemistry	3.75	42	21	63
ASC	3341	Animal Physiology	4.75	56	21	77
IES	3212	Plant Physiology		28	14	42
IES	3232	Introduction to Forestry		28	14	42
IES	3242	Namibia Geography & Natural History		28	14	42
IES	3252	General Soil Science		28	21	49
NRE	3222	Climatology and Hydrology	2.50	28	14	42
NRF	3292	Natural Resource Economics	4.75	56	21	77
			22.00	322	161	483
TOTALS			43.75	574	273	847

G.3 THIRD YEAR

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
IES	3311	Botany of Economic Plants		28	28	56
IES	3321	Wetland Ecology		42	14	56
IES	3331	Ecology II		28	14	42
IES	3341	Eco-physiology		42	14	56
IES	3351	Geo-informatics		42	28	70
IES	3361	Research Methodology		42	21	63
IES	3371	Field Attachment	3.0			
CSC	3311	Entomology	3.75	42	21	63
NRO	3312	Agroforestry	2.75	28	21	49
			27.50	294	161	455
Semester 2						
IES	3312	Natural Resource Policies, Laws & Conventions		42	14	56
IES	3322	Community Based Resource Management	4.5	42	28	70
IES	3332	Financial Management	4.5	42	28	70
IES	3342	Personal Management	2.75	42	14	56
IES	3352	Issues in Conservation & Sustainable Dev	2.75	28	14	42
IES	3372	Field Attachment	3.0			
AEC	3422	Entrepreneurship	4.0	42	28	70
NRF	3352	Conservation Biology	3.75	42	21	63
			18.25	280	147	427
TOTALS			45.75	574	308	882

G.4 FOURTH YEAR

FORESTRY:

COURSE	CODE	TITLE	CREDITS	L	P	TOTAL
Semester 1						
FOR	3411	Principles of Silviculture		42	28	70
FOR	3421	Forest Protection		42	28	70
FOR	3431	Utilization of Forest Products		42	28	70
FOR	3441	Community Forestry		42	28	70
FOR	3451	Forest Mensuration & Inventory		42	28	70
			21.0	210	140	350
Semester 2						
FOR	3400	Research Project	3.0	0	42	42
FOR	3412	Forest Economics & Marketing		28	14	42
FOR	3422	Forest Harvesting		28	28	56
FOR	3432	Forest Planning & Management		42	42	84
FOR	3442	Seminars	0.5	0	14	14
ENV	3462	Environmental Impact Assessment	4.0	42	28	70
			22.25	140	168	308
TOTALS			43.25	350	308	658

WILDLIFE ECOLOGY AND MANAGEMENT

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
WLM	3400	Research Project	3.0	0	42	42
WLM	3411	Wildlife Ecology	4.0	28	14	42
WLM	3421	Behaviour		42	14	56
WLM	3431	Mammalogy		28	14	42
WLM	3441	Ornithology		28	14	42
WLM	3451	Nutrition		42	21	63
WLM	3461	Rangeland Biology and Management		42	21	63
				210	140	350

Semester 2

WLM	3412	Wildlife Diseases		42	14	56
WLM	3422	Economics of Wildlife Resources		28	14	42
WLM	3432	Wildlife Survey Technics and Monitoring		42	14	56
WLM	3442	Economically Important Taxa		28	14	42
WLM	3452	Leisure Service and Park Management		28	14	42
WLM	3462	Seminars	1.0	0	14	14
ENV	3462	Environmental Impact Assessment		42	28	70
				210	112	322
TOTALS			41.25	420	252	672

ENVIRONMENTAL SCIENCE

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
Semester 1						
ENV	3400	Research Project	3.0	0	42	42
ENV	3411	Environment and Development		42	28	70
ENV	3421	Environment Pollution Control		56	28	84
AEN	3412	Land Use Planning	3.0	28	28	56
				22.75	126	126
						252
Semester 2						
ENV	3412	World Politics and Environment		42	14	56
ENV	3422	Management of Arid and Semi-Arid Lands		56	28	84
ENV	3432	Resource Planning and Management		42	28	70
ENV	3442	Applied Watershed Management		42	28	70
ENV	3452	Seminars	1.0	0	14	14
ENV	3462	ENVIRONMENTAL IMPACT ASSESSMENT		42	28	70
				224	140	364
TOTALS			43.25	350	266	616

G.5 COURSE DESCRIPTIONS

G.5.1 IES 3211: ECOLOGY I

Physical, chemical and biotic environments. Responses and adaptations of plants and animals to changes in environmental factors; population-structure and dynamics. 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 with specific reference to Namibia. Biotic and abiotic factors.

