CORRESPONDENCE

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VISION & MISSION STATEMENT

VISION

The University of Venda aspires to be at the centre of tertiary education for rural and regional development in Southern Africa.

MISSION

The University of Venda, anchored on the pillars of excellence in teaching, learning, research and community engagement, produces graduates imbued with knowledge, skills and qualifications which are locally relevant and globally competitive.

THE CALENDAR IS OBTAINABLE IN THE FOLLOWING SEPARATE PARTS:

OFFICERS OF THE SCHOOL OF AGRICULTURE

Dean	GRA Mchau, Dip (Horti), BSc (Fruit Ind), MSc (Agric) (Pomona), PhD (University of California)
Vice-Dean	JJO Odhiambo, BSc (Agric) (Hons), MSc (Agric) (Nairobi), PhD (University of British Columbia, Canada)
School Administrator	MM Maboho, BCom (Univen)
Executive Secretary	LH Kone

SCHOOL RESEARCH PROFESSOR:

Professor	I Wakindiki, BSc (Agric) (Hons), MSc (Soil Science) (Nairobi), PhD (Soil Science) (Egerton), PGDHE (UFH).
Research Assistant	Vacant

ACADEMIC STAFF AND DEPARTMENTS

Heads of Departments/Centre(s) are indicated by means of an asterisk*

Agricultural Economics and Agribusiness

Associate Professors	*PK Chauke, BSc (Agric.) (Econ) (UFH), M.Inst (Agric) (Eco) (UP), PhD (Univen), HED FDK Anim, BSc (Agric.) (Hons) (Ghana), M.Agric. Mgt (Natal), PhD (Agric.Econ) (UP)
Senior Lecturer	EN Raidimi, BSc (Agric.) (Hons) (UFH), MSc (Agric. Ext) (Reading), PhD (UP)
Teaching Assistant	Vacant

Agricultural and Rural Engineering

Senior Lecturers	*MO Marenya, BSc (Hons) (Agric. Eng), MSc (Agric. Eng) (Nairobi), PhD (Agric. Eng) (UP) PF Kapila, BSc (Agric), MSc (Agric. Eng), PhD (Agric. Eng) (CZU, Prague)
Lecturer	Vacant
nGAP Lecturer	DC Sambo, BSc (Agric)(Univen), MSc (Bioresources Systems) (UKZN)
Chief Lab Technician	MB Mongwai, BSc (Agric.) (Univen)

Animal Science

Associate Professor	*JJ Baloyi, BSc (Agric.) (Hons) (UZ), MSc (UK), PhD (UZ)
Associate Professor	Vacant
Senior Lecturer(s)	E Bhebhe, BSc (Agric) (Hons) (UZ); MSc (Texas A&M) (USA); PhD (Texas A&M) (USA)
Veterinarian	Vacant
Lecturers	F Fushai, BSc (Agric) (Hons) (UZ); MSc (Natal); PhD (Unisa) MS Mikasi, BSc (Agric.), MSc (Agric.), PhD (Univen) AJ Netshipale, BSc (Agric) (Univen), MSc (Agric) (Natal)
Chief Farm Technician	KT Mahlako, BSc (Agric), MSc (Agric) (Univen)
Chief Principal Lab Tech	EM Nyathi, BSc, MPH (Univen)
Lab Technician	AM Raseona, BSc (Agric) (UL); MSc (Agric) (Univen)

Consumer Sciences

Professor	Vacant
Lecturer	MT Malaza, B Home Economics (Education) (UWC), B Consumer Science (Hons)(UP), Masters in Consumer Science (UP)
Senior Lab Technician	M Mulondo, BFECS, HONRDV (Univen)

Food Science and Technology

Professor	AIO Jideani, BSc (Hons), MSc (Food Tech) (Ibadan), PhD (Leeds), PG Dip. (Food Tech) (Ibadan)
Associate Professor	Vacant

Senior Lecturers	Vacant
Lecturers	*H Silungwe, Dip. Agric. Eng. (UNZA), BSc (Agric) (UNISWA), MSc. (Agr.Eng.Tech) (Food Processing) (UCD-Ireland), PhD (Univen)
	T E Kgatla, BSc (FST) (Univen), Master of Nutrition (UL)
	M E Mashau, BInstAgrar (Food Processing) (UP), MSCFST(Univen), PGDip.HE (UKZN)
	SE Ramashia, BScFST (Univen), MTech (Food Tech) (TUT), PhD (Univen)
Teaching Assistant	Vacant
Pilot Plant Manager	Vacant
Pilot Plant Technician	Vacant
Lab Technician	B Nethathe, BSc (Univen); BSc (Hons), MSc (UFH)
	T Mokhele, BInstaAgrar (Food Processing) (UP), MSc (Agric)(Unisa)
	B Moyo, BSc (Unisa)
Laboratory Assistant	Vacant

Forestry

Professor	*PO Adesoye, B Tech, Forestry, MSc (FUTA), PhD (Forestry) (Ibadan)
Lecturer	Vacant
Teaching Assistants	Vacant
Technician	P Munyanduki, BSc (Forest Resources and Wildlife) (NUST)

Horticultural Sciences

Ass Professor	*GRA Mchau, Dip (Horticulture), BSc (Fruit Ind.), MSc (Agric) (Pomona) PhD (University of California)
Lecturer	F Thovhogi, BSc (Agric) (Univen), MSc (Horticulture) (Stellenbosch)
	ML Ramphinwa, BSc (Agric), MSc (Agric) (Univen)
Teaching Assistant	Vacant
Crop Technician	MV Makhado, BAgric (Hons) (Univen)

Plant Production

Professors	*ET Gwata, BSc (Agric) (Univ Novi Sad), MSc (Univ. of Melbourne), PhD (Univ. of Florida)
	JBO Ogola, BSc (Hons), MSc (Nairobi), PhD (Reading)
Ass. Professor	EC Kunjeku, B.S(Psy) (California Coast Univ.), BSc (Agric) (Hons), (UZ), MSc, PhD (Univ. of London)
Junior Lecturer	TM Maphosa, BSc(Agric), MSc(Agric) (UL)
Lab Technician	T Leboho, BAgric (Hons)(Univen), MSc (Agri) (UL)

Soil Science

Professor	*JJO Odhiambo, BSc (Agric) (Hons), MSc (Agric) (Nairobi), PhD (Univ. of British Columbia, Canada)
Senior Lecturer	J Mzezewa, BSc (Agric) (Hons) (UZ), MSc (Agric), (Aberdeen), PhD (UFS)
Lecturer	HP Nemakundani, BSc (Agric) (Unin) BSc (Agric) (Hons) (UP), Masters in Sustainable Agric (UFS)
	SG Lusiba, BSc (Agric) (UL); MSc (Agric) (Univen)
Lab Technician	Vacant

Institute for Rural Development

Ass. Professor	*J Francis, BSc (Agric) (Hons), MPhil, PhD (UZ)
Senior Lecturers	G Oloo, BSc, MBA (USIU), Dip HRM (Manchester), Cert MF (Cranefield),
	B Kilonzo, Dip. Community Empowerment (Israel), BA (Rani Durgavati), MA (Agra), PhD (Univen)
	M. Manjoro, BSc (Agric) (Hons), MSc Agric (UZ); PhD (UFH)
	J Zuwarimwe, BSc (Hons) (Rural & Urban Planning), MSc (Rural Econ.Dev Plan) (UZ), PhD (UP)
Lecturer	MA Mathaulula, SSTD, BPaed (Home Econ.) (Unizul), PGDTE, PGDEM (Unisa), HONRDV, MRDV (Univen)

Farm Manager	TG Kutama, N.Dip. (Animal Prod.) (Pret Tech.), B Tech. (Agric Mgt) (Unisa), BAgric (Hons) (Univen)

SCHOOL OF AGRICULTURE

RULES FOR THE SCHOOL

S.1 DEGREES / DIPLOMAS CONFERRED IN THE SCHOOL.

Bachelor of Science in Agriculture (various specializations)	BSC (Agric)
Bachelor of Science in Forestry	BSCFON
Bachelor of Science in Food Science and Technology	BSCFSN
Bachelor of Science in Agricultural and Biosystems Engineering	BSC(ENG.)
Bachelor of Agriculture Honours	BAGRIC (Hons)
Bachelor of Arts Honours in Rural Development	BAHRDV
Master of Science in Agriculture (various specializations)	MSCAGR
Master of Science in Food Science and Technology	MSCFST
Masters in Rural Development	MRDV
Doctor of Philosophy in Agriculture	PhD (Agric)
Doctor of Philosophy in Rural Development	PhDRDV

S. 2 ADMISSION REQUIREMENTS

2.1 GENERAL ADMISSION REQUIREMENTS

2.1.1 The minimum admission requirement for a candidate wishing to enroll for the degree program is a National Senior Certificate (NSC) or Independent Examination Board (IEB) school leaving certificate as certified by Council for Quality Assurance in General and Further Education (Umalusi) with a minimum achievement rating of 4 (adequate achievement, 50-59%) in Mathematics and Physical Science, English and either Life Sciences or Agricultural Sciences. **In addition, applicants must have a minimum admission point score (APS) of 26 (subject to review by Senate from time to time).** A grade 12 certificate with a bachelor degree or matric exemption if grade 12 was completed before 2008.

2.1.2 Candidates may be admitted based on Recognition of Prior Learning (RPL) (Selection testing; interviewing; and assessment of portfolio of evidence). Individuals will be declared competent on the basis of the provisions of the Recognition of Prior Learning (RPL) policy of UNIVEN.

Note: Achievement of the minimum admission requirements does not guarantee an applicant admission to any programme.

Calculation of admission point score

MATRIC	NSC LEVEL	PERCENTAGE	SCORE
A+	7	90 - 100	9.0 - 10
A	7	80 - 89	8.0 - 8.9
B	6	70 -79	7.0 - 7.9
C	5	60 - 69	6.0 - 6.9
D	4	50 - 59	5.0 - 5.9
E	3	40 - 49	4.0 - 4.9

The School does not include Life Orientation and Mathematics Literacy in the calculation of APS.

2.2 DEGREE - SPECIFIC ADMISSION REQUIREMENTS

2.2.1 BACHELOR OF SCIENCE IN AGRICULTURE (leading to BSc in Agriculture with specialization in Agricultural Economics, Agribusiness, Animal Science, Horticultural Sciences, Plant Production and Soil Science):

2.2.1.1 The minimum admission requirement for a candidate wishing to enroll for the degree program is a National Senior Certificate (NSC) with a bachelor's endorsement or Independent Examination Board (IEB) school leaving certificate as certified by Council for Quality Assurance in General and Further Education (Umalusi). **A pass with a minimum achievement rating of 4 (50-59%) in Mathematics and Physical Science, English and either Life Sciences or Agricultural Sciences is required to enroll for the programme. In addition, applicants must have a minimum point score of 26.**

2.2.2. BACHELOR OF SCIENCE IN FORESTRY

2.2.2.1 The admission requirements are the same as for the Bachelor of Science in Agriculture above.

2.2.3. BACHELOR OF SCIENCE IN FOOD SCIENCE & TECHNOLOGY

2.2.3.1 The minimum admission requirement for a candidate wishing to enroll for the degree program is a National Senior Certificate (NSC) with a bachelors' endorsement or Independent Examination Board (IEB) school leaving certificate as certified by Council for Quality Assurance in General and Further Education (Umalusi). **A pass with a minimum achievement rating of 5 (60-69%) in Mathematics and Physical Science, achievement rating of 4 (50-59%) in English and either Life Sciences or Agricultural Sciences is required to enroll for the programme. In addition, applicants must have a minimum point score of 32.**

2.2.4 BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYTEMS ENGINEERING

2.2.4.1 The minimum admission requirement for a candidate wishing to enroll for the degree program is a National Senior Certificate (NSC) with a bachelors' endorsement or Independent Examination Board (IEB) School Leaving Certificate as certified by Council for Quality Assurance in General and Further Education (Umalusi). **A pass with a minimum achievement rating of 6 (70-79%) in Mathematics, Physical Science, Life Sciences or Agricultural Sciences and a minimum achievement rating of 4 (50-59%) in English is required to enroll for the programme. In addition, applicants must have a minimum point score of 32.**

2.2.5 BACHELOR OF AGRICULTURE HONOURS

2.2.5.1 To qualify for admission a student must possess a Bachelor's degree in Agriculture with an average of 60% pass in the field of specialization.

2.2.6 BACHELOR OF ARTS HONOURS IN RURAL DEVELOPMENT

2.2.6.1 To qualify for admission, a student must possess a Bachelor's degree with an average of 60% pass in the field of specialization.

2.2.6.2 Minimum qualification for admission is an undergraduate degree in Agriculture (B. Agric or BSc. Agric), BA or BSc in Sociology, Anthropology, Development Studies, Community Development, Environmental Sciences, Education, B.Com in Economics, Management or any other related discipline, from this or any other university, as may be determined by the Director of the Centre.

2.2.6.3 Recognition of Prior Learning of practitioners in line with the University policy.

2.2.7 MASTER OF SCIENCE IN AGRICULTURE and MASTER OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY (DISSERTATION ONLY)

2.2.7.1 A relevant Honours degree or the equivalent is required for admission to study for the Master's degree.
2.2.7.2 A student who has obtained an Honours degree at another university or any other institution must apply for status recognition subject to the prescribed conditions.
2.2.7.3 Before a student's application for registration can be considered, a provisional topic and field of study is to be specified and submitted to the Registrar on recommendation by the Head of Department and approval by the School Board.
2.2.7.4 A student may be required to visit the University for an Interview with the Head of the Department concerned before admission.
2.2.7.5 Unless otherwise decided by Senate, a second Master's degree may not be taken in the same field of study.

2.2.8 MASTERS IN RURAL DEVELOPMENT

2.2.8.1 A relevant Honours degree or the equivalent is required for admission to study for the Masters degree.
2.2.8.2 A student who has obtained an Honours degree at another university or any other institution must apply for status recognition subject to the prescribed conditions.
2.2.8.3 Before a student's application for registration can be considered, a provisional topic and field of study is to be specified and submitted to the Registrar on recommendation by the Head of Department and approval by the School Board.
2.2.8.4 A student may be required to visit the university for an interview with the Head of Department concerned before admission.
2.2.8.5 Unless otherwise decided by Senate, a second Master's degree may not be taken in the same field of study.

2.2.9 DOCTOR OF PHILOSOPHY IN AGRICULTURE

2.2.9.1 A relevant Master's degree or its equivalent is required for admission to study for a Doctoral degree.
2.2.9.2 A student who has obtained a Master's degree from another university or institution must apply for status recognition subject to the prescribed rules.
2.2.9.3 Before a candidate's application for registration can be considered, the title or topic of the proposed thesis, together with a brief outline of the research must be submitted to the Department and the School's Postgraduate Committee for recommendation and approval by Senate.

2.2.10 DOCTOR OF PHILOSOPHY IN RURAL DEVELOPMENT

2.2.10.1 The minimum admission criterion for a doctoral degree is a master's degree in the relevant areas from this University or any other university, which is evaluated by the Director of the Centre and judged adequate.
2.2.10.2 Before a candidate's application for registration can be considered, the title or topic of the proposed thesis, together with a brief outline of the research must be submitted to the Department/Centre and the School's Postgraduate Committee for recommendation and approval by Senate.

S. 3 DURATION OF STUDY

3.1 The curriculum shall extend over at least four years of full-time study for the **BSCAGRIC, BSCFON, BSCFSN and BSCENG**.
3.2 The minimum duration of study for the **MSCAGRIC** and **MRDV (research only)** is one academic year. The maximum period of study is three years for full-time study and four years of part-time study. Students who wish to defer their studies at any stage must submit an application to the relevant department. If granted, such deferment will

be for a maximum period of one year, after which a further application must be submitted. Deferment will, at most, be granted twice.

3.3 The duration of study for a **DOCTORAL degree** will extend over a period of at least two years of full-time study and three years of part-time study. The maximum period of study is five years full-time and seven years part-time, subject to Senate approval. Extension may be granted only in exceptional cases and for only one year. A student who desires an extension must submit a motivated application for consideration by Senate.

S. 4 COMPOSITION OF THE CURRICULUM

4.1 BACHELOR OF SCIENCE IN AGRICULTURE (all specializations)

4.1.1 When the word "module" is used, it shall mean for a period of one semester except those ending with code …081.

4.1.2 Students may not select modules that clash on the lecturing and practical timetables. No modules, whether within the School or from outside the School will be recognized unless approved by the relevant Heads of Departments and the Dean of the School. Students wishing to enroll for **non-degree purpose (NDP) modules** must consult the Head of Department and the Dean.

4.1.3 **Students are allowed to register only modules for which prerequisites have been passed.**

4.1.4 A student who does not gain any credit in his/her first year of study will not be re-admitted to the same programme in the following year.

4.2 BACHELOR OF SCIENCE IN FORESTRY

4.2.1. Same as in 4.1

4.3 BACHELOR OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY

4.3.1. Same as in 4.

4.5 MASTER OF SCIENCE IN AGRICULTURE, MASTER OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY and MASTERS IN RURAL DEVELOPMENT (Dissertation only)

4.5.1 The curriculum consists of a dissertation based on a topic recommended by the Head of Department as well as the school's Postgraduate Studies Committee for approval by Senate.

4.5.2 Students may be required to take some makeup/ancillary modules as may be determined by the Head of Department under which the student is specializing. The modules may be at undergraduate or honours level or both.

4.6 DOCTOR OF PHILOSOPHY IN AGRICULTURE and DOCTOR OF PHILOSOPHY IN RURAL DEVELOPMENT

4.6.1 The curriculum consists of a thesis based on a topic approved by the Head of the Department as well as the school's Postgraduate Studies Committee for approval by Senate.

S. 5 MODULE CREDITS

5.1 Students retain credits for all modules passed.

5.2 A candidate shall not be permitted to repeat a module more than once. In the case of a final year student, the rule may be waived at the discretion of the Dean in consultation with the Head of Department.

5.3 No student will be allowed to switch from one School to another without consulting the relevant Deans and Heads of Departments and without complying with the relevant School entrance requirements.

5.4 Senate, on the recommendation of the School, may cancel or refuse to renew the registration of any student whose academic record is regarded by the School to be so unsatisfactory that the degree will not be completed within the period as stipulated in the General Rules.