G.5.2 IES 3221: INTRODUCTION TO WILDLIFE MANAGEMENT

Basic principles guiding the management of fish and terrestrial animals in wild habitat; Management of organisms, habitats, human users from biological, chemical/physical, ecological and sociological theories and practices.

G.5.3 IES 3212: PLANT PHYSIOLOGY

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 application in crop production.

G.5.4 IES 3222: INTRODUCTION TO FORESTRY

Definition and philosophy, its major sub-disciplines, the concepts of a normal forest, sustained yield and multiple use. Forest products and forest influences. The legal basis of forests and other natural resources – role of policy and legislation; World distribution of forests; Forestry in Namibia, past and today.

G.5.5 IES 3232: NAMIBIA GEOGRAPHY AND NATURAL HISTORY

The earth 's crust and plate tectonics; The influence of structure, process and time on present landform and soil pattern. Past, present and likely future climatic patterns in Namibia. Biogeography, and the past and present biota of Namibia. Potential and existing human use of Namibia's indigenous biota. Landform and vegetation mapping and land capability assessment. Biodiversity conservation, carrying capacity and ecological sustainability.

G.5.6 IES 3242: GENERAL SOIL SCIENCE

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 soils of Namibia; Soil sampling techniques.

G.5.7 IES 3311: BOTANY OF ECONOMIC PLANTS

Useful and toxic plants, their origin and history; 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; Importance of plant species; Utilization of indigenous plants.

G.5.8 IES 3321: WETLAND ECOLOGY

Physical, chemical and biological processes of freshwater systems. Biogeochemical cycles and the dynamics of freshwater biota. Effects of human interaction with freshwater systems. Wetlands.

G.5.9 IES 3331: ECOLOGY II

Taxonomy and identification; Taxonomic concepts, plants classification, nomenclature, Trees/plants identification, botanical keys and use, specimen collection. Important tree/plants families in Namibia: fabaceae, euphorbiaceae, rubiaceae, combretaceae, poaceae. Vegetation structure, species diversity and gradient analysis. Applications of ecological principles to woodland, livestock and wildlife management programmes. Introduction to ecological measurements in the forests and woodlands. Exploitation by man; Management stability and diversity; Monitoring response and implications of various degree of exploitation on vegetation, soil, water and animals. Climatic change and its effects.

G.5.10 IES 3341: ECO-PHYSIOLOGY

Habitat fragmentation, corridors, habitat diversity, ecotones, patch size, patch dynamics, spatio-temporal scales, landscape management in production systems (crop-growing systems and arid rangelands); importance of natural habitat "islands" amidst agricultural seas in maintaining essential ecological processes such as pollination, nutrient recycling, etc.; importance of wetlands in landscape systems.

G.5.11 IES 3351: GEO-INFORMATICS

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.

G.5.12 IES 3361: RESEARCH METHODOLOGY

Methods applicable to research in natural resources: Development of field research projects; design, implementation and evaluation; Management of a research project. Social research methods: PRA, RRA; Current data collection and banking techniques.

G.5.13 IES 3371: FIELD ATTACHMENT

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.

G.5.14 IES 3312: NATURAL RESOURCE POLICIES, LAWS AND CONVENTIONS

Principles of law with particular reference to environment, forestry and wildlife resources. Legal process governing environment and industrial pollution. Specific environmental acts and statutes in Namibia: environmental, forestry and wildlife. Introduction to International environmental law and International Conventions; CITES; RAMSAR sites. Policies, design and implementation.

G.5.15 IES 3322: COMMUNITY BASED RESOURCE MANAGEMENT

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, environmental and forestry.

G.5.16 IES 3332: FINANCIAL MANAGEMENT

Accounting: Record keeping, accounting equation, financial statement, financial analysis and interpretations. Planning: Enterprise budgets, partial budgets, cash flow budgets, whole budgets, application of linear programming to planning. Obtaining finance and credit: Financing policies of major lenders in Namibia, types of credit requirement, sources of finance, credit evaluation. Investment Appraisal Techniques: NPV, IRR, Cost-Benefit Analysis. Tax planning: Provisions within the Tax Act of Namibia, Tax avoidance vs Tax evasion, how to reduce tax burden. Estate transfer.

G.5.17 IES 3342: PERSONAL MANAGEMENT

Human resource management and the Labour Act of Namibia; Strategic human resource management: overview; Human resources provision: human resources planning, recruitment, selection, placement and induction, career management. Maintenance of Human resources: employment equity policy/Act of Namibia. Affirmative Action in Namibia, performance appraisal, compensation management, employee benefits and services, motivation (theories and practice). Human resource development: employee development policies, training management. Leadership: leadership defined, leadership styles, types of leaders, delegation.

G.5.18 IES 3352: ISSUES IN CONSERVATION AND SUSTAINABLE DEVELOPMENT

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; 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.

FORESTRY:

G.5.19 FOR 3400: RESEARCH PROJECT

Lectures: 0 hours/week

Practicals: 3 hours/week for the whole year

Supervised individual research project in selected topics in natural resources/environmental management. Project write-up and an oral presentation will constitute the total assessment mark.

G.5.20 FOR 3411: PRINCIPLES OF SILVICULTURE

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.

G.5.21 FOR 3421: FOREST PROTECTION

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 in Namibia and stem/wood borers; Useful forest insects. Forest Fire Management: causes, prevention and suppression.

G.5.22 FOR 3431: UTILIZATION OF FOREST PRODUCTS

Structure and properties of wood: Wood formation in forest trees and other woody vegetation, micro and macroscopic characteristics of wood, mechanical and other properties of wood and their importance in various forms of utilization. Saw milling and processing: veneer making and other boards. Wood for carving and other traditional implements, the importance of wooden handicrafts in rural economies. Non-food Forest Products: The importance of various fruits, nuts, fibres in rural development; their harvesting techniques, levels, processing and possible industrial uses. Focus on the improvement of their economic value through light processing.

G.5.23 FOR 3441: COMMUNITY FORESTRY

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.

G.5.24 FOR 3451: FOREST MENSURATION & INVENTORY

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.

G.5.25 FOR 3412: FOREST ECONOMICS AND MARKETING

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. 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.

G.5.26 FOR 3422: FOREST HARVESTING

Introduction; logging terms, tools and equipment: maintenance and use. 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.

G.5.27 FOR 3432: FOREST PLANNING AND MANAGEMENT

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. The concept of sustainable forest management and the management of forests as ecosystems rather than only for timber values. Stakeholder analysis in forest management planning. Data collection and preparation of a management plan for multiple products and services. The use of Socio-economic and biological data in management planning.

G.5.28 FOR 3442: SEMINARS

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

Students will attend departmental seminars to gain knowledge on information gathering, oral presentation, and discussion of topics related to their field of research. A seminar write-up and an oral presentation will constitute the total assessment mark

WILDLIFE ECOLOGY AND MANAGEMENT:

G.5.29 WLM 3400: RESEARCH PROJECT

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

Supervised individual research project in selected topics in natural resource/environmental management. Project write-up and an oral presentation will constitute the total assessment mark.

G.5.30 WLM 3411: WILDLIFE ECOLOGY

Population analysis. Determination of age, abundance, growth, natality, mortality and yield. Principles of harvesting and control. Ecology of predation and herbivory. Population regulation and cycles. Capture anaesthesia and telemetry. Wildlife in the desert and forest environments. Simple ecosystem modules. Habitat utilization, Game Management.

G.5.31 WLM 3421: BEHAVIOUR

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.

G.5.32 WLM 3431: MAMMALOLOGY

Classification, origin and radiation of the mammals. Natural history of African mammals, including a consideration of their bio-geographical distribution.

G.5.33 WLM 3441: ORNITHOLOGY

Introduction to the study of birds, classification, origins and phylogeny, identification, anatomy, physiology and natural history of birds, emphasis on predatory species, endangered species.