5.5 **In order to register second year modules, a student must pass 60% of first year modules. To register third year modules, all first year and second year modules must be passed while all modules at first, second and third years must be passed in order to register for the final year of study of a programme.**

5.6 To register for a module, the prerequisite module(s) must be passed where applicable.

S. 6 CREDIT FOR MODULES PASSED ELSEWHERE.

6.1 Accepted candidates may, subject to the provision of Rules S.4 and S.5 receive credit for modules completed at another recognized University towards a degree of this University, on application to the Senate.

6.2 Candidates holding a Diploma in Agriculture from a recognized Tertiary Institution may be exempted from certain modules on recommendation by the School and approval by Senate. For students who are granted exemption, there may be restrictions on the choice of disciplines.

S. 7 ASSESSMENT METHOD FOR DIPLOMA, BACHELOR'S AND HONOURS DEGREES

7.1 In the first 3 or 4 years of study (bachelors) each module will be assessed thus:
Continuous assessment of content (60%)
Examinations of content (40%)

7.2 A student must acquire a minimum of 40% in each of the two components of assessment. To qualify for the examination a student must have obtained 40% in the continuous assessment (tests, assignments and projects).

7.3 Subject to the respective rules, candidates for postgraduate degrees will only be assessed in a particular module if they attended lectures, tutorials and prescribed practicals satisfactorily and obtained a semester mark of 50%.

7.4 Candidates are not entitled to their assessment results unless they have paid the prescribed fees.

7.5. A student must attain a minimum of 50% pass in each of the components of assessment. A student who fails one of these components, will be allowed to repeat only that component. The written examination component will be conducted during the next normal examination period for that specific module.

7.6 All written examinations will be taken only during official examination sessions.

7.7. A mini dissertation / research report for honours students will not exceed 60 pages. Progress must be kept by both the supervisor and the Head of department and a report must be produced every semester. This report must serve at the respective school boards through the School's Postgraduate Studies Committee at the end of every semester. Each school shall submit their reports to the Dean who will in turn submit these reports to Senate.

7.8. All examination reports will be approved by the respective departments. These reports should be submitted to the School Postgraduate Studies Committee. The Committee should then forward these reports to Senate for ratification.

7.9. **A candidate who fails the mini-dissertation will be allowed to resubmit within a period not exceeding 6 months.**

7.10 Students must submit five bound copies of the final mini-dissertation to their departments for onward transmission to the Examination Section. These mini-dissertations must be hard bound after finalization.

S. 8 ASSESSMENT METHOD FOR MASTERS DEGREE BY COURSEWORK

8.1 The examination comprises a minimum of five (5) papers (may vary depending on individual departmental requirements) and a mini-dissertation.
8.2 Individual departments will, where applicable prescribe compulsory papers to be taken.
8.3 The student must write the relevant examinations during the year of registration (i.e., Jun/Jul) and (Nov/Dec) of the year of registration.
8.4 **To pass the examination the student must obtain an average of 50% in each individual paper.**

S. 9 ASSESSMENT METHOD FOR MASTERS DEGREE BY RESEARCH

9.1 The examination consists of a dissertation based on a topic recommended by the Head of Department and approved by Senate.
9.2 A dissertation may not be submitted until one year has elapsed after completion of the relevant honours degree.
9.3. The dissertation will be examined by both internal and external examiners. An oral examination may be required.

S.10 ASSESSMENT METHOD FOR DOCTOR of PHILOSOPHY IN AGRICULTURE AND DOCTOR of PHILOSOPHY IN RURAL DEVELOPMENT

10.1 A Doctor's degree is awarded on the basis of a thesis only.
10.2 The degree may be conferred on a candidate after a period of two years has elapsed since he/she has obtained the Masters degree.
10.3 A candidate for the doctoral degree has to present himself / herself for the oral defense of his / her thesis before the examination committee as part of the assessment criteria for the degree.

S.11 COMPOSITION OF THE CURRICULA FOR UNDERGRADUATE DEGREES

BACHELOR OF SCIENCE IN AGRICULTURE (BSCAEN) (AGRCULTURAL ECONOMICS SPECIALIZATION)

BSCAEN

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
ACC 1542 (12) ECO 1541 (12) ECS 1541 (12) CHE 1540 (12) MAT 1543 (12) PHY 1527 (6)	ACC 1644 (12) AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECO 1641 (12) ECS 1645 (12)	ANS 2531 (9) AEC 2541 (12) AGR 2541 (9) BMA 1541 (12) ECO 2541 (12) SSC 2541 (12) STA 1549 (12)	AGM 2641 (12) BMA 1641 (12) ECO 2641 (12) STA 1648 (12)	AEC 3541 (12) AEC 3542 (12) AEC 3543 (12) ECO 3541 (12) EXT 2541 (12)	ECO 3641 (12) AEC 3642 (12) AEC 3643 (12) AGM 3641 (12) EXT 3641 (12)	AEC 4541 (12) AEC 4542 (12) AEC 4081 (30) WIL 4582 (30)	AEC 4641 (12) AEC 4642 (12) CRD 4641 (12) AEC 4081

BACHELOR OF SCIENCE IN AGRICULTURE (BSCAGM) (AGRIBUSINESS MANAGEMENT SPECIALIZATION)

BSCAGM

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
ACC 1542 (12) BIO 1542 (16) ECS 1541 (12) STA 1549 (12) MAT 1543 (12) CHE 1540 (12)	ACC 1644 (12) AGR 1631 (9) BIO 1643 (12) ECS 1645 (12) STA 1649 (8)	PHY 1527 (12) AEC 2541 (12) AGR 2541 (9) BMA 1541 (12) SSC 2541 (12) EXT 2541 (12)	AGM 2641 (12) ARE 2641 (12) CHE 1622 (9) BMA 1641 (12) ANS 2643 (12)	AEC 3541 (12) AEC 3542 (12) AEC 3543 (12) BMA 2541 (12) FST 2541 (12)	AEC 3642 (12) AEC 3643 (12) AGM 3641 (12) BMA 2641 (12) EXT 3641 (12)	AEC 4541 (12) AEC 4542 (12) AEC 4081 (30) WIL 4582 (30)	AEC 4641 (12) AEC 4642 (12) CRD 4641 (12) AEC 4081

BACHELOR OF SCIENCE IN AGRICULTURE (BSCANN) (ANIMAL SCIENCE SPECIALIZATION)

BSCANN

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
BIO 1542 (12) ECO 1541 (12) ECS 1541 (12) CHE 1540 (12) MAT 1543 (12) PHY 1527 (6)	AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECO 1641 (12) ECS 1645 (12) GEN 1641 (12)	AGR 2541 (9) ANS 2531 (9) ANS 2532 (9) EXT 2541 (12) SSC 2541 (12) STA 1549 (12)	AGM 2641 (12) ANS 2631 (9) ANS 2643 (12) ARE 2641 (12) STA 1649 (12)	ANS 3531 (9) ANS 3533 (9) ANS 3541 (12) ANS 3543 (12) ANS 3544 (12) ARE 3542 (12)	ANS 3633 (9) ANS 3634 (9) ANS 3641 (12) ANS 3642 (12) EXT 3641 (12) RME 3648 (12)	WIL 4582 (30) ANS 4081 (30) AGR 4532 (9)	ANS 4641 (12) ANS 4642 (12) ARE 4641 (12) CRD 4641 (12)

BACHELOR OF SCIENCE IN AGRICULTURE (BSCHRN) (HORTICULTURAL SCIENCES SPECIALIZATION)

BSCHRN

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
BIO 1542 (12) CHE 1540 (12) ECO 1541 (12) ECS 1541 (12) MAT 1543 (12) PHY 1527 (6)	AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECO 1641 (12) ECS 1645 (12) GEN 1641 (12)	AGR 2541 (12) ANS 2531 (9) EXT 2541 (12) HRT 2541 (12) PPR 2541 (12) SSC 2541 (12) STA 1549 (12)	ARE 2641 (12) BCM 2621 (6) BCM 2622 (6) HRT 2641 (12) STA 1649 (12)	HRT 3531 (9) HRT 3534 (9) HRT 3544 (12) ARE 3545 (12) AGR 3541 (12)	HRT 3631 (9) HRT 3642 (12) PPR 3631 (9) PPR 3641 (12) EXT 3641 (12) RME 3648 (12)	HRT 4541 (12) HRT 4542 (12) HRT 4532 (9) HRT 4081 (30) WIL 4582 (30)	HRT 4633 (9) HRT 4642 (12) CRD 4641 (12)

BACHELOR OF SCIENCE IN AGRICULTURE (BSCHOR) (HORTICULTURAL SCIENCES SPECIALIZATION) (For students who first registered in 2017)

BSCHOT

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
BIO 1542 (12) CHE 1540 (12) ECO 1541 (12) ECS 1541 (12) MAT 1543 (12) PHY 1527 (6)	AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECO 1641 (12) ECS 1645 (12) GEN 1641 (12)	AGR 2541 (12) ANS 2531 (9) EXT 2541 (12) HRT 2541 (12) PPR 2541 (12) SSC 2541 (12) STA 1549 (12)	ARE 2641 (12) BCM 2621 (6) BCM 2622 (6) HRT 2641 (12) STA 1649 (12)	HRT 3534 (9) HRT 3545 (12) ARE 3545 (12) AGR 3541 (12)	HRT 3631 (9) HRT 3642 (12) HRT 3643 (12) PPR 3631 (9) PPR 3641 (12) EXT 3641 (12) RME 3648 (12)	HRT 4081 (30) WIL 4582 (30)	HRT 4081 HRT 4633 (9) HRT 4642 (12) CRD 4641 (12)

BACHELOR OF SCIENCE IN AGRICULTURE (BSCPPN) (PLANT PRODUCTION/ AGRONOMY SPECIALIZATION)

BSCPPN

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
BIO 1542 (12) CHE 1540 (12) ECO 1541 (12) ECS 1541 (12) MAT 1543 (12) PHY 1527 (6)	AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECO 1641 (12) ECS 1645 (12) GEN 1641 (12)	AGR 2541 (12) AEC 2541 (12) ANS 2531 (9) BCM 2521 (6) BCM 2522 (6) HRT 2541 (12) SSC 2541 (12) STA 1549 (12)	AGM 2641 (12) ARE 2641 (12) STA 1649 (12)	AEC 3541 (12) AGR 3541 (12) EXT 2541 (9) PPR 3541 (12)	AGR 3631 (12) AGR 3641 (12) PPR 3631 (12) PPR 3641 (12) SSN 3641 (12) CRD 3641 (12) RME 3648 (12)	AGR 4081 (15) AGR 4532 (12) AGR 4533 (12) PPR 4541 (12) WIL 4582 (30)	AGR 4081 (15) AGR 4632 (12) SSC 4645 (12)

BACHELOR OF SCIENCE IN AGRICULTURE (BSCSSN) (SOIL SCIENCE SPECIALIZATION)

BSCSSN

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
BIO 1542 (12) CHE 1540 (12) ECO 1541 (12) ECS 1541 (12) MAT 1543 (12) PHY 1527 (6)	AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECO 1641 (12) ECS 1645 (12) GEN 1641 (12)	AGR 2541 (12) ANS 2531 (9) BCM 2521 (6) BCM 2522 (6) EXT 2541 (12) SSC 2541 (12) STA 1549 (12)	ARE 2631 (9) ARE 2641 (12) CHE 2620 (6) SSC 2642 (12) STA 1649 (12)	AGR 3541 (12) ARE 3547 (16) ARE 3548 (8) SSC 3542 (12) SSC 3543 (12) SSC 3544 (12)	AGR 3631 (12) EXT 3641 (12) SSC 3641 (12) SSC 3642 (12) RME 3648 (12)	SSC 4541 (12) WIL 4582 (30) SSC 4081 (15)	SSC 4641 (12) SSC 4644 (12) SSC 4081 (15) SSC 4645 (12) CRD 4641 (12)

BACHELOR OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY (BSCFSN)

BSCFSN

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
BIO 1541 (12) BIO 1542 (12) ECS 1541 (12) CHE 1540 (12) MAT 1543 (12) PHY 1527 (6)	AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECS 1645 (12) MAT 1643 (12) PHY 1627 (6)	BCM 2521 (6) BCM 2522 (6) BMA 1541 (12) FST 2541 (12) MBY 2521 (6) STA 1549 (12)	BCM 2621 (6) BCM 2622 (6) FST 2621 (6) FST 2642 (12) FST 2643 (12) FST 2644 (12) STA 1649 (12)	FST 3541 (12) FSN 3542 (12) FSN 3543 (12) FSN 3081 (24)	FSN 3641 (12) FSN 3642 (12) FSN 3643 (12) FSN 3081 FSN 3644 (12) RME 3648 (12)	FST 4541 (50) FST 4081 (30)	FSN 4641 (12) FST 4081 FSN 4642 (12) CRD 4641 (12) FST 4643 (12)

BACHELOR OF SCIENCE IN AGRICULTURE (BSCFON) (FORESTRY SPECIALIZATION)

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
BIO 1542 (12) ECO 1541 (12) ECS 1541 (12) CHE 1540 (12) MAT 1543 (12) PHY 1527 (6)	AGR 1631 (9) BIO 1643 (12) CHE 1621 (6) CHE 1622 (6) ECO 1641 (12) ECS 1645 (12) GEN 1641 (12)	AEC 2541 (12) AGR 2541 (12) FRT 2541 (12) FRT 2543 (12) SSC 2541 (12) PPR 2541 (12) STA 1549 (12)	AGM 2641 (12) FRT 2641 (12) FRT 2642 (12) HRT 2641 (12) STA 1649 (12)	AEC 3541 (12) AEC 3543 (12) FRT 3542 (12) FRT 3544 (12) AGR 3541 (12)	FRT 3642 (12) FRT 3643 (12) FRT 3644 (12) FRT 3645 (12) EXT 3641 (12) RME 3648 (12)	FRT 4541 (12) FRT 4542 (12) FRT 4081 (30) WIL 4582 (15)	FRT 4642 (12) FRT 4643 (12) FRT 4644 (12) CRD 4641 (12) FRT 4081

BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING
(NB: First intake in 2017)

Year I		Year II		Year III		Year IV	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**	**Semester 1**	**Semester 2**
ABE 1531 (8) ABE 1532 (12) ABE 1533 (12) ABE 1534 (12) ABE 1535 (12) ABE 1536 (8) ABE 1537 (8)	ABE 1631 (8) ABE 1632 (12) ABE 1633 (12) ABE 1634 (8) ABE 1635 (12) ABE 1636 (12) ABE 1637 (8)	ABE 2531 (12) ABE 2532 (12) ABE 2533 (8) ABE 2534 (12) ABE 2535 (8) ABE 2536 (8) ABE 2537 (8) ABE 2538 (8)	ABE 2631 (12) ABE 2632 (12) ABE 2633 (12) ABE 2634 (8) ABE 2635 (8) ABE 2636 (8) ABE 2637 (8) ABE 3638 (8)	ABE 3531 (8) ABE 3532 (8) ABE 3533 (8) ABE 3534 (8) ABE 3535 (16) ABE 3536 (12) ABE 3537 (12)	ABE 3631 (12) ABE 3632 (12) ABE 3633 (8) ABE 3634 (12) ABE 3635 (8) ABE 3636 (8) ABE 3637 (8) ABE 3638 (8)	***SESSION I*** ABE 4000 ***SESSION II*** ABE 4532 (8) ABE 4533 (8) ABE 4534 (8) ABE 4535 (8) ABE 4536 (12) ABE 4537 (8) ABE 4538 (12)	ABE 4631 (16) ABE 4632 (8) ABE 4999 (0) ***SELECT 40 CREDITS FROM MODULES BELOW:*** ABE 4623(8) ABE 4624(8) ABE 4633(8) ABE 4634(8) ABE 4635(8) ABE 4636(8) ABE4637(16) ABE 4638(8) ABE 4639(8) ABE 4641(8)

							ABE 4643(8) ABI 4631 (8) ABI 4632(16) ABI 4634 (8) ABI 4635 (8) ABI 4642 (8) ABS 4631 (8) ABS4632(16) ABS 4633 (8) ABS 4634 (8) ABS 4635 (8) ABS 4636 (8) ABS 4637 (8) ABS 4738 (8)

S. 12 COMPOSITION OF THE CURRICULUM FOR BAGRIC (HONS)

BACHELOR OF AGRICULTURE HONOURS (BAGRHP) (Plant Production)

Semester 1		Semester 2	
Module	Credits	Module	Credits
CRD 5541 AGR 5531 ARE 5531 AGR/PPR 5099	18 14 14 10	STA 5649 EXT 5641 AGR 5631 PPR 5621 PPR 5632 AGR/PPR 5099	14 16 14 10 14 10
TOTAL	**56**		**78**

BACHELOR OF AGRICULTURE HONOURS (BAGRHS) (Soil Science)

Semester 1		Semester 2	
Module	Credits	Module	Credits
CRD 5541 AGR 5531 ARE 5531 SSC 5531 SSC 5099	18 14 14 14 10	STA 5649 EXT 5641 SSC 5631 SSC 5632 SSC 5099	14 16 14 14 10
TOTAL	**56**		**68**

BACHELOR OF AGRICULTURE HONOURS (BAGRHH) (Horticultural Sciences)

Semester 1		Semester 2	
Module	Credits	Module	Credits
CRD 5541 ARE 5531 HRT 5531 HRT 5532 or HRT 5533 HRT 5099	18 14 14 14 10	STA 5649 EXT 5641 HRT 5621 or HRT 5622 HRT 5099	14 16 14 10
TOTAL	**70**		**54**

BACHELOR OF AGRICULTURE HONOURS (BAGRHA) (Animal Science)

Semester 1		Semester 2	
Module	Credits	Module	Credits
CRD 5541 ANS 5531 ANS 5532 ANS 5099	18 14 14 10	STA 5649 EXT 5641 ANS 5631 ANS 5632 ANS 5099	14 16 14 14 10
TOTAL	**56**		**68**

S. 13 COMPOSITION OF THE CURRICULUM FOR BA(Hons) IN RURAL DEVELOPMENT

BA HONOURS IN RURAL DEVELOPMENT (BAHRDV)

Semester 1		Semester 2	
Module	Credits	Module	Credits
IRD 5541 IRD 5542 IRD 5543 IRD 5544 IRD 5099	21 18 12 12 30	IRD 5641 IRD 5642 IRD 5631 Elective Modules IRD 5621 IRD 5622	14 12 14 8 8

S. 14 COMPOSITION OF THE CURRICULUM FOR MASTER OF SCIENCE IN AGRICULTURE (COURSEWORK AND MINI-DISSERTATION)

MASTER OF SCIENCE IN AGRICULTURE (MSCAEC) (Agricultural Economics)

Year 1		Year 2
Semester 1	Semester 2	Full year
AEC 6541 AEC 6542 AEC 6543	AEC 6641 AEC 6642 EXT 6641	AEC 6099 (Dissertation)

MASTER OF SCIENCE IN AGRICULTURE (MSCANS) (Animal Science)

Year 1		Year 2
Semester 1	Semester 2	Full year
Compulsory module ANS 6531 Elective modules (Choose two) ANS 6542 ANS 6543 ANS 6544 ANS 6545	Compulsory module STA 6649 ANS 6631 Elective modules (Choose two) ANS 6642 ANS 6643 ANS 6644 ANS 6645	ANS 6099 (Dissertation)

MASTER OF SCIENCE IN AGRICULTURE (MSCHRT) (Horticultural Sciences)

Year 1		Year 2
Semester 1	Semester 2	Full year
HRT 6541 HRT 6542 HRT 6543 AGR 6531	HRT 6641 HRT 6642 HRT 6643 AGR 6642	HRT 6099 (Dissertation) HRT 6544 (1st sem module)

MASTER OF SCIENCE IN AGRICULTURE (MSCAGR) (Plant Production/Agronomy)

Year 1		Year 2
Semester 1	Semester 2	Full year
AGR 6531 AGR 6542 PPR 6541 SSC 4542	AGR 6631 AGR 6642 STA 6649	AGR 6099 (Dissertation)

NB: Electives up to 42 credits will be selected with the guidance of the supervisory committee in related disciplines and may be offered in any of the two years.		