G.5.34 WLM 3451: NUTRITION

Nutrients and basic characteristics of feeds; Analytical methods for chemical and metabolite determination; Comparative digestion of feeds and absorption of nutrients in ruminants and non-ruminants; Nutritive evaluation of feedstuffs including digestibility and systems of describing energy value; Mineral and vitamin nutrition; occurrence, function and deficiency symptoms of major and minor minerals and water and fat soluble vitamins; The role of water in animal nutrition.

G.5.35 WLM 3461: RANGELAND BIOLOGY AND MANAGEMENT

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; 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.

G.5.36 WLM 3412: WILDLIFE DISEASES

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.

G.5.37 WLM 3422: ECONOMICS OF WILDLIFE RESOURCES

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.

G.5.38 WLM 3432: WILDLIFE SURVEY TECHNICS AND MONITORING

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.

G.5.39 WLM 3442: ECONOMICALLY IMPORTANT TAXA

Biodiversity, classification and identifications, overall phylogenic picture and concentrating on taxa not covered in other countries. What makes some other taxa economically important; Potential for exploitation, pathogens, invasive aliens, problem animals. Examples from plant kingdom and insects. Other invertebrates especially pathogens. Fish, reptiles, amphibians and birds. Basic classification, phylogeny and identifications. Natural history, exploitation and problems relating to major groups. Merlucciids, Clupeids, Clariid, Cyprinids and Chichlids. Crocodiles, snakes and turtles. Bullfrogs. Cormorants, Gannets, Lamingoes, Queleas Raptors. Endangered taxa.

G.5.40 WLM 3452: LEISURE SERVICE AND PARK MANAGEMENT

Theory and practice in management; principles of management; organizational structures; laws governing recreation, parks and leisure services; the planning process of leisure service management: setting goals and objectives; personnel management; role of managers and personnel in recreation and park facilities; recreation programme development; budgeting and management including auditing and accounting procedures; marketing; cost cutting and productivity; risk management; community involvement; community relations.

G.5.41 WLM 3462 SEMINARS

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

Students will attend departmental seminars to gain knowledge on information gathering, oral presentation and discussion of topics related to their field of research. A seminar write-up and an oral presentation will constitute the total assessment mark.

ENVIRONMENTAL SCIENCE:

G.5.42 ENV 3400: RESEARCH PROJECT

Lectures: 0 hours/week
Practicals: 3 hours/week

Supervised individual research project in selected topics in natural resource/environmental management. Project write-up and an oral presentation will constitute the total assessment.

G.5.43 ENV 3411: ENVIRONMENT AND DEVELOPMENT

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.

G.5.44 ENV 3421: ENVIRONMENTAL POLLUTION AND CONTROL

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.

G.5.45 ENV 3412: WORLD POLITICS AND ENVIRONMENT

Multinational corporations, industries and environmental issues relating to environment safety standards in developed and developing countries. International waste disposals. Regional and international environmental organizations. Bilateral and multilateral aid issues and approaches. International treaties/agreements on environment, biological diversity and conservation. Conflicts and Environment.

G.5.46 ENV 3422: MANAGEMENT OF ARID AND SEMI-ARID LANDS

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.

G.5.47 ENV 3432: RESOURCE PLANNING AND MANAGEMENT

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.

G.5.48 ENV 3442: APPLIED WATERSHED MANAGEMENT

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.

G.5.49 ENV 3452: SEMINARS

Lectures: 0 hours/week

Practicals: 1 hour/week

Students will attend departmental seminars to gain knowledge on information gathering, oral presentation, and discussion of topics related to their field of research. A seminar write-up and an oral presentation will constitute the total assessment mark.

G.5.50 ENV 3462: ENVIRONMENTAL IMPACT ASSESSMENT

Definitions: Impact assessment, Environmental Studies; Environmental Impacts of Human Activities on Natural Resources; impact on atmosphere, impact on water bodies, impact on land resources, 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 Department of Environmental Affairs; examples of EIA in Namibia.