MASTER OF SCIENCE IN AGRICULTURE (MSCSSC) (Soil Science)

Year 1		Year 2
Semester 1	Semester 2	Full year
SSC 6531 SSC 6532 SSC 6533 NB: Optional up to 42 credits will be selected with the guidance of the supervisory committee in related disciplines and may be offered in any of the two years.	SSC 6631 SSC 6632 STA 6649 Optional modules SSC 6633 SSC 6634 SSC 6635 AGR 6642	SSC 6099 (Dissertation)

MASTER OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY (MSCFST)

Year 1		Year 2
Semester 1	Semester 2	Full year
FST 6541 FST 6542 FST 6543	FST 6641 FST 6642 FST 6643	FST 6099 (Dissertation)

S. 15 MODULES OFFERED BY DEPARTMENTS

Department of Agricultural Economics and Agribusiness

AEC 2541: Introduction to agricultural economics
AGM 2641: Introduction to agribusiness management
AEC 3541: Farm Business management
AEC 3542: Agricultural sector planning and project appraisal
AEC 3543: Introduction to mathematical economics
AEC 3642: Introduction to econometrics.
AEC 3643: Research Methods for Agricultural Economics and Agribusiness
AGM 3641: Agribusiness management and applications
AEC 4541: Agricultural production economics
AEC 4542: Agricultural policy in developing countries
AEC 4641: Natural resource and environmental economics
AEC 4642: Markets and price analysis
AEC 4081: Project and seminar presentation
EXT 2541: Introduction to rural sociology
EXT 3641: Introduction to agricultural extension
EXT 5641: Communication and extension for rural development
AEC 6541: Advanced agricultural production economics
AEC 6542: Advanced agribusiness management & marketing
AEC 6543: Research methodology
AEC 6641: Advanced agricultural policy
AEC 6642: Research project and seminar
EXT 6641: Advanced agricultural extension education
AEC 6099: Dissertation
AEC 7099: Thesis

Department of Agricultural and Rural Engineering
(Modules for the new BSC(ENG.) degree programme) (First Intake 2017)

ABE 1531 Technical Communication skills
ABE 1532 Introduction to Agricultural and Biosystems Engineering
ABE 1533 Physics I
ABE 1534 Chemistry I
ABE 1535 Pure Mathematics I
ABE 1536 Applied Mathematics I
ABE 1537 Engineering Drawing I
ABE 1631 Introduction to Agricultural Sciences
ABE 1632 Physics II (**Prerequisites ABE 1536)**
ABE 1633 Chemistry II (**Prerequisites ABE 1534)**
ABE 1634 Earth and Environmental Science
ABE 1635 Pure Mathematics II (**Prerequisites ABE 1535**)
ABE 1636 Applied Mathematics II (**Prerequisites ABE 1536**)
ABE1637 Fundamentals of Computing
ABE 2531 Engineering Mathematics I (**Prerequisites ABE 1635, ABE 1636**)
ABE 2532 Electrical Engineering (**Prerequisites ABE 1632**)
ABE 2233 Thermodynamics I (**Prerequisites ABE 1632**)
ABE 2534 Solid and Structural Mechanics I (**Prerequisites ABE 1632**)
ABE 2535 Mechanics of Machines I (**Prerequisites ABE 1632**)
ABE 2536 Material Science and Engineering (**Prerequisites ABE 1532**)
ABE 2537 Engineering Drawing II (**Prerequisites ABE 1537**)
ABE 2538 Fluid Mechanics I (**Prerequisites ABE 1632**)
ABE 2631 Engineering Mathematics II (**Prerequisites 2531**)
ABE 2632 Computer Programming for Engineers (**Prerequisites ABE 1637**)
ABE 2633 Engineering Surveying (**Prerequisites ABE 2531**)
ABE 2634 Solid and Structural Mechanics II (**Prerequisites ABE 2534**)
ABE 2635 Mechanics of Machines II (**Prerequisites ABE 2535**)
ABE 2636 Electronics (**Prerequisites ABE 1632**)
ABE 2637 Materials Processing (**Prerequisites ABE 2536**
ABE 2638 Fluid Mechanics II (**Prerequisites ABE 2538**)
ABE 3531 Renewable Energy Resources and Technologies (**Prerequisites ABE 1533**
ABE 3532 Thermodynamics II (**Prerequisites ABE 2533**)
ABE 3533 Operations Research (**Prerequisites ABE 1532**)
ABE 3534 Soil Science (**Prerequisites ABE 1532**)
ABE 3535 Instrumentation (**Prerequisites ABE2636**)
ABE 3536 Engineering Hydrology and Meteorology (**Prerequisites ABE2632**
ABE 3537 Statistical Methods and Experimental Design (**Prerequisites ABE 2632, ABE 1635**)
ABE 3631 Soil dynamics and Mechanics (**Prerequisites ABE 1532**)
ABE 3632 Irrigation and Drainage Engineering (**Prerequisites ABE 3536, ABE 1532**)
ABE 3633 Tractor Power Engineering (**Prerequisites ABE 2635**)
ABE 3634 Structural Design (**Prerequisites ABE 2634**)
ABE 3635 Process and Food Engineering (**Prerequisites ABE 1631**)
ABE 3636 Principles of Microeconomics
ABE 3637 Heat and Mass Transfer (**Prerequisites ABE 3532**)
ABE 3638 Rural Water Supply and Sanitation (**Prerequisites ABE 3536**)
Session I Comp 4
ABE 4000 Industrial/Field Attachment (**Prerequisites – PASSED ALL YEAR 3 MODULES**)
Session II
ABE 4532 Engineering Economy (**Prerequisites AB 3633**)
ABE 4533 Built Environment Engineering (**Prerequisites ABE 2633**)
ABE 4534 Soil and Water Conservation Engineering (**Prerequisites ABE 1634, ABE 3534**)
ABE 4535 Entrepreneurship and Product Development (**Prerequisites ABE 4532**)
ABE 4536 Design Project I* (**Prerequisites – PASSED ALL YEAR 3 MODULES**)

ABE 4537 Project Planning and Management (**Prerequisites ABE 3537**)
ABE 4538 Rural Structures (**Prerequisites ABE 2633**)
ABE 4631 Design Project II – CONTINUES FROM SESSION I (**Prerequisites ABE 4536**)
ABE 4632 Electrification (**Prerequisites ABE 2532**)
ABE 4999 ECSA outcome portfolio
ABE 4633 Conservation and Precision Agriculture (**Prerequisites ABE 3534**)
ABI 4642 Water Systems Engineering (**Prerequisites ABE 3632, ABE 3638**)
ABE 4634 Mechanization & Machinery Management (**Prerequisites ABE 3633**)
ABE 4635 Aquatic Machinery Engineering (**Prerequisites ABE 3633**)
ABE 4637 Tractor Power and Machinery Systems Design (**Prerequisites ABE 3633**)
ABE 4636 Transport Systems (**Prerequisites ABE 3633, ABE 4538**)
ABE 4638 Land Development Machinery (**Prerequisites ABE 3633**)
ABE 4639 Minor Roads (**Prerequisites ABE 3631, ABE 4538**)
ABE 4623 Watershed Management (**Prerequisites ABE 3536**)
ABE 4641 Construction Management (**Prerequisites ABE 4533**)
ABE 4624 Rural Extension & Technology Transfer (**Prerequisites ABE 4535, ABE 4532**)
ABE 4643 Geo-Information Systems (**Prerequisites ABE 2633**)
ABI 4631 Hydrological Design of Reservoirs (**Prerequisites ABE 3536**)
ABI 4632 Design of Irrigation and Drainage Systems (**Prerequisites ABE 3632**)
ABI 4634 Groundwater Hydrology (**Prerequisites ABE 3536**)
ABI 4635 Surface Water Hydrology (**Prerequisites ABE 3536**)
ABS 4631 Refrigeration and air conditioning (**Prerequisites ABE 3635**)
ABS 4632 Storage of agricultural products (**Prerequisites ABE 3635**)
ABS 4633 Processing plant design (**Prerequisites ABE 3635**)
ABS 4634 Food engineering systems (**Prerequisites ABE 3635**)
ABS 4635 Dairy technology (**Prerequisites ABE 3635**)
ABS 4636 Post harvest technology (**Prerequisites ABE 3635**)
ABS 4637 Agro-Industrial Waste Management (**Prerequisites ABE 1634**)
ABS 4638 Packaging technology **(Prerequisites ABE 3635)**

Department of Animal Science

GEN 1641: Principles of genetics
ANS 2531: Introduction to Animal production
ANS 2532: Biochemical principles in animal nutrition
ANS 2541: Basic principles of nutrition
ANS 2631: Principles of animal nutrition
ANS 2641: Feeding of farm livestock
ANS 2643: Anatomy, histology and physiology of farm animals
ANS 3531: Genetic principles in animal breeding
ANS 3533: Management of dairy cattle
ANS 3541: Applied animal nutrition
ANS 3542: Management of ruminant farm animals
ANS 3543: Management of small stock
ANS 3544: Management of beef cattle
ANS 3632: Principles of poultry production
ANS 3633: Animal health
ANS 3634: Pig production
ANS 3641: Reproductive physiology
ANS 3642: Poultry production
ANS 4531: Qualitative and quantitative genetics
ANS 4532: Biochemical principles in animal nutrition
ANS 4081: Seminar/Scientific Project
ANS 4621: Animal production systems and management
ANS 4632: Environmental physiology
ANS 4641: Applied animal breeding
ANS 4642: Livestock products

ANS 5531: The science and management of monogastric animals
ANS 5532: The science and management of ruminant animals
ANS 5631: Selected topics in animal production
ANS 5632: Animal health and disease control
ANS 5099: Research project and mini dissertation
ANS 6541: Agricultural biometry
ANS 6531: Seminar presentation /special topic
ANS 6542: Ruminant nutrition
ANS 6543: Advance large stock production
ANS 6544: Advance pig production
ANS 6545: Advance animal breeding
ANS 6631: Seminar presentation / special topic
ANS 6642: Non ruminant nutrition
ANS 6643: Advance animal physiology and anatomy
ANS 6644: Advance small stock production
ANS 6645: Advance poultry production
ANS 6099: Dissertation
ANS 7099: Thesis

Department of Consumer Sciences

FEC 1541: Introduction to Family Ecology
FEC 1641: Family Development and Management
FEC 1642: Introduction to nutrition
FEC 2541: Family resource management and decision making
FEC 2542: Life-cycle nutrition
FEC 2543: Introduction to foods
FEC 2544: Housing provisions
FEC 2545: Introduction to clothing and textiles
FEC 2641: Family financial management and consumer studies
FEC 2642: Nutrition-related diseases
FEC 2643: Food preservation
FEC 2644: Ecology and design perspectives of housing
FEC 2645: Garment construction and pattern design
FEC 3541: Adult education, gender and development
FEC 3542: Community nutrition
FEC 3543: Meal management and food product development
FEC 3544: Interior planning of houses
FEC 3545: Fashion marketing & clothing industry consumer services
FEC 3081: Research project / industrial attachment

Department of Food Science and Technology

FST 2541: Introduction to food science and technology
FST 2621: Introduction to food and nutrition
FST 2642: Fundamentals of Post-harvest biology and storage technology
FST 2643: Fundamentals of food preservation technology
FST 2644: Food process engineering
FST 3541: Principles of human nutrition
FSN 3542/ FST 3542: Food chemistry I
FSN 3543: Food Microbiology
FSN 3081: Food commodity processing
FSN 3641: Product development and sensory evaluation of food
FSN 3642: Food chemistry II
FSN 3643: Quality management systems
FSN 3644: Cereal science and technology
FST 4541: Industrial attachment/Work Integrated Learning

FSN 4641: Fruit and vegetable technology
FSN 4642: Meat and poultry products technology
FST 4643: Food machinery
FST 4081: Research project
FST 6541: Quality assurance and marketing in food process enterprise
FST 6542: Food machinery
FST 6543: Advances in post-harvest technology
FST 6641: Seminar presentation
FST 6642: Research project
FST 6643: Technical report writing
FST 6099: Dissertation
FST 7099: Thesis

Department of Forestry

FRT 2541: Forest ecology and tree identification
FRT 2542: Wood science
FRT 2543: Wood anatomy and properties
FRT 2641: Introduction to forestry engineering
FRT 2642: Wood and non-wood-based materials
FRT 3531: Silviculture I
FRT 3541: Mensuration, inventory and harvesting
FRT 3542: Sawmilling
FRT 3544: Forest resources assessment
FRT 3641: Silviculture II
FRT 3642: Forest policy
FRT 3643: Silviculture of planted forests
FRT 3644: Forest protection
FRT 3645: Logging and roads
FRT 4541: Agroforestry
FRT 4542: Forest conservation
FRT 4641: Forest engineering
FRT 4642: Community forestry
FRT 4643: Timber transportation and planning
FRT 4644: Silviculture of natural forests
FRT 4081: Project and seminar presentation

Department of Horticultural Sciences

HRT 2541: Principles of horticultural crops production
HRT 2641/3641: Plant propagation
HRT 3531: Ornamental horticulture
HRT 3533: Plant tissue culture
HRT 3534: Citriculture/Citrus production
HRT 3544: Controlled environment horticulture
HRT 3631: Olericulture
HRT 3642: Turf grass and landscape horticulture
HRT 4532: Spice, herbs, beverages and medicinal crops
HRT 4541: Postharvest physiology of horticultural crops
HRT 4542: Tropical and subtropical fruit and nut trees production
HRT 4633: Temperate fruits and nut trees production
HRT 4642: Agriculture biotechnology
HRT 4081: Project and seminar presentation
HRT 5531: Advanced plant propagation
HRT 5532: Advanced pomology
HRT 5533: Advanced olericulture
HRT 5621: Special topics in horticultural sciences

HRT 5622: Sustainable horticultural crops production
HRT 5099: Research project and mini dissertation
HRT 6541: Data analysis & evaluation techniques in HRT
HRT 6542: Agriculture biotechnology
HRT 6543: Special Topics in HRT crop production
HRT 6544: Guide to interdisciplinary research
HRT 6641: Advances in Horticultural crops production systems
HRT 6642: Post harvest diseases: Tropical & subtropical HRT crops
HRT 6643: Advances in Horticultural crop protection
HRT 6099: Dissertation
HRT 7099: Thesis

Department of Plant Production

AGR 1631: Agriculture and Humankind
AGR 2541: Introduction to plant production (**Prerequisite AGR 1631**)
AGR 3541: Principles & application of plant physiology in plant production (**Prerequisites BIO 1542, BIO 1643**)
AGR 3631: Dryland farming technology (**Prerequisite AGR 2541**)
AGR 3641: Introductory plant breeding and seed production (**Prerequisites GEN 1641, AGR 3541**)
AGR 4531: Agronomy of selected commercial crops
AGR 4631: Agronomy of selected oil seed, fibre & cereal crops
AGR 4532: Management of natural and cultivated pastures (**Prerequisite AGR 2541**)
AGR 4533: Bio-energy crops: Agronomy and postharvest processing (**Prerequisite AGR 2541, AGR 3641, PPR 3541**)
AGR 4632: Agronomy of selected field crops (**Prerequisite AGR 2541, AGR 3641, PPR 3541**)
AGR 4081: Project and seminar presentation
AGR 5531: Agronomy of cereal crops
AGR 5631: Agronomy of legumes and tuber crops
PPR 3541: Introduction to plant protection
PPR 3631: Agricultural entomology (**Prerequisite PPR 2541/3541**)
PPR 3641: Weed science (**Prerequisite PPR 2541/3541**)
PPR 4541: Plant pathology (**Prerequisite PPR 3541**)
PPR 5621: Weed science
PPR 5632: Disease and insect pest control
PPR 5099: Research project and mini dissertation
AGR 6531: Special topics in crop production
AGR 6542: Special topics in plant breeding
AGR 6631: Crop production systems
AGR 6642: Advances in applied crop physiology
PPR 6541: Advanced plant protection
AGR 6099: Dissertation
AGR 7099: Thesis

Department of Soil Science

SSC 2541: Introduction to Soil Science
SSC 2642: Geology for soil science
SSC 3531: Soil biology and ecology
SSC 3541: Soil classification and mapping
SSC 3542: Soil chemistry
SSC 3543: Pedology
SSC 3544: Soil physics
SSC 3632: Soil fertility and analysis
SSC 3633: Soil physics

SSC 3643: Pedology
SSC 3641: Soil survey, classification and mapping
SSC 3642: Soil microbiology
SSC 3644: Regional pedology
SSC 4541: Soil-plant-water relationships
SSC 4641: Soil fertility and plant nutrition
SSC 4642: Advanced soil chemistry
SSC 4643: Advanced soil physics
SSC 4644: Land evaluation
SSC 4645: Soil, water and plant analysis
SSC 4081: Project and Seminar presentation
SSC 5531: Soil genesis and morphology
SSC 5631: Soil survey and classification
SSC 5632: Soil technology and conservation
SSC 5099: Research project and mini-dissertation
SSC 6531: Soil genesis, survey and classification
SSC 6532: Soil chemistry and clay mineralogy
SSC 6533: Soil physics
SSC 6631: Project and seminar presentation
SSC 6632: Chemical analysis of soils, plants, fertilizer and water
SSC 6633: Soil fertility and fertilizer use
SSC 6634: Soil biology and biochemistry
SSC 6635: Soil technology and conservation
SSC 6099: Dissertation
SSC 7099: Thesis

Institute for Rural Development

IRD 5541: Rural Development Theories and Practice
IRD 5542: Research Methods 1
IRD 5543: Project Management
IRD 5544: Entrepreneurship
IRD 5641: Institutions for Rural Development
IRD 5631: Contemporary Issues in Rural Development
IRD 5642: Research Methods 2
IRD 5621: Ethics in Community-based International Research
IRD 5622: People, Culture and the Environment
IRD 5099: Research Project
IRD 6099: Dissertation
IRD 7099: Thesis

S. 18 SYLLABI

DEPARTMENT OF AGRICULTURAL AND AGRIBUSINESS MANAGEMENT (Module content)

AEC 2541 Introduction to agricultural economics
The scope and nature of agricultural economics. The price mechanism and allocation of resources. Supply and Demand Analysis. Factor-Factor and Product-Product Relations. Risk Management and Agricultural production system.

EXT 2541 Introduction to rural sociology
Rural Institutions and Organisations in rural areas. Structural set up and decision making in rural areas. Communications and diffusion of innovations in rural societies. Cognitive, attitudinal and interpersonal factors influencing social change. Some selected case studies of social action in rural African Communities.

AGM 2641 Introduction to agribusiness management
Prerequisite AEC 2541
The nature of agribusiness: Define agribusiness. Overview of agribusiness in South Africa. Careers in agribusiness. Agribusiness management concepts. Management and its functions. Marketing management, Financial management Human resources management. Entrepreneurship. Define and describe entrepreneurship. Personal attributes of entrepreneurs. Entrepreneurship opportunities in agribusiness. Review of agribusiness case studies in South Africa. Identify and describe the types of business ownership (sole proprietor, partnership, corporation (etc). Advantages and disadvantages of the different types of business. Review of cooperatives in agribusiness. The business plan.

AEC 3541 Farm business management
Prerequisites AEC 2541
Organisational Structure. Leadership. Motivation. Functions of personnel management. Legislation controlling human resource management. Farm Machinery management. Investment in Fixed assets. Business objectives. Farm management information. Risk management. Budgeting. Time Value of money and Farm credit

AEC 3542 Agricultural sector planning and project appraisal
Prerequisite AEC 2541
Resource allocation and agricultural development planning. Macro-plans versus Micro-plans. Problems of planning for agricultural development in African Countries. Project preparations and appraisal; Cash Flow Analysis. Cost-Benefit Analysis. Internal Rates of Return. Sensitivity Analysis. Problems of project preparations and appraisal in African Countries.

AEC 3543 Introduction to mathematical economics
Prerequisite MAT 1543

Use of linear and non-linear equations in economics; solving equations. Logarithms and indices. Use of differentiation in economics, rules of differentiation, partial differentiation, differential equations, difference equations. Constrained and unconstrained optimisation. Use of integration in economics, rules of integration. Matrix algebra and its applications in economics. Mathematical programming.

AEC 3642 Introduction to econometrics
Prerequisites STA 1648 and AEC 3543
Purpose, role and limitations of Econometrics. Revision of hypothesis tests and point and interval estimation. Elementary Econometrics: regression theory; regression and variance analysis; non-linear regression. Dummy variables. Estimation of parameters and interpretation. Violations of the classical assumptions of linear regression: heteroscedasticity; auto-correlation; multicollinearity; and their implications on parameter estimates. Dealing with time-series and lagged variables. Introduction to computer packages.

AEC 3643 Research methods for Agricultural Economics and Agribusiness
Prerequisites STA 1549 and STA1648
Definition of research. Research design. Qualitative and qualitative research. Population and sampling techniques. Data collection, analyses and presentation techniques. Referencing techniques. Proposal writing.

AGM 3641 Agribusiness management and applications
Prerequisite AGM 2641
Components of the agribusiness sector and practical examples from the South African economy. The size of the agribusiness sector in South Africa. Agribusiness Management. Agribusiness Supply Chain Management. Forms of organisations in the South African agribusiness sector. Legislations affecting the agribusiness sector in South Africa. An empirical study of one component of the agribusiness sector in South Africa.

EXT 3641 Introduction to agricultural extension
Origin and philosophy of agricultural Extension. Organisation and structure of agricultural extension in South Africa. Extension communication methods. Group Dynamics and leadership role in extension. Case studies and group discussions of extension methods in developing countries.

AEC 4081 Project and seminar presentation
Prerequisite AEC 3643
The philosophy of Agric. economic research. The framework for research proposal. Research background and research problem statement. Research objectives and hypothesis. Theoretical framework and review of literature. Data collection techniques and data analysis. Presentation of research results. Project research report writing. Seminar on research findings.

AEC 4541 Agricultural production economics
Prerequisite AEC 3541
Goals of agricultural production systems. Agricultural production functions for crops, and livestock. Factor-Factor and product-product relations. Cost Functions and returns to scale in agriculture. Supply response in agriculture. Linear programming as planning tools for agricultural production system.

AEC 4542 Agricultural policy in developing countries
Prerequisite AEC 2541
Role of agriculture in the economic development process. Macro-economic goals in relation to agriculture in the economic development process. Agricultural policies relating to land use and land reform; credit, water use, extension, research and marketing of agricultural products. Structural adjustments and their impact on African Agriculture. Agricultural institutions and their role in poverty alleviation in developing countries.

AEC 4641 Natural resource and environmental economics
Prerequisite AEC 2541
Natural Resource classification. The economic concepts of natural resource use. Renewable and non-renewable resources with specific examples from Africa. Natural resource valuation techniques. Benefit-cost analysis as used in natural resource management. Environmental Impact Assessment. Resource use and environmental pollution. Government policy and pollution control with examples from Africa.

AEC 4642 Markets and price analysis
Prerequisite AEC 2541
Price movements and price cycles for agricultural products with examples from Africa. Market trend analysis and weighted moving average of prices. Economic analysis of agricultural product prices in South Africa. Marketing research and product market surveys. Price control and price intervention policy in South Africa.

WIL 4582 Work-integrated learning
Prerequisite AGM 3641
Practical exposure to agribusiness planning processes. Practical exposure to agribusiness coordination and monitoring activities. Practical exposure to agribusiness control processes. Report on work covered.

DEPARTMENT OF ANIMAL SCIENCE (Module content)

GEN 1641 Principles of genetics
Prerequisites None
Credits 12 .
Module Contents: History of genetics; Mendelian genetics; Multiple alleles; Modified ratios; Sex determination and sex linkage; Structure and functions of the genetic material; Chromosomal and gene mutations; Biotechnology (genetics and society).

ANS 2531 Introduction to animal production
Prerequisites CHE 1540 and CHE 1622
Credits 9
Module content: breeds of livestock and their products; environmental physiology; vegetation and livestock distribution in RSA; selected management practices in animal production; breeding of livestock; grazing systems and veld management practices; diseases of animals and their causes; grading and classification of livestock products

ANS 2532 Biochemical principles of animal nutrition
Prerequisites CHE 1540 and CHE 1622
Credits 9
Module content: an understanding of metabolism, bioenergetics and energy metabolism, final common pathway of energy metabolism including substrate level phosphorylation and oxidative phosphorylation, carbohydrates, lipids and protein and digestion and metabolism in non-ruminants and ruminants, and indicators in pasture and range studies.

ANS 2631 Principles of animal nutrition
Prerequisites ANS 2532
Credits 9
Module content: Feed definition, components and functions, proximate analysis of foods. Carbohydrates, lipids and protein classification, structures, functions and sources. Vitamins and minerals. Digestibility of feeds. Partition of feed energy. Introduction to energy systems. Measures of protein quality for non-ruminants.

ANS 2641 Feeding of farm livestock (syllabus not available)

ANS 2643 Anatomy and physiology of farm animals
Prerequisites None
Credits 12
Module content: Cell structures and cell physiology, terminology, identification of body parts in anatomy, nervous system, digestive system, respiratory system, excretory system, blood and circulation, reproductive system, endocrine system, homeostasis and its control, immune system.

ANS 3531 Genetic principles in animal breeding
Prerequisites GEN 1641, ANS 2531
Credits 12
Module Content: Genetic properties of a population; Factors that change gene frequencies; Qualitative and Quantitative characters; Types of traits in farm animals; Breeding value; Principles of selection; Aids to selection; Multiple-trait selection; Inbreeding; Crossbreeding in farm animals.

ANS 3533 Management of dairy cattle
Pre-requisite: **ANS 2531**
Credits: 9
Module content: Dairy breeds, Mating systems, Feeds and feeding of dairy cattle, Fodder flow, Milking program, Herd management. Herd health, Facilities, equipment and technological, developments, Dairy record keeping

ANS 3541 Applied animal nutrition
Pre-requisite: **ANS 2631**
Credits: 12
Module content: Classification of livestock feeds, Feed ingredients of livestock rations; agricultural and industrial waste products, Nutrient requirements for different physiological stages of livestock, Basic principles of ration formulation, Ration formulation using computer software's.

ANS 3542 Management of ruminant farm animals (old code)
Prerequisites ANS 2531, ANS 2641 and GEN1641
Credits 9
Module content: beef breeds; beef management practices, beef production systems, dairy breeds; mating systems; feeds and feeding of dairy cattle; fodder flow; milking and milking palors, problems associated with dairying; diseases of cattle and their control.

ANS 3543 Management of small stock
Pre-requisite: **ANS 2531**
Credits: 12
Module content: Sheep and goat breeds and their distribution in S.A, Management practices of sheep and goats, Breeding systems, Lamb/kid management, Describe and discuss the feeds and feeding of goats and sheep, Fodder flow planning, Basic flock-health principles, Management calendar, Recordkeeping, Welfare issues.

ANS 3544 Management of beef cattle
Pre-requisite: **ANS 2531**
Credits: 12.
Module content: Beef cattle breeds and their distribution in S.A, Production systems and associated management requirements, Feeds and feeding of beef cattle, Fodder flow planning, Basic flock-health principles, Management calendar, Record keeping, Welfare issues.

ANS 3633 Animal health
Prerequisites ANS 2531 and ANS 2643
Credits 12
Module content: Animal immune system and vaccines, most important pathological conditions: bacterial, viral, protozoal, fungal, toxins. Vaccination programs, first aid, castrations, dehorning, branding, injections, parasites and their control. Poultry diseases.

ANS 3634 Pig production
Pre-requisite: **ANS 2531**
Credits: 9
Module content: Pig breeds and their distribution in SA, Pig production systems and their requirements, Breeding and genetic improvement, Nutrition and feeding, Computer formulation of pig rations, Production schedule for different production goals, Basic pig health principles, Welfare issues.

ANS 3641 Reproductive physiology
Prerequisites ANS 2643
Credits 9
Module content: Hormones and reproduction, spermatogenesis, oogenesis, reproductive cycles, synchronization, physiology, fertilization, gestation and parturition, animal biotechnology and assisted reproduction, poultry reproduction.

ANS 3642 Poultry production
Prerequisites ANS 2531
Credits 12
Module Content: Domestication of poultry; Poultry products Growth; Reproduction – female reproduction: Male reproduction Incubation; Brooding and raising of chicks; Poultry breeding and genetic improvement; Nutrition and feeding; Poultry production systems; Poultry housing and welfare.

ANS 4531 Quantitative animal breeding (old code)
Prerequisites ANS 3531, STA 1642
Credits 12
Module Content: Traits, phenotypes, genotypes, environment; Strategies for genetic improvement of farm animals; Genetic model for quantitative traits; Heritability and repeatability; Factors affecting the rate of genetic change; Genetic prediction; Comparing animals from genetically similar groups; Selection index; Introduction to BLUP; Correlated response to selections; Mating systems: Inbreeding and relationship; Outbreeding and hybrid vigour; Biotechnology in animal breeding.

ANS 4532 Biochemical principles of animal nutrition (old code)
Prerequisites CHE 1545 and CHE 1624
Credits 10
Module content: to create an understanding of metabolism, bioenergetics and energy metabolism, final common pathway of energy metabolism including substrate level phosphorylation and oxidative phosphorylation, carbohydrates, lipids and protein and digestion and metabolism in non-ruminants and in ruminants, and indicators in pasture and range studies.

ANS 4621 Animal production systems & management (old code)
Prerequisites ANS 3531 and ANS 3632
Credits 14
Module content: to develop students with a holistic approach towards beef, fat lamb, goats, pigs and poultry and be cable of identifying and solving production problems associated with these systems. Emphasis will be placed on the role of small-scale farming systems. Students will have the insight and skills to evaluate animal production systems and how to manage them.

ANS 4632 Environmental physiology (old code)
Prerequisites ANS 2641 and ANS 3641
Credits 10
Module content: to integrate knowledge towards maximal animal production in terms of the environmental effects on body systems. The content of the course covers body temperature and thermoregulation in animals, acclimatization and adaptation to different environment, thermoregulations in various farm animals.

ANS 4641 Applied animal breeding
Prerequisites ANS 3531
Definition of animal breeding concepts such as trait, phenotypes, genotypes etc. Strategies for genetic improvement of farm animals. Genomics. Introduction to BLUP. Factors affecting the rate of genetic change. Genetic prediction. Inbreeding and relationship. The role of breed societies in the national data base.

ANS 4642 Livestock products
Prerequisites ANS 3543; ANS 3544 and ANS 3642
Meat quality and marketing: Structure and functions of muscle; conversion of muscle to meat. Factors affecting meat quality, pre- and post- gate effects. Consumer requirements, including perceptions and nutritional qualities. Meat processing, determinants of quality. South African market for red meat and poultry. Opportunity for cooperation with each sector. SA role in support of animal products. Milk and milk products: The market for milk and milk products: changing requirements and distribution systems. Manipulation of milk composition and quality – production systems. Processing of milk for liquid consumption – low fat, long life and nutritionally-enhanced products. Requirements and processes for butter, cheese, yoghurt and other milk products. Eggs: Market for eggs and egg products. Quality

criteria and their modifications by production practices. Wool and fibre: sheep wool, mohair and cashmere. Skins and hides

DEPARTMENT OF AGRICULTURAL AND RURAL ENGINEERING (Module content)

ARE 2631 Agro-meteorology
The module introduces the learner to principles of agricultural meteorology. It gives a learner the basic knowledge on how climate influences agricultural activities. Therefore the module introduces the learner to the elements of weather and climate, measurements and simple analysis of climatic data, climatic surveys and their classifications. Having completed the module, the learner is expected to be able to determine what agricultural enterprises would suit various regions depending on a variety of conditions such a climate and socio-economic factors among others.

ARE 2641 Introduction to agricultural mechanization
Prerequisites AGR 1631; ANS 2531; AGR 2541; MAT 1643 and PHY 1527
The module introduces the learner to principles of agricultural engineering and mechanization. It gives a learner a holistic approach towards proper identification, planning and solving related agricultural mechanization problems encountered in the field. The module also introduces the learner to farm machinery working principles (tractors and animal power technologies), crop processing technologies and mechanization systems for agricultural production and processing.

ARE 3531 Engineering drawing and design I
To introduce the learners to principles of Engineering drawing and design of machinery parts, systems and other technologies.

ARE 3532 Farm workshop practice I
Prerequisite ARE 2641
To give students an understanding of the basic workshop tools, e.g. spanners, sockets, welding machine, poprivert, grease gun, and etc. this will enable the students to be able to fix broken metals and farm implements. This module introduces students to metal work.

ARE 3543: Principles of surveying and measurements
(Prerequisite MAT 1643, PHY1527)
The module introduces student to surveying and instruments. Both theoretical and field measurement for the following types of surveying are covered: profile surveying (levelling), two-peg test, distance, area and volume measurement, traverse surveys.

ARE 3632 Farm workshop practice II
Prerequisite ARE 3532
To give an understanding of the basic wood materials, and how to cut, measure, join and to work on the carpentry activities.

ARE 3545 Renewable energy technologies
Prerequisites CHE 1624; MAT 1543 and PHY1527
To develop a good appreciation on how renewable energy technologies play a vital role in agricultural production and improving rural livelihoods

ARE 3641 Engineering drawing and design II
Prerequisite ARE 3531
To introduce the learners to advanced Engineering drawing and design of machinery parts, systems and other technologies. (including farm buildings).

ARE 3546 Farm structures
ARE 3542 Farm structures
Prerequisite ARE 2641
The module introduces the learner to principles of farmyard planning and building technology. Emphasis will be on livestock structures and farm buildings. The module also introduces the learner to basic

leveling techniques, site selection and preparation of layout, elementary surveying, elementary building planning and construction. The learner is expected to be aware of the role of farm buildings in agricultural production and livestock enterprises.

ARE 3547 Principles of irrigation and drainage
Prerequisites ARE 2631 and ARE 2641
The module introduces the learner to the principles of irrigation and drainage. It gives a learner, knowledge on the importance of irrigation in South African agriculture and the various irrigation methods. Learners acquire skill on how to evaluate the water requirement of crops. It also imparts to the learner the knowledge of irrigation scheduling and removal of excess water from agricultural fields. Having completed the module, the learner is expected to be able to select the appropriate irrigation method for a particular field and determine irrigation schedules.

ARE 3548 Soil and water conservation
Prerequisites ARE 2631 and ARE 2641
The module introduces the learner to field of soil and water conservation. It gives a learner the basic knowledge on how man's activities and nature influence soil and water. Having completed the module, the learner is expected to be able to assess the dangers poised to soil and water resources and how to solve them.

ARE 3641: Engineering drawing and design II
(Prerequisite ARE 3531)
To introduce the learners to Engineering drawing and design of machinery parts, systems and simple buildings used in agriculture.