H. DIPLOMA IN AGRICULTURE

H.1 FIRST YEAR

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
SEMESTER 1						
ACB	2111	English and Communication Skills	3.5	21	56	77
ACB	2121	Computer Skills	2.5	14	42	56
ACB	2131	Agricultural Mathematics and Statistics	4.0	42	28	70
ASC	2111	Animal Nutrition	1.5	14	14	28
ASC	2121	Rangeland Ecology	2.25	21	21	42
CSC	2111	Principles of Crop Production	3.0	28	28	56
AEN	2111	Surveying	1.75	14	21	35
AEN	2121	Fundamentals of Agricultural Engineering	1.5	14	14	28
ACA	2100	FARM DUTIES	1.75		49	49
				168	273	441
SEMESTER 2						
CSC	2112	Soil Science	3.5	28	42	70
ASC	2112	Animal Reproduction	1.5	14	14	28
ASC	2122	Applied Animal Feeding	2.75	28	21	49
ASC	2132	Animal Anatomy and Physiology	1.5	14	14	28
AEC	2112	Indigenous Resource Management and Rural Sociology	3.0	28	28	56
AEC	2122	Basic Concepts in Economics	3.0	28	28	56
AEN	2112	Workshop Technology	2.75	14	49	63
ACA	2100	FARM DUTIES	1.75		49	49
				154	245	399
TOTALS				322	518	840

H.2 SECOND YEAR

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
SEMESTER 1						
ASC	2211	Applied Animal Breeding	2.0	21	14	35
ASC	2221	Range Management	2.25	21	21	42
ASC	2231	Animal Health I	2.25	21	21	42
ASC	2241	Mutton & Goat Production	2.0	21	14	35
CSC	2211	Crop Protection	3.5	28	42	70
AEC	2211	Personnel Management	1.5	14	14	28
AEC	2221	Research Methodology	3.0	28	28	56
NRO	2211	Introduction to Agroforestry	3.0	28	28	56
ACA	2100	FARM DUTIES	1.75		49	49
				182	231	413
SEMESTER 2						
ASC	2212	Animal Health II	2.25	21	21	42
ASC	2222	Dairy Production	2.0	21	14	35
ASC	2232	Pig Production	2.0	21	14	35
CSC	2212	Vegetable Production	2.5	21	28	49
AEC	2212	Financial Management	3.0	28	28	56
AEC	2222	Principles of Extension and Approaches	3.0	28	28	56
AEN	2212	Farm Power and Machinery	3.75	28	49	77
AEN	2222	Land Use Planning	3.0	14	28	42
ACA	2100	FARM DUTIES	1.75		49	49
				182	259	441
TOTALS				364	490	854
FIELD ATTACHMENT : 5 WEEKS IN SUMMER			175 HOURS			

H.3 THIRD YEAR

COURSE	CODE	COURSE TITLE	CREDITS	L	P	TOTAL
SEMESTER 1						
ASC	2311	Beef Production	2.0	21	14	35
ASC	2321	Pelt and Fibre Production	1.75	14	21	35
ASC	2331	Cultivated Pastures	2.0	21	14	35
CSC	2311	Field Crops Production	3.75	28	49	77
AEC	2311	Marketing, Policy and Trade	2.75	28	21	49
AEC	2321	Communication and Information Systems	3.0	28	28	56
AEN	2311	Soil and Water Management	3.5	28	42	70
AEN	2321	Farm Structures	2.0	14	28	42
ACA	2300	Special Study	1.25		35	35
				182	252	434
SEMESTER 2						
CSC	2312	Fruil Production	2.0	14	28	42
ASC	2312	Meat Science & Livestock Products	1.5	14	14	28
ASC	2322	Poultry & Ostrich Production	2.0	21	14	35
ASC	2332	Game Ranching & Wildlife Management	2.0	21	14	35
AEC	2312	Introduction to Entrepreneurship	1.75	14	21	35
AEC	2322	Project Management	2.0	14	28	42
AEN	2312	Animal Draft Power Technology	1.75	14	21	35
AEN	2322	Irrigation and Drainage	2.0	14	28	42
ACA	2300	Special Study	1.25		35	35
				126	203	329
TOTALS				308	455	763

H.4 COURSE DESCRIPTIONS (BASIC STUDIES)