ARE 3632: Farm workshop practices II
(Prerequisite ARE 3532)
To give an understanding of the basic wood materials, and how to cut, measure, join and to work on the carpentry activities.

ARE 3633 Irrigation and drainage system design
Prerequisites ARE 3547 and ARE 3548
The module introduces the learner to the principles of design of irrigation and drainage systems. It also gives a learner the basic knowledge on irrigation development. Having completed the module, the learner is expected to be able to design small scale irrigation and drainage projects.

ARE 3634 Postharvest processing technology
Prerequisite ARE 2641
To impart knowledge and information of post-harvest processing machinery / equipment, and instrumentation systems used in crop processing. To expose learners to design and operational principles of processing technologies and storage facilities

ARE 3646 Farm power and machinery
Prerequisite ARE 2641
The aim of the module is to introduce students to the different types of farm power that can be used in the farm and the various machinery used in the farm. This module introduces students on the types of farm power and machinery to use for farm operation.

ARE 3647 Rural and urban transport systems
Prerequisite ARE 3543
The module introduces learners to the transport modes and systems. It covers aspects rural and urban transport system with emphasis on planning, traffic generation, management of transport systems and operations.

ARE 4521 Land use planning and management
Prerequisites ARE 3543 and ARE 3548
The module introduces learners to the land and its suitability depending on what that land can be used for. E.g. Agricultural purpose, industries, or any other means, different land types can be used for many purposes but the use of land depend on the type of soil. The module also introduces learners to land capabilities, land evaluation, planning possibilities, resource inventory evaluation, soil interpretation.

ARE 4522 Mechanization planning and costing
Prerequisite ARE 2641
The module introduces students on the planning, and costing of mechanization in the farm. Type of machine to employ on the farm, depending on the size of the farm, population needs of the community, laborers, and financial status of the farmer.

ARE 4543 Entrepreneurship in rural development
To develop a good appreciation on how business are created and developed. Various types of agricultural oriented businesses will be identified for which the student can be self-employed.

ARE 4544 Research methods and experimental design
To review knowledge of basic statistical principles concepts and their application to experimentation. Also to familiarize the student with the Research methods and common statistical designs for experimentation particularly on the fields, as well as with data analysis and interpretation of same.

ARE 4526 Project and seminar presentation
Prerequisite ECS 1541
To expose the student to a problem solving approach to research in the area of agricultural and rural engineering. The student should be able to identify a research problem and adopt a scientific methodology to investigate the problem through appropriate data collection, data analysis and careful interpretation of the results of data analysis. To integrate knowledge and practice in rural engineering and development problems

ARE 4541: Evaluation and management of irrigation and drainage systems
(Prerequisites ARE 3547 and ARE 3633)
The module introduces the learner to the principles of evaluating irrigation and drainage systems, and their management. Topics covered include evaluation of different irrigation and drainage systems, irrigation development, and management of irrigation and drainage systems, among others. Having completed the module, the learner is expected to be able to evaluate and manage small-scale irrigation and drainage projects.

ARE 4621 Selected topics in appropriate technology design
Prerequisite ARE 3634
To expose learners to the current trend in technology design and developments. New technologies and methods are being invented on a daily basis. Budding engineers have to be kept abreast with these developments. Learners are to be equipped with principles of Computer Aided Design and Design of material handling structures/machines and selected crop processing technologies.

ARE 4622 Ergonomics and environmental safety
Prerequisite ARE 3646
To develop a good appreciation on ergonomics principles and how they affect human safety and comfort at a particular work environment.

ARE 4641: Animal traction
(Prerequisite ARE 2641)
The module covers the role of animal traction as used in agriculture and rural settings. It covers aspects such as the selection of traction animals, harnesses, animal health and care, and use of animal in provision of tractive power.

ARE 4643 Rural water resource development
Prerequisite ARE 4541
The module introduces the learner to the basic principles of hydrology. It gives a learner the basic knowledge on how to evaluate water demand and how to manage it especially for rural areas. The module also introduces the learner to the concept of water resource management and water quality management. Having completed the module, the learner is expected to be able to determine the water demand of a community, select a source of supply and manage the scheme.

ARE 4644: Field practical/attachment
This module is intended to expose the student to a real-world working environment of graduates of the program. It is intended to expose the student to the following aspects of Agricultural and Rural Engineering: farm power and machinery, primary processing and handling of agricultural products, management, research, sales and marketing of agricultural tools and equipment, entrepreneurship, etc.

ARE 4645: Project and mini dissertation
(Prerequisite ARE 4526)
This is a final-year research/design project conducted by a student in any of the areas of specialization in Agricultural and Rural Engineering. It is carried out individually or in groups of student depending on scope and complexity of the problem being solved. The work culminates in a research project report that is defended by the student before a public audience and academic staff members in the department.

ARE 5531: Soil - Plant – Water Relationships and Irrigation
(Prerequisite ARE 3633)
This is an honours module that is offered to graduates of the Bachelor of Agriculture. It covers application of elements of soil science, and irrigation and drainage.

ABE 1531 Technical Communication Skills
The module is designed to make the engineering students understand the basics and the importance of Technical Communication. It will enhance their ability in listening comprehension by making them understand the listening process and train them in professional speaking by imparting the knowledge of the various speech/presentation situations they have to face as technical students and as professionals later.

ABE 1532 Introductions to Agricultural and Biosystems Engineering
This module is to teach engineering students important skills that include technical problem solving and engineering design, ethical decision-making, the role of an engineer, teamwork, and communicating to diverse audiences.

ABE 1533 Physics I
The module is designed to make the engineering students understand the application of physics in engineering- applications of vibrational motion are developed and a basic description of the properties of elastic media given. The methods required to predict the performance of physical or engineering systems are demonstrated using examples drawn from various fields of science and engineering with emphasis on mechanics and vibrations, waves and optics.

ABE 1534 Chemistry I
This module is designed to equip the students with the knowledge of nature through building a basic knowledge of the structure of chemistry, analyzing scientific concepts and thinking critically, reviewing the importance and relevance of chemistry in our everyday lives and being able to utilize the methods of science as a logical means of problem solving.

ABE 1535 Pure Mathematics I
To understand advanced mathematical applications.

ABE 1536 Applied Mathematics I
Applied mathematics concepts.

ABE 1537 Engineering Drawing I
The aim of this course is to introduce students the basic concepts and the use of engineering drawing in the design and manufacturing field. The students acquaint with the basic knowledge and skills in engineering drawings and the capability to read and interpret blue prints for manufacturing.

ABE 1631 Introductions to Agricultural Sciences
This module is designed to enhance student perception of agriculture and its applications. This module covers principles in soil science; and plant and animal science and their products.

ABE 1632 Physics II
Prerequisite ABE 1536
The module is designed to make the engineering students understand the application of physics in engineering- the description of electrostatics, magnetostatics and electromagnetic induction, together with a discussion of the properties of dielectrics and ferromagnetics, are presented

ABE 1633 Chemistry II
Prerequisite ABE 1534
This module is designed to give student an introduction to general organic chemistry with an emphasis on natural aspects of the topic. Areas of concentration will include: organic nomenclature, structural theory and stereochemistry of aliphatic and aromatic compounds, and chemical reactions of fundamental importance to organic chemistry.

ABE 1634 Earth and Environmental Science
The module is designed to make the engineering students understand the function of Earth's systems. Emphasis is placed on matter, energy, environmental awareness, materials availability, and the cycles that circulate energy and material through the earth system; and conservation.

ABE 1635 Pure Mathematics
Prerequisite ABE 1535
Mathematics applications and principles.

ABE 1636 Applied Mathematics
Prerequisite ABE 1536
Mathematics applications.

ABE 1637 Fundamentals of Computing
This module is designed to help student understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc; understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries; be aware of the important topics and principles of software development and ability to write a computer program to solve specified problems.

ABE 2531 Engineering Mathematics
Prerequisite ABE 1635, ABE 1636
To understand advanced mathematical applications.

ABE 2532 Electrical Engineering
Prerequisite ABE 1632
The module is designed to make the engineering students understand electrostatics, basic dc circuits, circuit simplification techniques, magnetic fields, ac circuit components, the dynamic of circuits, analysis of ac circuits, resonance, sinusoids and phasor, three phase power systems, operational amplifiers, transistors as amplifiers, diodes and transistors as switches

ABE 2533 Thermodynamics I
Prerequisite ABE 1632
The module is intended to give engineering students a comprehensive introduction to thermodynamics. It is designed as a module that will give students a necessary foundation for a comprehensive understanding of energy and other engineering systems. Energy systems are fundamental not only in

energy production but in many other important aspects of engineering including the manufacturing of materials.

ABE 2534 Solid and Structural Mechanics
Prerequisite ABE 1632
The module is designed to teach the engineering student how to use the knowledge of mechanics in understanding the behaviour of structures. This module serves as an introduction to structural systems, and to methods of analyzing these systems under various loading conditions.

ABE 2535 Mechanics of Machines I
Prerequisite ABE 1632
The module is designed to make the engineering students understand the extension of classical mechanics and engineering applications. Plane dynamics, relative motion and forces in moving and accelerated reference frames; and it introduces students to general three-dimensional motion of a rigid body, inertia tensor and steady-state precession; and the laws of conservation of mass, momentum and energy.

ABE 2536 Material Science and Engineering
Prerequisite ABE 1532
The module is designed to make the engineering students understand the fundamentals of materials engineering, including bonding, crystal structures, and phase diagram; terminology, mechanical testing and behavior, heat treating, and processing of metals, ceramics, polymers, and composites; degradation of materials and criteria for materials selection.

ABE 2537 Engineering Drawing II
Prerequisite ABE 1537
The module is designed to make the engineering students understand the techniques and practices of engineering towards those elements and composites which are relevant to a particular field of engineering design and construction.

ABE 2538 Fluid Mechanics I
Prerequisite ABE 1632
The module is designed to make the engineering students understand the properties of fluids and hydrostatics pressure, basic principles of kinematics of fluid mechanics, relative equilibrium of liquids, flow through orifices, tubes, and wires.

ABE 2631 Engineering Mathematics II
Prerequisite ABE 2531
To advance concepts of Engineering Mathematics.

ABE 2632 Computer Programming for Engineers
Prerequisite ABE 1637
The module is designed to make the engineering students understand computer programming. The principal goal of the module is to teach basic computer programming concepts and apply them to computer-based problem-solving methods. The course stresses hands-on computer programming using MATLAB, a powerful high-level programming environment.

ABE 2633 Engineering Surveying
Prerequisite ABE 2531
The module is designed to give students full understanding of the nature of surveying data, including errors and the need for error control. Students will learn about surveying project fundamentals, particularly referencing systems, horizontal and vertical control, and topographic mapping and gain an understanding of the nature of calculations made with surveying data, methods of data recording, display, and storage.

ABE 2634 Solid and Structural Mechanics II
Prerequisite ABE 2534
The module builds on solid and structural mechanics I. The module gives an understanding of the design of multiply loaded complex structures with the addition of less than ideal boundary conditions. It reviews stress and strain in three dimensions, elastic and inelastic material behavior, and energy methods. It also covers use of the strength of materials approach to solving advanced problems of torsion, bending of beams and plates, buckling of columns, stress concentrations, and fracture mechanics.

ABE 2635 Mechanics of Machines
Prerequisite ABE 2535
This course is designed to enable students upon completion of the course to develop viable kinematic and dynamic models of real-world mechanisms and machines, and to describe and explain their dynamic behaviour during operation. The experience and reflective inquiry will enable students to obtain knowledge, skills and attitudes needed to understand and predict the dynamic behaviour of machinery and to relate these findings to their key design features and parameters.

ABE 2636 Electronics
Prerequisite ABE 1632
This module is designed to teach students the design of electronic circuits and systems, using commonly available devices and integrated circuits. The properties of linear circuits are discussed with particular reference to the applications of feedback; operational amplifiers are introduced as fundamental building blocks. Digital circuits are examined and the properties of the commonly available I.C. types are studied; their use in measurement, control and signal analysis is outlined.

ABE 2637 Materials Processing
Prerequisite ABE 2536
This module is designed to give engineering students a wide overview of materials and processes used to transform them. This module focuses on the classifying, properties, and processes of materials and the selection of those materials to be used in applications. Learners should be concerned with processes and materials used in metals, woods, plastics, ceramics, and composites.

ABE 2638 Fluid Mechanics II
Prerequisite ABE 2538
The module is designed to expand on the knowledge gained in Fluid mechanics I. A few of the more important topics will be taken to a moderately advanced level in this module. Students are taught the conservation principles of mass, momentum, and energy for fluid flow and how to apply the basic mathematical tools that support fluid dynamics.

ABE 3531 Renewable Energy Resources and Technologies
Prerequisite ABE 1533
The module is designed to make the engineering students understand the principles and utilization of solar (thermal and photovoltaic), hydroelectric, wind, geothermal, ocean thermal, wave, tidal and geothermal energy, as well as energy from biomass. The potential of using renewable energy technologies as a complement to, and, to the extent possible, replacement for conventional technologies are analyzed.

ABE 3532 Thermodynamics II
Prerequisite ABE 2533
This module builds on Thermodynamics I. The students will be asked to demonstrate their knowledge of the material covered in Thermodynamics I. Through the study of this course on thermodynamics the student will among others be able to sketch figures of systems and control volumes; sketch process diagrams for the processes occurring within systems and control volumes; develop the governing equations for conservation of mass, conservation of energy, and process relations for processes occurring in systems and control volumes.

ABE 3533 Operations Research
Prerequisite ABE 1532
This module introduces the methods of Operations Research to engineering students. It further emphasizes the mathematical procedures of nonlinear programming search techniques, introduce advanced topics such as probabilistic models (Markov chain & queuing theory) and dynamic programming.

ABE 3534 Soil Science
Prerequisite ABE 1532
This module is designed to give students of engineering an understanding of soil as a product of physical, chemical and biological processes acting over time on various rock and organic parent materials; the wide variety of soils resulting from soil-forming processes; the major criteria used for classifying these soils into the South African System of Soil Classification and the importance of appropriate management and land use practices to ensure conservation of this vital resource for forestry and agriculture.

ABE 3535 Instrumentation
Prerequisite ABE 2636
This module is designed to give the students of engineering an understanding of key aspects of current instrumentation and process control technology and upon completion enable them to carry out commissioning, calibration and maintenance of the typical devices used for measurement and control in industrial systems.

ABE 3536 Engineering Hydrology and Meteorology
Prerequisite ABE 2632
The module is designed to give students an understanding of engineering hydrology meteorology and applying the concepts in carrying out quantitative calculations relating to ground water and surface flows.

ABE 3537 Statistical Methods and Experimental Design
Prerequisite ABE 1635, ABE 2632
The module is designed to give students of engineering a broad overview of experimental designs and statistical methods in order to plan their own experiments and to analyze existing data. This will enable them to select the appropriate statistical model for the design in question

ABE 3631 Soil Dynamics and Mechanics
Prerequisite ABE 1532
This module is designed to develop student technical competence in basic principles of soil mechanics and fundamentals of application in engineering practice; ability to identify common situations when the soil becomes a factor in an engineering or environmental problem; and capability of performing basic analytical procedures in these situations to obtain the engineering quantity desired given the formulae, tables, and the soil properties and understand their limitation.

ABE 3632 Irrigation and Drainage Engineering
Prerequisite ABE 1532, ABE 3536
This module is designed to give students an understanding of the basic soil-plant-water parameters related to irrigation; the hydrologic cycle, principles and processes necessary to effectively manage water resources through well designed drainage and irrigation systems. Further to enable them apply appropriate techniques and analyses to the effective design of both irrigation and drainage systems; design, test, and analyze agricultural irrigation and drainage systems and their components.

ABE 3633 Tractor Power Engineering
Prerequisite ABE 2635
This module is designed to teach as much as possible about engines and tractors, with particular emphasis on design features, principles of operation, and maintenance for those going into industry, students will learn terminology, design features and principles of operation that will help them in a sales

and/or service position for those going into farming, the course will help students decide which tractor to buy and how to get the most out of it.

ABE 3634 Structural Design
Prerequisite ABE 2634
The module is designed to develop skills in design of structures and an understanding of the overall structural concept, the choice of materials, and the concepts for details in a structure. Students will learn how to design and apply engineering principles to the design and analysis of structures used for agricultural and biological production. At the end of the course, the students are expected to know how to determine forces and displacements of determinate structures.

ABE 3635 Process and Food Engineering
Prerequisite ABE 1631
This module is designed to give train students in the engineering design, testing and analysis of unit processing operations employed in the food and biotechnology industries (sterilization, pasteurization, freezing/refrigeration, drying, evaporation, and fermentation, along with physical, chemical and phase separations); and to introduce students to the general approach for design and economic feasibility of an entire process line for a food, pharmaceutical or biotech manufacturing plant.

ABE 3636 Principles of Microeconomics
This module is designed to introduce students to the basics of microeconomic analysis; develop students' ability to understand economic relationships; learn to use models to analyze current economic problems, particularly as they relate to the behavior of firms and individuals within a market economy.

ABE 3637 Heat and Mass Transfer
Prerequisite ABE 3532
This module is designed to teach the students the concept of energy balances and the three modes of heat transfer - conduction, convection, and radiation - are covered. Upon completing this course, the student will have an understanding of the mechanisms of heat transfer in physical systems and be able to calculate heat transfer rates and temperature distributions in practical engineering applications.

ABE 3638 Rural Water Supply and Sanitation
Prerequisite ABE 3536
The main goal and objective of this class is to study and understand aspects of rural water supply and sanitation. The course will discuss the relationship between water and sanitation and sustainability of rural water supply.

ABE 4000 Industrial/Field Attachment
Prerequisite Passed All Year 3 Modules
A period of attachment to an agro-industrial firm, a parastatal or a government department dealing with Environmental and Biosystems Engineering to gain practical knowledge, understanding and experience.

ABE 4531 Rural Structures
Prerequisite ABE 2633
The module is designed to teach students adequate tools to apply in the design criteria of rural buildings. The module considers both functional requirements deriving from the farm production scheme, and the effects of planning options on farm management, on environment and landscape.

ABE 4532 Engineering Economy
Prerequisite ABE 2633
This module is designed to teach the students economic theories and principles as applied to engineering decision making. It includes methods of compound interest, annual worth, and present worth, rate of return, benefit/cost ratio, capital allocation, depreciation, and risk analysis.