H.4.1 ACB 2111: 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 and agricultural terminology. Using a dictionary (guide words and head words, find/derive the meaning of words in various contexts, abbreviations used in dictionaries), library and other sources of information (reference material, citation). Communication: listening – for comprehension, to messages, for specific information and actively to lectures; speaking – improve fluency through dialogue, making convincing oral arguments (debates), participate in group discussions, oral presentations; reading – loud and silent, read for comprehension, skimming and scanning,

interpreting of diagrams, maps, tables, graphs; writing – taking notes, outlining passages, summarizing articles, write essays/letters/reports (Scientific Report); and studying skills – locating of information using a table of contents, a glossary and an index; extract main ideas and key words, working towards summarizing.

H.4.2 ACB 2121: 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); 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; Ration mixer; Studmaster; Spreadsheets.

H.4.3 ACB 2131: AGRICULTURAL MATHEMATICS AND STATISTICS

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

Operations, percentages and conversion of fractions and decimals. Ratio, rate, proportion and scale. Measurements and conversion of units. Algebraic representation and formulae, equations. Indices. Mensuration. Bearings. Tables and graphs in practical situations. Trigonometry. Basic statistics: population and sampling; probability sampling methods, measures of lateral tendency, measures of dispersion, frequency distribution (grouped) and (ungrouped) data, analysis of variance, probabilities, regression, correlation.

H.5 COURSE DESCRIPTIONS (AGRICULTURAL ECONOMICS AND EXTENSION)

H.5.1 AEC 2122 : BASIC CONCEPTS IN ECONOMICS

Lectures: 2 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

The production process; Establishment of production facilities; Productivity and quality control in production; Managing inventories. (students to be exposed to available computer soft ware).

H.5.2 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.

H.5.3 AEC 2112: 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 and traditional beliefs and healers, kinships; 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.

H.5.4 AEC 2222: PRINCIPLES OF EXTENSION AND APPROACHES

Lectures: 2 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.

Define the concept "agricultural extension system"; Define the concept 'Agricultural extension approach'; Define: 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.

H.5.5 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.

H.5.6 AEC 2312: 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.

H.5.7 AEC 2211 : 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.

H.5.8 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;

H.5.9 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.

H.5.10 AEC 2321: COMMUNICATION AND INFORMATION SYSTEMS

Lectures: 2 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; 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; Taking of Minutes and follow up actions after meetings.

H.6 COURSE DESCRIPTIONS (ANIMAL PRODUCTION)

H.6.1 ASC 2111: ANIMAL NUTRITION

Lectures: 1 hours/week
Practicals: 1 hours/week
Assessment: one exam paper (2 hrs) 40%; tests, assignments and practicals 60%.

Anatomy and physiology of GIT. Introductory biochemistry of nutrients. Nutrients and the composition of feeds: water, carbohydrates, lipids, proteins, vitamins and minerals. Nutrient standards.

H.6.2 ASC 2112: ANIMAL REPRODUCTION

Lectures: 1 hours/week
Practicals: 1 hours/week
Assessment: one exam paper (2 hrs) 40%; tests, assignments and practicals 60%.

Anatomy and physiology of the reproductive system. Endocrine of the reproductive system. Reproduction processes, reproduction technology: artificial insemination, multiple ovulation and embryo transfer, genetic engineering and other techniques.

H.6.3 ASC 2121: RANGELAND ECOLOGY

Lectures: 1 ½ hours/week
Practicals: 1 ½ hours/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

The effects of climate on rangelands; soils of Namibia; agro-ecological zoning of Namibia; Objectives of range management, current condition of Namibia's range. Rangeland terminology. Identification of the major forage species. Growth cycle **OF PLANTS**. **N**atural, traditional and modern defoliation systems, defoliation habits of wild and domestic animals. Rangeland degradation and rehabilitation. Components of the natural environment. 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.

H.6.4 ASC 2122: APPLIED ANIMAL FEEDING

Lectures: 1 ½ hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Feeds and feedstuffs: roughage, concentrates, supplements, feed additives, growth promotants and performance manipulants. Farm processing of feeds. Nutrient requirements. Feed analysis. Basic feed formulation. Practical feeding of farm animals for production objectives: feeding and supplementing the grazing ruminant, fertility, growth, maintenance, feedlot-finishing, draught power, milk, egg, pelt and fibre production, drought feeding. Nutrition and product quality, ethical considerations and consumer preferences. Body conditioning.