ABE 4533 Built Environment Engineering
Prerequisite ABE 2633
This course is designed to teach students the design and analysis of structures, and environmental modification of systems used in agricultural production. It will provide them with the fundamental knowledge necessary to understand structural and environmental control design parameters for agricultural buildings. It will train students in the use of current computational software and computer data acquisition and control equipment used for analysis of structural design, environmental monitoring and control, and analysis of environmental control systems.

ABE 4534 Soil and Conservation Engineering
Prerequisite ABE 1634, 3534
This module will teach students descriptive and quantitative hydrology that deals with the distribution, circulation, and storage of water on the earth's surface; discusses principles of hydrologic processes and presents methods of analysis and their applications to engineering and environmental problems.

ABE 4535 Entrepreneurship and Product Development
Prerequisite ABE 4532
This module will introduce engineering students to the relevant principles, processes, and practices of technical entrepreneurship. It will develop principles of entrepreneurship in a global economy and will include developing technology-based business plans for industrial firms, allowing students to apply in a real-world situation what they have previously learned about communications and engineering economics.

ABE 4536 Design Project I
Prerequisite Passed All Year 3 Modules
The project is a practical assignment aimed at solving a particular engineering problem. It requires the application of knowledge gained in the courses up to the final year. It might deal with a problem in any of the five areas of specialization. This course shall be examined by coursework, oral presentation and report.

ABE 4537 Project Planning and Management
Prerequisite ABE 3537
The module is designed to help students master the principles of efficient project planning and control - needs analysis, work breakdown, scheduling, resource allocation, risk management, and performance tracking and evaluation - within the timeframe and cost projections stated in the overview section. Concepts and techniques will be developed by navigating through a recent textbook in project management and through a popular project management software package.

ABE 4631 Design Project II
Prerequisite ABE 4536
The project is a practical assignment aimed at solving a particular engineering problem. It requires the application of knowledge gained in the courses up to the final year. It might deal with a problem in any of the five areas of specialization. This course shall be examined by coursework, oral presentation and report.

ABE 4632 Electrification
Prerequisite ABE 2532
This modules will help students understand electricity as a power source on the farm lighting, farm production and processing. They will learn how to plan the farm stead distribution system - demand load for farm buildings and workshops, central metering and distribution, capacity of main service; and care and maintenance of electrical farm installations and machines –hatcheries, milking machines, feed mills, etc.

ABE 4999 ECSA Outcome Portfolio
The ECSA portfolio is compiled by a student as s/he advances in the programme. It is a file kept by a student that shows all the academic work that a student undertakes throughout the programme.

ABE 4633 Conservation and Precision Agriculture
Prerequisite ABE 3534
The module is designed to help students to master comparative assessment of spatial variability in erosion prediction, sediment yield, C inputs and N use Initiate evaluation of precision conservation and agroecologic suitability.

ABE 4634 Machinery and Mechanisation Management
Prerequisite ABE 3633
This modules will teach students how to manage mechanization - performance, costs, application, selection, and replacement of farm tractors and field implements; optimization of mechanized agricultural field operations.

ABE 4635 Aquatic Machinery Engineering
Prerequisite ABE 3633
Study of the principles and design methodology for aquatic machinery used for plant and animal production and processing and environmental control.

ABE 4636 Transport Systems
Prerequisite ABE 3633, ABE 4538
This module is designed to teach students descriptors of transportation systems; allocation models; transportation as an industrial activity and public good; and transportation and spatial development, including the role of transportation in developing countries and in urban and regional development and problems involved in measuring the impact of transport investment.

ABE 4637 Tractor Power and Machinery System Design
Prerequisite ABE 3633
The module teaches students the design and specification of power and machine elements applied to agricultural, biological, land and water resources, or food engineering; fundamentals of power units, design of machine elements, power transmission, traction and stability, fundamentals of fluid power circuits, and an introduction to mechatronics.

ABE 4638 Land Development Machinery
Prerequisite ABE 3633
This module is designed to make engineering students understand the planning, designing, and constructing of earthworks. They will learn how estimate production rates, characteristics, operation techniques, and soil considerations for earthmoving equipment. They will acquire knowledge on how to select the most economical and effective equipment for each individual operation.

ABE 4639 Minor Roads
Prerequisite ABE 3631, ABE 4538
The course will provide the students with a thorough understanding of the issues related to the application of planning and scheduling principles in the construction industry. It is intended to provide an in-depth discussion of some of the important scheduling issues faced by various agencies involved in the construction industry. The focus is on the development and planning of rural road, project financing, and rural project administration.

ABE 4623 Watershed Management
Prerequisite ABE 3536
This module is designed to introduce to students the principles of the watershed management approach and the value of working at a watershed; generate awareness about the importance of sustainable development and maintenance of natural resources; and develop human resource in watershed development and management.

ABE 4641 Construction Management
Prerequisite ABE 4533
The module teaches students critical elements in the development and planning of construction projects; project economic justification; alternative analysis procedures; cost estimation; site civil design; surveying; construction management; construction procedures for given projects.

ABE 4643 Geo-Information System
Prerequisite ABE 2633
The module is designed to make the engineering students understand the concepts, techniques and interdisciplinary application of GIS as an environmental decision-making tool. This module introduces methods of managing and processing geographic information. Emphasis will be placed on the nature of geographic information, data models and structures for geographic information, geographic data input, data manipulation and data storage, spatial analytic and modelling techniques, and error analysis.

ABE 4634 Rural Extension and Technology Transfer
Prerequisite ABE 4532, ABE 4535
This module is designed to help students understand the genesis, meaning and concept of Agricultural Extension; know the various facets of Agricultural Extension, its objectives, principles and philosophy in reaching farmers and other clients effectively; know the process and steps involved in Agricultural Extension in transfer of technology; and identify and find out the meaningful extension strategy for realizing higher productivity and income of family community.

ABI 4631 Hydrological Design of Reservoirs
Prerequisite ABE 3536
This module teaches the students engineering applications of hydrologic science. Rainfall-runoff analysis. Lumped and distributed flow routing. Reservoir and river flood routing. Kinematic, diffusive and dynamic waves. Precipitation data analysis and optimal interpolation. Hydrologic design: risk analysis, hydroeconomic analysis, and analysis of uncertainty. Bayesian decision analysis. Design storms. Design flows. Hydrologic reservoir design. Watershed modelling applied to hydrologic design.

ABI 4632 Design of Irrigation and Drainage Systems
Prerequisite ABE 3632
The module is designed to give students an understanding of the fundamental principles of economic efficiency, soil physics and crop water use applied to the design of irrigation and drainage systems. It will enable them to develop design specifications for surface, sprinkler and trickle irrigation application systems and their operation; familiarize them with considerations for development of computerized analysis techniques for the design and operation of irrigation systems and enable them to develop design specifications for pumps and drainage systems.

ABI 4633 Water Systems Engineering
Prerequisite ABE 3632, ABE 3638
This module is designed to equip the student with skills that are needed to enhance the ability of student to sustain adequate water supply facilities. It will give knowledge on the planning, design, construction, operation and maintenance aspects of water supply and sanitation programs and projects; and give them management skills with regard to sustainable water supply and sanitation facilities.

ABI 4634 Groundwater Hydrology
Prerequisite ABE 3536
This module will teach students fundamentals of subsurface flow and transport, emphasizing the role of groundwater in the hydrologic cycle, the relation of groundwater flow to geologic structure, and the management of contaminated groundwater. The class includes laboratory and computer demonstrations.

ABI 4635 Surface Water Hydrology
Prerequisite ABE 3536
This module will teach students specific knowledge in the field of water management in general and with respect to quantitative assessment of the surface water runoff in particular. Students will be trained on the development of their reasoning ability and critical reflection and on the writing of reports. Students are also trained in the use of up-to-date simulation models and GIS techniques and are hereby encouraged to develop their skills with respect to self-study.

ABS 4631 Refrigeration and Air Conditioning
Prerequisite ABE 3635
Air conditioning: heat sources, cooling loads, psychometrics, systems and equipment; design of ducts and fans. Elements of control. Interpretation of air conditioning data on psychometrics and mollier charts. Refrigeration: vapour compression, absorption systems industrial and commercial refrigeration, refrigerants and their properties, systems control, heat pumps, other forms of refrigeration. Applications of refrigeration and air conditioning principles and practice in environmental and Biosystems engineering.

ABS 4632 Storage of Agricultural Products
Prerequisite ABE 3635
The module is designed to teach students the requirements for storage of cereals, fruits, vegetables and potatoes. Analysis of the processes that occur during storage, ways to reduce losses. Selection of parameters and their impact on the quality characteristics of stored raw materials, storage and design for the type of raw material.

ABS 4633 Processing Plant Design
Prerequisite ABE 3635
This module is designed to train students in the engineering design, testing and analysis of unit processing operations employed in the food, pharmaceutical, and biotechnology industries (sterilization, pasteurization, freezing/refrigeration, drying, evaporation, and fermentation, along with physical, chemical and phase separations). Introduce students to the general approach for design and economic feasibility of an entire process line for a food, pharmaceutical or biotech manufacturing plant.

ABS 4634 Food Engineering Systems
Prerequisite ABE 3635
The module will give the student an understanding of the functional requirements and principles of operation of systems for handling and processing food and agricultural products. The student will become acquainted with the principles of handling and processing food and agricultural products. Particular emphasis will be given to the principles of operation of equipment used in the processing industry and the response of biological materials to these operations.

ABS 4635 Dairy Technology
Prerequisite ABE 3635
This module will introduce students to all methods of handling milk from production and consumption - including processing, packaging, storage, transport and physical distribution. They will learn principles of engineering that are employed in diary technology; and how to prevent spoilage, improve quality, increase shelf-life, and make milk palatable and safe for human consumption.

ABS 4636 Post Harvest Technology
Prerequisite ABE 3635
To impart knowledge and information of post-harvest processing machinery / equipment, and instrumentation systems used in crop processing. To expose learners to design and operational principles of processing technologies and storage facilities

ABS 4637 Agro-Industrial Waste Management
Prerequisite ABE 1634
Waste water – elements of waste water management, healthy and environmental implications. Principles of physical, chemical and biological process for waste water treatment. Solid waste – Elements of solid waste management, health and environmental implications, fundamentals of solid waste stud; generation rates, quantities, characteristics and composition. Hazardous waste - elements of hazardous waste management, health and environmental implications. Engineering principles applied to the control of hazardous waste generation, transport and disposal.

ABS 4638 Packaging Technology
Prerequisite ABE 3635
To understand the functional and protective aspects of packaging in food systems. The module includes aspect of packaging selection and its impact on the shelf-life of products, packaging design, packaging materials.

FEC 1541 Introduction to family ecology
Introduce learners to; the philosophy and mission of Family Ecology, the various family structures existing in the society and apply family ecology skills to enhance the quality of life of individuals, families and communities.

FEC 1641 Family Development and Management
The module covers family types, family relations, parenting, and socialization, changing needs and dynamics of families over time, the growth and the development of individuals over family life cycle, the interrelationship of individuals, families and communities in the context of diverse socio-economic and cultural systems.

FEC 1642 Introduction to nutrition
Introduce learners to the world's food/nutrition problems, digestion, and metabolism and to the basic nutrition principles of macronutrients and micronutrients.

FEC 2541 Family resource management and decision making
The module introduces learners to the management of resources (Time, Money, energy) that apply to families and households.

FEC 2641 Family financial management and consumer studies
Introduce learners to financial management and consumer studies. Content includes how to manage the family financial resources effectively, understanding factors that influences families' consumer behaviour and choices, and consumer rights and marketing strategies

FEC 3541 Adult education, gender and development
Prerequisite FEC 2641
Sensitise learners to gender issues; to broaden their problem solving skills of learners, to needs and problems of communities/women. Helps learners develop cognitive skills in designing strategies/programs/policies to meet the needs of women and other groups of people in the community.

FEC 2542 Life- cycle nutrition
Learners acquire knowledge about the nutrient requirements of individuals in a life cycle (pregnancy, lactation, infant feeding, toddler, school children, adolescents, men and women, the elderly.) with the use of Dietary Guidelines, Recommended Daily Allowances;' food groups and exchange lists.

FEC 2642 Nutrition related diseases
Learners acquire knowledge about nutrition related diseases and ways in which diets can be modified to promote health and prevent nutrition related diseases. The module covers eating habits, effect of malnutrition on infection and nutrition related diseases (cancer, diabetes mellitus, atherosclerosis and hypertension, osteoporosis, HIV/AIDS)

FEC 3542 Community nutrition
Prerequisite FEC 2642
Learners learn skills of planning nutrition intervention programs in the communities (food security, nutrition education, growth monitoring, feeding programs, food supplementation/fortification promotion of good health, programs to control micronutrient deficiencies) integrated nutrition programs in South Africa, Africa and other countries.

FEC 2543 Introduction to foods
Learners gain skills about composition of food (physical/chemical), reaction processes during application of different preparation methods, preparation of different foods and equipment used in the foods laboratory.

FEC 2643 Food preservation
Prerequisite FEC 2543
Introduce learners to; the role of food microorganisms during food preparation, the general principles of food preservation /methods of preservation (high/low temperature, dehydration, chemical preservatives, irradiation, controlled atmosphere packaging), reaction processes that take place, the effects of chemical preservatives and additives, food preservation equipment, packaging, sanitation and hygiene.

FEC 3543 Meal management and food product development
Prerequisite FEC 2643
Learners acquire skills in meal planning/serving/purchasing of food/ and basic techniques of food preparation for food service institutions. Scientific principles involved in food preparation, research, and product development are explored.

FEC 2544 Housing provisions
Environmental and health impact of rapid urbanisation and housing crisis in the world/South Africa, factors which influence housing needs of individuals, families, specific groups/ communities, financial/legal aspects of housing, community involvement in housing and alternative energy sources explored.

FEC 2644 Ecology and design perspectives of housing
Prerequisite FEC 2544
Learners acquire skills about factors which influence housing needs and problems faced by individuals and families with regards to housing issues. Profiling of communities and evaluation of architectural plans and materials that are used in different types of houses are covered.

FEC 3544 Interior planning of houses
Prerequisite FEC 2644
Learners are introduced to; elements and principles of interior design, interior design of residential spaces for life-cycle, maintenance/restoration/arrangement of furniture according to floor plan, interior planning from a multi-cultural perspective. Curtains, soft furnishings and interior materials/accessories for the home are examined and constructed.

FEC 2545 Introduction to clothing and textiles
The module covers physical and chemical properties of natural and man-made fibres, fibre composition, care of textiles, basic construction techniques/methods/finishing (basic stitches, seam finishes, neckline finishes, collars, sleeves, hems, pockets, fasteners).

FEC 2645 Garment construction and pattern design
Prerequisite FEC 2545
The module covers, pattern manipulation, designing/ construction of different types of garments, and handling of different types of fabrics.

FEC 3545: Fashion marketing and clothing industry consumer services
Prerequisite FEC 2645
The module covers fashion development and trends, wardrobe planning, fashion/marketing and retailing (fashion creators, quality assurance, consumer behavior regarding clothing) and Socio-cultural aspects of clothing.

FEC 3081 Family Ecology Research Project and Industrial attachment
Students are introduced to the broad spectrum on basic research methodologies and research procedures used in academic discipline. They formulate and carry out an independent research on a topic in Consumer Sciences. Students are placed for internship in an organization of their interest. To get hands on work place experience.

FST 2541 Introduction to food science and technology
Food science and technology as a discipline. Status of food processing industry in South Africa, globalization of food Industries. Types of food: convenience, nutraceutical and organic foods. Human nutrition and food security. New food product development. Food quality, quality control and assurance in food industry. Food deterioration and preservation methods. Introduction to food microbiology, safety and traceability system. Food packaging and labeling. Food legislation. Food processing and the environment.

Practical work: Food science and technology as a career (SAAFoST video); processing of marula wine, baking technology, quality factors in food, sensory evaluation of processed foods, preservation of food, microbiological analysis of food and factory visits

FST 2621 Introduction to food and nutrition
Nutrients and their categories: historical perspective in nutrition, functions of nutrients and nutrients categories, nutrient bioavailability. Brief discussion on digestion and absorption of nutrients: Carbohydrate, protein and fats. Vitamins and minerals, food fortification and enrichment. Nutrients quality of local foods and diets and weaning diets. Functional foods and health claims. Selection and formulation of balanced diets and weaning diets and recommended daily allowance. Nutrition in contemporary South Africa

FST 2642 Fundamentals of postharvest biology and storage technology
Biological and environmental factors in the deterioration of intact plant tissues i.e. Fruits, vegetables, seeds, nuts and post-slaughter animal tissues. Post harvest technology procedures to extend shelf life – temperature management procedures, control of relative humidity, treatment to manipulate the environment e.g. packaging, controlled or modified atmospheres, control of air exchange or ventilation, etc. Techniques for fresh produce quality measurements. Practical work: Visit to packing houses

FST 2643 Fundamentals of food preservation technology
Food contamination, spoilage and pH in foods. Food processing steps (materials handling, sorting, peeling, washing and thawing, homogenization, mixing, grinding, cutting and moulding). Food preservation methods: Combination of methods/ Hurdle technology. Heat treatment (blanching, pasteurization, and sterilization). Low Temperature (Refrigeration and freezing). Dehydration, concentration and intermediate moisture food (IMF). Types of chemical preservatives used in different food. Radiant and electrical energy. Fermentation, microorganisms and biotechnology. Advanced methods of food preservation.

Practical work: Enzymatic browning of fruits, determination of pH in fruit juices, demonstration of food processing equipment, blanching and pasteurisation of seasonal fruits and vegetables, preparation of syrup and canned fruits, freezing of seasonal vegetables, meat and fish products, dehydration of fruits & vegetables, preparation of fruit bar, preparation of Jam, Jelly & squash, pickle preparation and fermented food products and visit to fruits and vegetable industry to see above operations.

FST 2644 Food process engineering
Prerequisite PHY 1527 and PHY 1627
Basic principles of food process engineering, dimensions and units. Materials and energy balance, heat and mass transfer during food processing, thermal processing of foods, non-thermal processing of

foods. Conversion unit operations: size reduction, mixing, separation processes: filtration, sedimentation, separation, sieving and distillation.

Practical work: Calculations on mass and energy balances, psychrometry, refrigeration and freezing. Drawings of appropriate equipment and processes

FST 3541 Principles of human nutrition
Prerequisite FST 2621
Principles of human nutrition: Food, nutrition and health. Guides for good food choices. The art of nutrition in a family meal environment, vegetarianisms, kosher and halaal foods. Digestion, absorption and metabolism. Nutrition in the life cycle: Maternal and infant nutrition. Growth and development and nutrition of the older adult. Diet therapy: Diseases of the gastrointestinal tract. Cardiovascular disease (CVD), salt, potassium and the control of blood pressure. Obesity and overweight. Diabetes mellitus. Food allergy and intolerance.

FSN 3542 Food chemistry I
Prerequisite BCM 2521 and BCM 2522
Chemistry of the major food components; including carbohydrates, proteins, Lipids and water. Chemical and nutritional aspects of food processing. Implications of different processing techniques on major food components. Functional properties of major food components. Modification of functional characteristics, Food analysis methodology.

Practical work: Activation and control of enzymatic reactions in fruits and vegetables; consequences of water migration on food quality; gelatinization-retrogradation in starch based foods (e.g., pudding, bread, and rice); initiation and control of non-enzymatic browning (e.g., pretzels, meat); and food emulsions (e.g., salad dressings, commutated meats products).

FSN 3543 Food microbiology
Prerequisite MBY 2521
Microbiology of milk and milk products like cheese, butter, Ice-cream, milk powder. Microbiology of meat, fish, poultry and egg products. Microbiology of oil and fat based foods. Microbiology of Nuts, oilseeds, and dried legumes. Microbiology of fruits and vegetable products like jam, jelly, sauce, juice. Microbiology of cereal and cereal products like bread, etc. Practical work: Microbiological analysis of the above mentioned products.

FSN 3081 Food commodity processing
Exercise aimed at producing value added food products from a food raw material of plant and animal origin using the principles and practices of relevant food processing technologies. The exercise involves the following components: planning, execution and reporting. Practical work: Food processing practical exercises should among others include processing technologies for processing and preservation of fruit and vegetable product, animal products, cereal based products, milk and dairy products, roots and tubes etc. One of the main objectives of this practical exercise is to develop and improve technological expertise and communication skills

FSN 3641 Product development and sensory evaluation of foods
Product development- A study on the consecutive steps followed in the development of a new food products, including packaging, factory hygiene and sanitation. Application of sensory evaluation, types of test and their specific functions. Selection and training of panel members, statistical analysis and interpretation of dat. Practical work: New food product development and aplication of different sensory evaluation methods

FSN 3642 Food chemistry II
Prerequisite BCM 2621, BCM 2622
Chemistry of the major food components; including carbohydrates, proteins, Lipids and water. Chemical and nutritional aspects of food processing. Implications of different processing techniques on major food components. Functional properties of major food components. Modification of functional characteristics, Food analysis methodology. Practical work: Food analysis.

FSN 3643 Quality management systems
Food quality systems charts, fundamentals of quality control, assurance and management with specific references to HACCP concept, Food standard and legislation, shelf life of foods and Food labeling. Food toxicants, food safety and food toxicants, food safety and food safety management tools. Practical work: New product development and application of HACCP plan in food products.

FSN 3644 Cereal science and technology
Prerequisite FST 2642 and FST 2643
Science and technology of cereals. Sources of cereal products in the world. The physical chemical composition of the grain of cereals. Storage of cereals. Nutritional value of cereals. Composition and use of products of cereals. Milling and extraction process. Baking technology. Malting technology. Production of RTE (ready to eat) breakfast cereals. Pasta technology. Alternative uses of cereals. Practical work: Visits to mills, extraction and baking process. Laboratory analyses of components and products of grain. Experiments to determine the milling and baking quality of wheat. Rheological, chemical and baking tests of wheat.

FST 4541 Work integrated learning
Six months practical training in a relevant accredited food industry which covers at least two of the following: Research and product development, production/ processing/ manufacturing, quality assurance/ quality control, stock control and marketing

FSN 4641 Fruit and vegetable technology
Prerequisite FST 2642; FST 3542 and FST 3642
Fruit and vegetable technology: Overview of structure and composition. Post-harvest handling: storage, packaging and transport; extension of shelf life of fresh and minimally processed products. Preprocessing and / or preservation: canning, freezing, dehydration, concentration, fermentation, juice extraction, irradiation. Quality evaluation of processed products. Practical work: Practical execution of the process discussed above. Determination of preprocessing on losses, colour, and texture; inhibition of enzymatic browning, bottling, canning and pouches; juice extraction; freeze drying; factory visits; execution and reporting of a project on extended shelf life of a fresh juice or minimally processed products.

FSN 4642 Meat and poultry products technology
Prerequisite FSN 3081
Animal food products. The red meat industry in South Africa. The composition of muscle tissue, the transformation from muscle to meat and the composition of meat. The slaughtering process and its effect on meat quality. The poultry and fishing industries in the RSA. The composition, processing, preservation and deterioration of poultry, meat and fish. Nutrition aspects of red and white meat. The use of eggs and preparation of egg products. Preservation and storage of meat. Meat processing and equipment. Decomposition of meat. Packaging. Quality characteristics of meat. Quality control and hygiene in the meat processing plant. Practical work: Actual manufacturing of different meat products such as sausages, salamis and related fermented meat products cured and emulsion type products.

FST 4643 Food machinery
Prerequisite FST 2642; FST 2643; FST 3543 and FST 3544
General consideration of the nature and properties of material of construction, design features and functions of equipment used in unit operations in the food and Agro-processing industry. Equipment specification and some know-how of the construction of the equipment system. Information sources on food machinery / equipment.

FST 4081 Research project
Small research projects in Food Science and Technology or related fields under the supervision of a research advisor.

FRT 2541 Forest ecology and tree identification
Prerequisite BIO 1643
Components of natural forests, woodlands and plantation forests. Factors influencing growth, management of forests and trees, interactions between and among components, alien invasive plant species, invasion process. Ecology and evolutionary processes influencing invasion by alien plant species. Mechanisms of adaptation by alien tree species, shrubs**.** Restoration of degraded ecosystems, habitats, environmental impact assessment and the FSC principles; Botanical concepts, tree/plant parts, the components of the Plantae Kingdom, characteristics of the gymnosperms and angiosperms, reproduction systems in forests trees. Biology and ecology attributes of the most important tree species in Southern Africa. Plant identification keys, collection of plant specimens, procedures for plant identification. Herbarium procedure

FRT 2542 Wood science (syllabus not available)

FRT 2543 Wood anatomy and properties
Prerequisite CHE1540 and CHE 1622
Botanical background of woody plants. Tree growth and cell differentiation in the xylem of gymnosperms and angiosperms. Gross structure of wood: sapwood and heart wood, growth increments, grain, texture, figure, odour and taste. Minute structure of wood: cell types, cell arrangements, cell wall structure and special features of cell wall. Relationship between wood anatomy and wood quality. The chemical structures and properties of some important, commonly occurring extractives. Natural defects in wood: knots, reaction wood, cross grain, growth stresses, shakes, bark pockets, resin or pitch pockets, compression failures, mineral streaks and pith. Variation in the structure of wood: variability between species, between trees of the same species and within a tree. Mechanical properties of wood: fundamental considerations, assessment of mechanical properties, description of tests, factors affecting mechanical properties.

FRT 2641 Introduction to forestry engineering
Prerequisite None
Elementary mechanics, forces and acceleration. Newton's Laws of motion. Systems of forces, resolution, resultant and equilibrium for concurrent forces. Two dimensional force systems involving moments, vector, and equilibrium of forces. Behavior of engineering materials. Young's modulus yield strength, ultimate strength. Internal combustion engine principles. Logging terminologies. Operating principles and maintenance of tools and accessories for different forest operations. Tree cutting/felling principles, cross- cutting operation.

FRT 2642 Wood and Non-wood based materials
Prerequisite FRT 2543
Types of wood based materials: plywood, particleboard, fibre board and paper. Types of non-wood products for rural income generation and subsistence livelihood**.** Methods of manufacturing, properties and their uses. Wood anatomy. Physical and chemical properties of wood and non-wood products**.** Chemistry of glues: introduction to the chemistry of natural products, wood additives and wood finishes. Pulping and pulping methods: recovery of chemicals bleaching with reduced effluent load (including oxygen and ozone bleaching). Paper Technology: paper making machines, fibre recovery and pollution control. Chemical products from wood. Modifying and joining of solid wood; wood preservation process, preservation of wood against organisms, protection of wood against fire, dimensional stabilization of wood, degradation of wood by chemicals, weathering of wood, densification of wood, bending of wood, laminated wood, joining of wood.

FRT 3531 Silviculture I (syllabus not available)

FRT 3541 Mensuration, inventory and harvesting (syllabus not available)

FRT 3542 Sawmilling
Prerequisite FRT 2543 and FRT 2642
Log handling at the log yard: types of log yards, deterioration of floated and stored logs. Types of sawing machinery and layouts. Sawmill production planning: raw material requirements, sawing

patterns and determination of sizes to be cut, personnel requirement, preventive maintenance, production costs, quality control (sawing accuracy and surface quality). Record keeping including recovery rates. Timber handling while in process including sorting. Saw doctoring: saw tightness and looseness, tensioning, sharpening and teeth setting. Timber drying: methods of drying, types of kilns and drying schedules. Timber preservation: preservation methods, types of preservatives, procedures, properties of treated wood, treatment specifications and quality control. Timber grading: rules, grading of softwood and hardwoods. Manufacturing and seasoning defects: raised, loosened, fuzzy grain; checks, cupping, warping, case hardening, collapse and honey combing.

FRT 3544 Forest resource assessment
Prerequisite FRT 2642
Techniques for measurement of individual trees stand variables such as, calculating tree volume, estimating stem form and taper, as well as timber scaling a grading, growth and yield modeling, forest inventory. Basic techniques of surveys and sampling methods in natural and plantation forests. Fundamentals, principles and elements of remote sensing. Remote sensing and forest resource assessment: Principles of electromagnetic radiation, interaction with the atmosphere and vegetation cover; The multispectral concept, spectral resolution. Earth resource satellites (sensors and satellite). Visual interpretation, Digital Image processing. Vegetation mapping. Geographic Information System (GIS). GIS software and hard wares.

FRT 3641 Silviculture II (syllabus not available)

FRT 3642 Forestry policy
Different types and ownerships of forests and woodland resources in Southern Africa. The South African forest sector and the National Forestry Action Programme. Forest policy and the processes by which it is developed. State, local Government and tribal laws and regulations which influence forest management and use, how different policies, laws, Acts (e.g. Forests and Veld and Fire Acts, land reform Act) and regulations interact with socioeconomic and environmental factors to influence management and use of forests and woodland resources in Southern Africa.

FRT 3643 Silviculture of planted forests
Prerequisite FRT 2541
The role, current status and challenges facing plantation forests in South Africa. Role and organizational issues of silvicultural practices for establishment, tending and harvesting of plantation forest South Africa. Factors affecting the sustainability of plantation forest management in South Africa. Criteria for selection of plantation sites, tree species, provenances and tree improvement practices through tree species & provenance trials, selection of plus trees, clonal orchards, progeny trials, seed stands, seed collection, handling, storage and nursery practices. Silvicultural techniques for site preparation, planting depth & spacing, blanking, weeding, pruning and thinning practices. Conservation of soil, water and biodiversity in plantation forests and afforestation in difficulty sites (steep slopes, arid lands etc)

FRT 3644 Forest protection
Prerequisites FRT 2541
The concept of forest health. Types and causes of forest fires, environmental and socioeconomic impacts of forest fires, forest fires behavior, theoretical approaches, strategies and practices to prevent forest fires (detection, management response to suppress), tools, equipment and organization set-up for fire-fighting. With regards to protection and maintenance of forest health and vitality the major focus will be on the following aspects: Major and emerging insect pests, disease wild animals of concern in Southern Africa plantation forests. Classification and identification of the most common insects pests. Identification of the most affected and resistant tree species and places, the causes of the outbreak, effective protection strategies & methods, phytosanitary measures. Principles of integrated pest management in plantation forests. International and local organization set-ups for collaboration in monitoring, evaluation and reporting of risks of outbreaks and impacts of insect pests disease pathogens and other major destructive agents of plantation forests in Southern Africa.

FRT 3645 Logging and roads
Prerequisite FRT 2641
Principles and application of forest road location and surveying. Principles and application of forest road design, including; horizontal curves, vertical curves, cross-sectional information and structural design considerations. Terrain transport systems: manual, draught animal, semi mechanized and mechanized methods. Planning of logging operations: factors affecting logging and recommended environmentally sound harvesting systems. Harvesting Code of Practice. Logging production cost analysis. Road planning, design, alignment, construction and maintenance, types and layout of drainage structures. Felling methods and equipment. Moving wood to roadside on the ground. Best management practice and logging site impact. Cash flow analysis of logging business. Forestry certification – SFI, FSC, ISO, PEFC etc.

FRT 4541 Agroforestry
Prerequisite None
Agroforestry definition, concepts or hypotheses and main components. Agroforestry role (economic, social and environmental values); overview of the structure. Management and functioning of the most common agroforestry systems and practices in Southern Africa and worldwide. Component interactions in agroforestry systems and practices, institutional organization set-up for agroforestry promotion. Research methods for identification and evaluation of promising agroforestry tree species and shrubs. Participatory tools for identification, monitoring and evaluation of performance of promising agroforestry practices/technologies in Southern Africa.

FRT 4542 Forest conservation
Factors leading to loss and or degradation of forest resources. Forest conservation role and scope. Principles and criteria for selection and development of a network of forest conservation areas. Sustainable forest management criteria and indicators and their role in planning for conservation of forests and woodlands in Southern Africa; forest conservation categories. Applicability of the IUCN categorization of conservation status to Southern Africa forests and woodlands, approaches for selection of forest conservation sites, steps in preparation of forest conservation management plan. Limitations and sound ecological and socioeconomic basis for setting conservation priorities and targets; forest conservation activities. Surveying, monitoring and evaluating effectiveness of forest conservation activities; institutional arrangement for forest conservation in Southern Africa.

FRT 4641 Forest engineering (syllabus not available)

FRT 4642 Community forestry
Community forestry definition and meaning as adopted in different countries. Differences and similarities between Community forestry, agroforestry and urban forestry. Historical background of community based forestry or participatory forest resources management. The conceptual basis of the different community forestry arrangements. Principles and applications of common property management. Different Community forestry approaches/ strategies, practices and activities. The main aim/goal of community forestry in Southern Africa and elsewhere in the world. Review of experiences, perceptions and trends of Community forestry development in Southern Africa and elsewhere. Review of the potentials and limitations/challenges of community forestry e.g. in poverty alleviation, food security, prevention of deforestation, conservation of soil, water and biological diversity. Circumstances under which community forestry activities and or arrangements can be effective. Effects of globalization, poverty and conflict of interests. Community forestry agreements with local communities. Processes, tools and guidelines for Community forestry development

FRT 4643 Timber transportation and planning
The harvest planning environment (different types of harvest plans). Decision making framework for matching harvesting systems to the site. Steps in completing a harvest plan. Secondary log transport systems: objectives, methods and equipment: road, water, aerial and rail systems. Terminal operations and equipment. Road transport (truck configurations). Pulpwood and saw log truck selection. Planning in timber harvesting and transport. Timber transportation cost analysis. Work science and work study and their application in forestry.

FRT 4644 Silviculture of natural forests

Multiple values of natural forests and woodlands. Management goals and objectives of natural forest and woodland. Silvicultural basis for management of trees and forests which includes. Historical and current silvicultural activities in natural forests (management, research, inventory and monitoring). General silvicultural principles (interaction effects between ecology, biology attributes of trees with abiotic and biotic environmental conditions, human activities and needs. Silvicultural systems and practices; functions of silvicultural systems and practices. Silviculture of the major indigenous tree species in natural forests and woodlands of Southern Africa; forest harvesting systems and regeneration processes/practices. Constraints and opportunities of natural regeneration and enrichment planting of major indigenous trees in Southern Africa. Factors influencing the implementation of various silvicultural systems and practices, adaptation process of silvicultural systems to suite local conditions e.g. for restoration of degraded natural forests and woodlands in rural areas of Southern Africa

FRT 4081 Project and seminar presentation

The framework for research proposal. Research Background and research problem statement. Topic identification. Research proposal writing. Research objectives and Hypothesis. Theoretical framework and review of literature. Conducting an experiment. Data analyses and interpretation.

Data collection techniques and Data analysis. Presentation of Research Results. Project Research report writing. Seminar on Research Findings.

WIL 4582 Forest management planning

Biophysical and socio-economic data collection and analysis. Indigenous rights issues. Land management goals. Regulatory context. Participatory approaches to monitoring and management. Integrative strategies. Preparation of forest management plans for a specified plantation or natural forest area. The plan must contain sections on description, registration, directives, and prescriptions of different operations. Preparation of annual plan of operations (APO).

HRT 2541 Principles of horticultural crops production
Prerequisite AGR 1631

This module is designed to introduce learners to fundamental principles and practices underlying successful production of horticultural crops. The module will explore the basic plant structure, growth and development of horticultural plants from practical and scientific approaches; environmental effects, basic principles of propagation, nutrition, pruning. It provides an aesthetic appreciation of how plants affect us in our daily lives.

HRT 2641 Plant propagation

This module deals with the principles, practices and techniques followed in sexual and asexual plant multiplication. Seed production, seed harvesting, postharvest seed handling and storage will also be covered. Learners will be provided with the opportunity to practice different techniques in plant propagation; crop micropropagation, cutting propagation, stem, leaf and root cuttings; propagation by layering, grafting techniques, and propagation by specialized plant structures.

HRT 3531/3545 Ornamental horticulture
Prerequisite HRT 2541

This module exposes learners to identification, classification, selection, adaptation, production techniques and utilization of common ornamental and native plants in South Africa and the world, relating to decorative purposes for indoor and outdoor living. Learners will gain knowledge in the production of cut flower plants, flowering pot plants, and flowering plants for outdoor.