H.6.5 ASC 2211: APPLIED ANIMAL BREEDING

Lectures: 1 ½ hours/week
Practicals: 2 hours/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Basic concepts of genetics in farm animals. The phenotype of farm animals: traits of economic importance, quantitative and qualitative traits, genotype-environment interactions, heritability, breeding value and correlated traits. Selection methods and breeding systems. Breeding strategies for farm animals.

H.6.6 ASC 2132: ANIMAL ANATOMY AND PHYSIOLOGY

Lectures: 1 ½ hours/week
Practicals: 1 ½ hours/week
Assessment: One Exam Paper (3 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, endocrine, urinary and nervous systems.

H.6.7 ASC 2221: RANGELAND MANAGEMENT

Lectures: 1 ½ hour/week
Practicals: 1 ½ hours/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Carrying capacity: techniques and calculations; Rangeland Management Practices - rotational grazing; Range and grazing records; Range inventory; monitoring techniques; Integrated fodder flow planning; Management during critical periods like droughts, floods, etc.

H.6.8 ASC 2231: ANIMAL HEALTH I

Lectures: 1 ½ hour/week
Practicals: 1 ½ 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.

H.6.9 ASC 2241: MUTTON AND GOAT PRODUCTION

Lectures: 1 ½ hour/week
Practicals: 1 hours/week
Assessment: One Exam Paper (3 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.

H.6.10 ASC 2212: ANIMAL HEALTH II

Lectures: 1 ½ hour/week
Practicals: 1 ½ 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.

H.6.11 ASC 2222: DAIRY PRODUCTION

Lectures: 1 ½ hour/week
Practicals: 1 hour/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of dairying in Namibia. Breeds. Anatomy and physiology of the mammary gland. Production systems, management of lactating and dry cows, rearing replacement heifers. Metabolic diseases and herd health. Body condition scoring Facilities and handling. Milk extraction, quality and processing. Record keeping and future prospects.

H.6.12 ASC 2232: PIG PRODUCTION

Lectures: 1 ½ hour/week
Practicals: 1 hour/week
Assessment: One Exam Paper (3 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.

H.6.13 ASC 2311: BEEF PRODUCTION

Lectures: 1 ½ hour/week
Practicals: 1 hours/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of beef production in Namibia. Breeds. Production systems and management. Management targets and calendar. Facilities and handling. Slaughtering process, farm processing of products, product quality. Record keeping and future prospects.

H.6.14 ASC 2321: PELT AND FIBRE PRODUCTION

Lectures: 1 hour/week
Practicals: 1 ½ hours/week
Assessment: One Exam Paper (3 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.

H.6.15 ASC 2331: CULTIVATED PASTURES

Lectures: 1 ½ hour/week
Practicals: 1 hours/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Introduction to cultivated pastures. Establishing pasture. Choice of pasture species and pasture species description. Fodder preservation. Drought resistant fodder crops.

H.6.16 ASC 2312: MEAT SCIENCE & LIVESTOCK PRODUCTS

Lectures: 1 hour/week
Practicals: 1 hour/week
Assessment: One Exam Paper (2 hrs) 40%; Tests, Assignments and practicals 60%.

Pre – slaughtering handling, slaughtering process, carcass dressing and inspection. Different types of meat species. Muscle physiology and carcass composition. Abattoir hygiene, basic processing. Preservation and storage of livestock products. Factors affecting quality; public health hazards. Bio – security and consumer concerns.

H.6.17 ASC 2332: GAME RANCHING & WILD LIFE MANAGEMENT

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. Ecosystems of arid zones: terrestrial, freshwater and marine. Product diversity and quality control. Biodiversity. Conservation in Namibia conservancies. Future prospects.

H.6.18 ASC 2322: POULTRY OSTRICH PRODUCTION

Lectures: 1 ½ hour/week
Practicals: 1 hour/week
Assessment: One Exam Paper (3 hrs) 40%; Tests, Assignments and practicals 60%.

Requirements and constraints of poultry and ostrich production in Namibia, historical review. Breeds. Production systems, management of broilers and layers. 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.

H.7 COURSE DESCRIPTIONS (CROP SCIENCE)

H.7.1 CSC 2111: PRINCIPLES OF CROP PRODUCTION

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

Crop environment in Namibia; Botany of crops – anatomy and physiology, growth processes, plant competition, botanical classification of plants; Crop improvement:- breeding methods, seed production practices; tillage practices; Crop establishment practices- land preparation, sowing,; crop nutrition, required elements and their functions, harvesting, handling and storage. cropping systems:

H.7.2 CSC 2112: 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, Organic components of soil. Organic Manure and fertilizers. Soil organisms, soils reaction; soil colloids, reclamation of problem soils.

H.7.3 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.

H.7.4 CSC 2312: FRUIT PRODUCTION

Lectures: 1 hours/week
Practicals: 2 hours /week
Assessment: One Exam Paper (2 hrs) 40%; Tests, Assignments and practicals 60%.

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 (eembe, marula, makalani): environmental requirements, planning, establishment, management practices, harvesting, post harvest technology, marketing. Ornamental and landscape plants.

H.7.5 CSC 2212: VEGETABLE PRODUCTION

Lectures: 1^{1/2} hours/week
Practicals: 2 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. Mushroom production.

H.7.6 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, soyabean, 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.

H.8. COURSE DESCRIPTIONS (AGRICULTURAL ENGINEERING)

H.8.1 AEN 2121: FUNDAMENTALS OF AGRICULTURAL ENGINEERING

Motion and friction, pressure, forces, work, power. Simple machines and devices: levers, pulleys, gears, and velocity ratios. Heat, fuel, pulleys, gears, velocity ratios. Heat, fuel and combustion. Basic principles of electricity. Introduction to engineering materials.

H.8.2 AEN 2111: 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.

H.8.3 AEN 2112: 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).

H.8.4 AEN 2212: 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.

H.8.5 AEN 2222: 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.

H.8.6 AEN 2312: 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.

H.8.7 AEN 2311: 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.

H.8.8 AEN 2321: 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).

H.8.9 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.

ACA 2100: FARM DUTIES

49 HOURS/SEMESTER – FIRST AND SECOND YEAR

All Diploma students will undertake 7-hour farm duties every second week in years one and two. 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.

SPECIAL STUDIES

Supervised individual study on relevant field. Project write up and an oral presentation will constitute the total assessment.

I. DIPLOMA IN FORESTRY

I.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
TOTALS			38.25	323	524	847

Field Attachment (six weeks)

I.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
TOTALS			35.5	297	501	798

Field Attachment (six weeks)

I.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
TOTALS			31.75	251	536	787

I.4 COURSE DESCRIPTIONS (BASIC STUDIES)

I.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.

I.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.

I.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

I.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.

I.5 COURSE DESCRIPTIONS (FORESTRY)

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

1.5.12 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

1.5.13 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.

1.5.14 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.

1.5.15 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.

1.5.16 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.

1.5.17 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.

I.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

I.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.

I.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.

I.5.22 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.

I.5.23 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.

I.5.24 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

I.6 COURSE DISCRIPTION (AGRICULTURAL ECONOMICS AND EXTENSION)

I.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).

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.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.

I.7 COURSE DESCRIPTIONS (ANIMAL PRODUCTION)

I.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.

I.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.

I.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.

I.8 COURSE DESCRIPTIONS (CROP SCIENCE)

I.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.

I.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.

I.9. COURSE DESCRIPTIONS (AGRICULTURAL ENGINEERING)

I.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.

I.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.

I.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.

J. DIPLOMA IN FORESTRY (FOR CERTIFICATE IN FORESTRY HOLDERS)

J.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
			19.25	161	217	378
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
			19.0	160	198	358
TOTALS			38.25	321	415	736

J.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
			15.75	114	134	248

J.3 COURSE DESCRIPTION (UPGRADING COURSE FOR CERTIFICATE HOLDERS IN FORESTRY)

J.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.

J.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

J.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.

J.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.

J.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.

J.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.

J.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.

J.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.

J.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.

J.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.

J.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.

J.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.