HRT 3533 Plant tissue culture

This module presents to the learners principles of plant tissue culture and micropropagation. It covers the totipotency concept, laboratory requirements and set up for tissue culture, role and composition of tissue culture media and pathways of plant regeneration by tissue culture. Characteristics of callus and suspension cultures, somatic embryogenesis, genetic stability and artificial seeds, organogenesis and meristem culture will be covered. Case studies on successful micropropagation of horticultural crops are included

HRT 3534 Citriculture (citrus production)
Prerequisite HRT 2541
This module deals with world citrus production and marketing. Topics covered include, history, botany, classification, distribution, cultivation, varieties and rootstocks, soil and climate suitable for citrus production, propagation, layout and planting new citrus orchard, and management practices of established citrus orchard. The module will emphasize the relationship of environment to species, cultivar, and rootstock selection. Recent significant developments in plant breeding and cultural practices will also be covered.

HRT 3544 Controlled environment horticulture
Prerequisite HRT 2541
This module exposes learners to controlled environment technology in horticulture. Topics covered include; concepts and systems of environmental control, commercial applications, relative merits and demerits of controlled environment production systems. Learners will be introduced to the cropping and production of high value horticultural crops in plastic tunnels, shade houses and greenhouses. Other topics covered are; types of structures for protected cultivation and their characteristics, greenhouse design and site considerations, greenhouses and their operations, plant culture in hydroponics, plant nutrition in soil-less culture, Hydroponics media and Aeroponics.

HRT 3631 Olericulture
Prerequisite HRT 2541
This module deals with a comprehensive study of principles and practices related to the production of major and minor vegetables of South Africa, Africa and world in relation to production practices, nutritional value and quality characteristics. Special emphasis will be placed on growing crops for markets. It includes the following families Salicaceae, Asparagaceae, Asteraceae, Brassicaceae, Chenopodiaceae, Fabaceae, and Gramineae

HRT 3642 Turfgrass and landscape horticulture
Prerequisite HRT 2541
This module deals with Turfgrass production and management, comparisons of turfgrass for recreational, landscape uses and covers area. Other topics covered are: growth, characteristics, methods of propagation, and basic management requirements, including control of important pest and diseases, turfgrass identification and adaptation, establishment and maintenance of high quality turf areas. Learners will be briefly introduced to application of the principles and elements of design to planning and developing residential landscape designs.

HRT 4532 Spices, herbs, beverages and medicinal crops
Prerequisite HRT 2541
This module deals with history, origin, classification, cultural practices in production of major spices, herbs, beverages and medicinal plants. It discusses ecology, factors affecting growth and development, crop management and cultural practices, pest and disease control, harvesting, sorting, packaging storage and marketing. Their contemporary uses will also be discussed.

HRT 4541/4644 Postharvest physiology of horticultural crops
Prerequisite AGR 3541
This module is designed to provide learners with knowledge of physiological changes associated with storage and handling of horticulture produce. It covers current practices used in extending shelf-life, basic and applied laboratory analysis techniques, produce deterioration, senescence of perishable crops, properties of ethylene, biosynthesis and mechanism of action of ethylene, and its role in fruit ripening. Other topics covered include; manipulation of postharvest physiological processes to enhance quality of fresh produce, waxes and edible coatings, postharvest chlorination, cooling and pre-cooling methods, and curing root, tuber and bulb crops.

HRT 4542/4643 Tropical and subtropical fruit and nut trees
Prerequisite HRT 2541
This module is designed to introduce learners to current principles and practices in production of fruit and nut trees of economic importance in tropical and subtropical areas. Topics covered include; history, botany, classification, taxonomy, origin, adaptation, cultural practices, climate, producing regions of the world, varieties grown, rootstocks and factors for successful cultivation and utilization of these crops. Emphasis is on application of modern science and advanced technologies in the production of fruit crops for fresh and processing industries.

HRT 4633 Temperate fruit and nut trees production
Prerequisite HRT 2541
This module deals with temperate fruits and nut trees production in summer rainfall areas of South Africa. Topics include climatic and soil conditions, cultural management, pruning and training. Physiological principles involved in growing temperate fruits in marginal environment of the sub-tropics will be covered. Emphasis will be on selection of low chilling requirement cultivars, rootstocks and methods of breaking dormancy in temperate trees.

HRT 4642 Agriculture biotechnology
Prerequisite BCM 2621 and BCM 2622
This module deals with organization of genetic material, gene structure, expression and transmission. It covers topics in control of gene expression, structure and properties of DNA, DNA replication, protein synthesis and principles of gene cloning. Learners are introduced to recombinant DNA technology, concept, and basis of biotechnology and application of biotechnology in agriculture and crop improvement.

HRT 4081 Project and seminar presentation
Prerequisite RME 3648
Independent research under academic adviser culminating in an oral and research report. Research topic related to horticulture. Students should demonstrate good practice in using skills and knowledge acquired during the programme and follow dissertation guidelines as laid down by the department.

AGR 1631 Agriculture and humankind
Prerequisite None
Origin and development of agriculture through the ages. Global agricultural profile; output of major agricultural products. Branches of agriculture. Career opportunities in agriculture. Role of agriculture in socio-economic development. History and development of agriculture in South Africa. Climate and soils of South Africa. Factors affecting agricultural production in South Africa. Agricultural organisations and research institutions in South Africa. Farming systems of South.

AGR 2541 Introduction to plant production
Prerequisite AGR 1631
Historical perspective of crop production; when and why crop production began. Classification of crop plants; agronomic, botanical, life-span, special purpose etc. The environment in relation to crop production. Cultural practices. Introduction to climate change. Principles and practices of crop protection. Crop improvement and seed production. Cropping systems. Principles of irrigation

AGR 3541 Principles and applications of plant physiology in plant production
Prerequisite BIO 1542 and BIO 1643
Role of crop physiology in food production. Review of the physical characteristics of tropical and sub-tropical environment. Review of plant cell structure and physiological functioning. Plant water relations. Photosynthesis. Respiration. Mineral nutrition of crop plants. Plant growth regulators. The physiology of yield production.

AGR 3631 Dryland farming technology
Prerequisite AGR 2541
Definition and classification of drylands. Distribution of drylands in South Africa. Factors that constrain crop production in the drylands. Management practices to ameliorate the constraints. Soil water and conservation

AGR 3641 Introductory plant breeding and seed production
Prerequisite GEN 1641 and AGR 3541
History of the development of plant breeding. Genetic basis of plant breeding. Tools of the plant breeder. Methods in plant breeding and their application. Germplasm resources and conservation. Seed production of crop germplasm. Intellectual property rights.

AGR 4532 Management of natural and cultivated pastures
Prerequisite AGR 2541
Natural pastures: Introduction – veld and pasture management terminologies in Southern Africa
Plant succession – primary and secondary succession – process involved in plant succession- limiting factors. Pasture ecology – the grass family – taxonomy of grasses- morphology of grasses. Grazing value and ecological status of grasses – factors that determine the ecological status of grasses and variation in ecological status of grasses and variation status. Vegetation types of Southern Africa – Grassland, Savanna, Fynbos, Karoo, and Forest. Fire ecology – fire terminologies – characteristics of fire behavior – ecological effects of fire – principles of fire management. Monitoring vegetation change and assessing veld condition – the concept of the vegetation change and veld condition. Different methods of assessing veld condition. The animal/plant interaction – effects of animals on plants – defoliation – species selective grazing – area selective grazing – the use of veld by wild ungulates. Grazing management principles and practices – types of grazing management – resting veld burning as management practice in livestock production- bush encroachment. Veld rehabilitation of denuded and eroded. Establishment of cultivated pastures: The role of cultivated pastures in South African farming Pasture establishment. Selection of pasture species according to soil, climate and livestock

AGR 4533 Bio-energy crops: Agronomy and postharvest processing
Prerequisite AGR 2541; AGR 3631 and PPR 3541
History/origin. Distribution. World production. Economic importance. Botany. Ecological requirements. Crop improvement. Field management. Harvesting. Post-harvest handling

AGR 4632 Agronomy of selected field crops
Prerequisite AGR 2541; AGR 3641 and PPR 3541
History/origin. Distribution. World production. Economic importance. Botany. Ecological requirements. Crop improvement. Field management. Harvesting. Storage processing

AGR 4081 Project and seminar presentation

PPR 3541 Introduction to plant protection
Prerequisite AGR 2541
Diversity and role of insect and plant pathogenic microorganisms in natural ecosystems and agroecosystems. History of plant pathology and agricultural entomology. Pests and diseases and their effects on plant production. Concept of disease in plants: infectious and non-infectious diseases. Etiology of disease causing agents. Disease cycles and disease epidemics. Life cycles of some diseases of economic importance. History of agricultural entomology. Economic and ecological changes that cause insects to become pests. General development of insect populations and economics of pest control. Life cycles of some insect pests of economic importance. Significance of weeds in crop production. Categories of weeds. The Law and weeds in South Africa.

PPR 3631 Agricultural entomology
Prerequisite PPR 2541 or PPR 3541
Economic importance of insects. Categories of pests and causes of pest outbreaks. Sampling and its importance in pest management. Insect Orders of economic importance: biology and life histories. Principles of insect pest control: insect ecology and behavior. Practices of insect pest control. Cultural, biological, genetic and legislative control. Plant resistance to insects. Chemical control: formulation, safety and application. Insecticide resistance and its management. Pesticide safety and application. Pesticide registration. Integrated pest management. Examples of pest control in annual and perennial crops

PPR 3641 Weed science
Prerequisite PPR 2541 or PPR 3541
Definition and classification of weeds. Plant succession and development of weeds in cropping systems. Impact of weeds on crop production. Weed biology. Weed ecology. Nature of weed-crop interactions. Management of weeds. Herbicides: classification criteria and working classification. Herbicide-plant interactions. Herbicide-soil interaction. Herbicide resistance and how it is managed

PPR 4541 Plant pathology
Prerequisite PPR 3541
Plant defence mechanisms. Types of diseases and disease symptoms. Diagnosis of plant diseases
Non-infectious diseases. Disease causing agents: classification and biology of fungi, nematodes and bacteria. Viruses: classification and replication strategies. The disease triangle and factors affecting infection and disease development. Disease cycles. Development of disease epidemics
Impact of plant diseases on crop production: historical and current examples. Etiological and epidemiological principles in disease control. Disease and crop loss assessment. Examples of plant diseases management in different cropping systems.

SSC 2541 Introduction to soil science
Soil: Definition and concepts, soil profile, horizons. Soil forming factors and processes. Physical properties of soils – Texture, structure, density, colour, porosity. Chemical properties of soils – cations and anions, CEC, Alkalinity and acidity, pH and nutrient availability. Biological properties of soils – classification of soil biota. Effects of soil organisms on soil fertility, detrimental effects of soil organisms. Organic matter – origin, composition, and influence on soil properties

SSC 2642 Geology for soil science
Geology: Definition. Types of rocks Igneous, Sedimentary and Metamorphic rocks. Weathering of different rocks and minerals. Types of minerals (Iron bearing minerals and felldspars). Soil forming minerals and clay minerals. The general structure and classification of the phyllosilicates, Properties and structure of 1:1 and 2:1 minerals.

SSC 3531 Soil Biology and Ecology (Old curriculum)
Organic components of soil. Soil biota: microfauna and –flora, earthworms, termites and insects.
Food and energy sources of soil organisms. Dynamics of soil organic material: N and S cycles
Aspects of the rhizosphere.

SSC 3541 Soil Classification (Old curriculum)
Profile description. Diagnostic horizons and diagnostic soil characteristics in the SA system.
The Soil orders in Soil Taxonomy: concepts, genesis, uses and problems. Procedure of classifying soils for both systems.

SSC 3542 Soil chemistry
Prerequisite SSC 2541
Soil Colloids: General properties and types of soil colloids, Fundamentals of layer silicate structure, Mineralogical organization of silicate clays, Structural characteristics of nonsilicate colloids, Genesis and geographic distribution of soil colloids, sources of charges on soil colloids, Adsorption of cations and anions, Cation exchange reactions, Cation exchange capacity, Anion exchange, sorption of organic compounds, physical implication of swelling-type clays. Distribution of ions near charged particles, Soil solution, Oxidation and reduction reactions in soils. Soil Acidity, Alkalinity, and Salinity: The process of soil acidification, causes of alkalinity: High soil pH, Role of aluminium in soil acidity, Buffering of pH in soils, Determination of soil pH, Human induced soil acidification, Biological effects of soil pH, Raising soil pH by liming, Alternative ways to ameliorate the negative effects of soil acidity, Lowering soil pH, Development of salt-affected soils, Measuring salinity and sodicity, Classes of salt affected soils, Water quality considerations for irrigation, Reclamation of saline soils, Reclamation of saline-sodic and sodic soils.

Practicals: Equipment and Methods for Soil Preparation and soil preparation. Determination of hygroscopic water content. Determination of pH and EC. Adsorption and ion exchange exercises. Organic carbon analysis.

SSC 3543 Pedology
Prerequisite SSC 2541
Soil forming factors and processes. The effect of soil forming factors to soil morphology and on soil physical, chemical and biological properties. Physical and chemical weathering processes of rocks and minerals and their products. Pedogenesis i.e. soil forming processes (sulfurization, salinization, calcification, eluviation, illuviation, Podzolization, gleization, erosion, leaching, alkalization, dealkalization, calcification, decalcification, braunification, and deposition. Soil morphology: development of A, B, C and other soil horizons. Effects of soil organisms on soil fertility development (termites). Soil spatial variability in the field

SSC 3544 Soil physics
Prerequisite SSC 2541
Soil composition. Soil water and energy measurement. Specific surface area. Soil structure and aggregation. Flow of water in saturated soils. Flow of water in unsaturated soils. Infiltration. Gas transport in soil (Soil Aeration). Heat transport in soil (Soil Temperature). Evapotranspiration

SSC 3632 Soil Fertility (Old curriculum)
Principles of plant nutrition. Soil as a medium for plant nutrition. Soil as a medium for plant growth. Macro and micronutrients. Evaluation of soil fertility. Fertilizers, manures and organic wastes. Soil pollution.

SSC 3633 Soil Physics (Old curriculum)
Selecting and analyzing information on study topics. Structure and texture. Compaction and crusting. Methods of assessing soil water. Practical importance of soil physical properties

SSC 3641 Soil survey, classification and mapping
Prerequisite SSC 2541
Soil forming factors and processes. The effect of soil forming factors to soil morphology and on soil physical, chemical and biological properties. Pedogenesis i.e. soil forming processes. Soil morphology: development of A, B, C and other soil horizons. Soil spatial variability. Soil survey, soil classification and mapping (using different systems). Remote sensing and GIS. Practical will be based on the influence of litho sequences, Chronosequence, rainfall sequences, temperature sequences, bio-sequences, and toposequence. The field trip is done in Limpopo. Mpumalanga, and Kruger National Park Soil classification (S.A)

SSC 3642 Soil microbiology
Prerequisite SSC 2541
Major types and groups of soil organisms, their ecological relationships and functions in the soil.
Conditions affecting the growth of soil microorganisms. Role of microorganisms in synthesis and decomposition of soil organic matter. Role of microorganisms in nutrient cycling (N, P, S). Microbial interactions in the soil. Biological nitrogen fixation. Mycorrhiza. Rhizosphere
Practicals: Setting of Winogradsky's column. Enumeration of soil microorganisms (bacteria), actinomycetes, fungi by standard plate count. Estimation of soil microbial activity by CO_2 evolution. Mycorrhiza. Biological nitrogen fixation.

SSC 3643 Pedology (Old curriculum)
Soil forming factors. Soil forming processes: Sulfidizatio, Salinization. Calcification, Eluviation and Illuviation, Podzolization, Latosolization, Gleization.

SSC3644 Regional Pedology (Old curriculum)
Soil forming factors in the different climatic regions: influence of climate, influence of vegetation, influence of parent material, influence of time, influence of topography. Genetic concept of tropical and arid soils. Ferrallictic soils. Arid and semi-arid soils

SSC 4541 Soil-Plant-Water relationship
Prerequisite SSC 2541
Basic soil physical properties and calculations. Soil properties and their effects on water and gas movement. Water in soils and its measurement. Water movement in saturated Soil. Field Capacity, Permanent Wilting, Available Water. Infiltration. Water movement to plant roots. Water Potential and its measurement. Stomatal Anatomy and Stomatal resistance. Potential evapotranspiration. Crop water requirements, principles of irrigation scheduling. Mechanisms of nutrient movement in soils and plants

SSC 4641 Soil fertility and plant nutrition
Prerequisite SSC 2541
Soil fertility definition and concepts (past and present). Total versus available nutrients. Soil and fertilizer Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur. Trace elements and factors affecting their availability. Soil organic matter. Soil fertility evaluation and management practices. Plant absorption of nutrients and factors affecting it. Role of various nutrients in plant growth.

SSC 4642 Advanced Chemistry (Old curriculum)
Thermodynamics of solutions and suspensions. Chelation. Sorption and exchange mechanisms. Diffusion process. Chemistry of micronutrients. Chemical properties of soil colloids

SSC 4643 Advanced Soil Physics (Old curriculum)
Water retention diagrams and their practical use. Theory and applications of water and salt flux through soils. Crusting and company: dynamics and problem solving exercises.

SSC 4644 Land evaluation
Prerequisite SSC 2541
Soil mapping and soil survey. Map scales. Air photography. Interpretation of a soil map. Land evaluation, principles and procedures. Land evaluation systems. Data sources for Land evaluation
Remote sensing for Land Evaluation. Land use planning. GIS

SSC 4645 Soil, water and plant analysis
Prerequisite SSC 2541
Soil sampling – aims and procedure. Sample preparation, Extraction. Underlying chemical principles relating to the analyses of – N, P, K, Ca, Mg, Org.C, micronutrients, pH, EC, texture
Interpretation of soil analysis results. Recommendations based on the interpretation of soil analysis results. Water sampling – aims and procedures. Preparation for analysis and analysis for various nutrients/elements. Interpretation of water analysis results based on the proposed usage. Recommendations based on the interpretation of water analysis results. Plant tissue sampling – aim, and procedure (which part and when to sample). Sample handling and storage, grinding and ashing. Underlying chemical principles relating to the analyses of – N, P, K, Ca, Mg, micronutrients. Interpretation of plant tissue analysis results. Recommendations based on the interpretation of plant tissue analysis results Practical: Analysis of soil samples. Analysis of water samples. Analysis of Plant tissue samples.

SSC 4081 Project and seminar presentation
Prerequisite RME 3648
Independent research under academic adviser culminating in an oral and research report. Research topic related to soil science. Students should demonstrate good practice in using skills and knowledge acquired during the programme and follow dissertation guidelines as laid down by the department.