SOKOINE UNIVERSITY OF AGRICULTURE

FACULTY OF FORESTRY AND NATURE CONSERVATION

CURRICULUM FOR

B.Sc. (FORESTRY) DEGREE PROGRAMME

July 2008
EXECUTIVE SUMMARY

Background

The current B.Sc. (Forestry) programme at the Faculty of Forestry and Nature Conservation, SUA started in 1973 at the then Faculty of Agriculture of the University of Dar es Salaam (UDSM) at Morogoro with a curriculum that aimed to prepare students for professional positions in forestry and forestry industries. Since then, the curriculum has been revised several times to reflect the emerging needs and challenges within the forestry profession and beyond. The most dramatic revision of the curriculum occurred in 2001 when a semester system was adopted university-wide. Among other things, the 2001 revision was aimed to facilitate the implementation of the SUA Corporate Strategic Plan (1997 – 2005) which requires the University to become more competitive by providing conducive working environment and demand driven programmes in a cost effective and yet flexible manner. The curriculum was operational from 2001 to 2007 when the reported revision in this curriculum was proposed.

During the implementation of the semester system, training needs assessment, job market surveys and tracer studies were conducted to examine the adequacy of our training in addressing actual demands in the field. Accumulated experience revealed the following challenges:

- Inadequacies existed in the training programmes offered at the Faculty in relation to the expected performance of graduates in the field.
- The job market requires more versatile graduates who can cope with changing global demands in terms of poverty reduction, self employment, market economy, environmental concerns and emerging challenges.
- Modalities of conducting field practicals were constrained by budgetary allocations and increasing number of students over years and yet academic excellence needs to be maintained.
- Graduates generally lacked basic science and communication skills to perform their duties optimally, despite efforts to incorporate these aspects in previous curricula.

These challenges were addressed in the revised curriculum presented in this document, making the training at Sokone University of Agriculture more responsive to the demands of the dynamics in the forestry profession, the job market and the shrinking levels of budgetary allocations and donor support.

Justification

The revision is justified considering the fact that new courses have been introduced to address emerging challenges in the forestry sector and is tailored towards the increased demand of professional foresters with new vision on sustainable management of natural resources. Also issues hitherto inadequately covered such as environmental conservation, use of ICT, entrepreneurship skills, and crosscutting issues including gender are now given more emphasis. Further, the revision has adopted a more realistic and effective way of conducting field practicals given the low funding levels at the university and professional demands in the field.

Objectives of the Curriculum

The main objectives of the revised B.Sc. (Forestry) curriculum are to develop students’ knowledge and understanding of the principles of forestry in terms of science and practice. To produce graduate foresters who have sound knowledge and understanding of forestry and have key skills that are required to spearhead the move to modernise forestry practices for sustainable development.

Specific objectives of the programmes are:

- Providing the necessary background in technology and analytical skills, which will enable graduates to analyse and assess forestry systems for effective application to sustainable forestry practices in a multidisciplinary environment.
- Producing graduates with a view to acquiring relevant knowledge and skills in entrepreneurship for self-employment.
- Providing professionalism that permits graduates to fill responsible positions in forestry and forest industries development, environmental conservation, and forest research.
- Producing graduates who are competent in the technology and art of processing forestry products with the eventual aim of adding value to meet market demands.
- Providing a sound base from which graduates can embark on postgraduate training leading to research in forestry, academic, extension and higher management related professional careers.

PRINCIPAL LEARNING OUTCOMES

Upon successful completion of the degree programme, the graduates will be able to:

**KNOWLEDGE AND UNDERSTANDING OF SUBJECT**

- Demonstrate an interdisciplinary knowledge and understanding of the fundamental concepts and techniques of sustainable forest management.
- Show knowledge and understanding of the basic theories and concepts of silviculture of forests, insect pests and pest management, and relate them to practical work-based situations.
- Demonstrate knowledge and understanding of the new and emerging technologies for harvesting, and processing of timber into different forest products.
- Exhibit an understanding of the analytical and managerial strategies for sustainable forestry practices in multi-disciplinary environment.
- Express an understanding of relevant natural resources policies and legislation (forest policy, wildlife policy and land use policy)
- Describe the anatomy of wood and demonstrate an understanding of wood properties, wood and non-wood products, theories of wood utilisation and production (sawmilling, production of pulp and paper products).
- Describe the fundamentals of forest economics and business management; evaluate social-economic issues and investments in forestry and forest industries.

**SKILLS AND OTHER ATTRIBUTES**

**DISCIPLINE-SPECIFIC/PRACTICAL SKILLS**

- Demonstrate basic practical skills in forest management and forest operations.
- Identify the principle tree species; describe their uses, economic value; habitats and identify and manage the principle insect and disease pests of forest trees in the tropics.
- Assess environmental, social and economic impacts of forestry investments.
- Identify, formulate and solve forest engineering problems; select appropriate harvesting methods for forests.
- Identify a forestry problem or issue; investigate it through an appropriately planned, designed and implemented research project, and to present the findings as a research project report using reasoned argument to draw clear conclusions.
- Apply a range of methods to measure and evaluate forest stands for basic tree and stand parameters for forest resource assessment, management and marketing purposes.
- Prepare quality forest management plans for a forest plantation or natural forest using appropriate approaches and technologies.

**COGNITIVE/INTELLECTUAL SKILLS**

- Apply forestry management knowledge and skills to a range of resource management problems faced by forestry business industry, government departments; CBO’s and NGO’s.
- Apply multi-disciplinary and interdisciplinary approaches to generate research questions and to identify and use appropriate methods in reaching and reporting conclusions (to plan, conduct and write reports on appropriate researches in forestry).
- Evaluate alternative forest economic investments, and marketing strategies for different enterprises.
- Analyse, synthesise, and evaluate critically information; research papers and publications.

**TRANSFERABLE SKILLS**

- Communicate information, ideas, problems, arguments and solutions about aspects of forestry production effectively and professionally by written, graphical and verbal forms to both specialist and non-specialist audiences.
Collect, record, analyse, interpret and present data from a range of sources using appropriate analytical techniques.

Use of appropriate IT packages to solve natural resources management problems (finds, explore, develop and present numbers, texts and images).

Demonstrate interpersonal skills and team working ability by the successful completion of the forest management plan.

Demonstrate skills, knowledge and understanding for the opportunity to progress to an appropriate postgraduate degree in forestry, forest management or an allied field.

Learning and Teaching Methods

The learning methods consist of a mixture of lectures, tutorials and computer sessions and laboratory classes. Students will also learn through the production of essays, reports, case studies that will be presented orally. Independent reading will also be encouraged.

Lectures combine traditional presentation with interactive discussion and real-time development of models supported by the use of Information Technology.

Problem-solving skills will be developed through students working in groups on selected case studies which are based on typical real-world problems – preparing for presentation and discussion of the problem in the class. Students will be required to write and present a forest management plan and a research project report before graduation.

Assessment of Learner Outcomes

Students will be assessed by:

1. Tests and quizzes of knowledge of processes, theories and management problems, for which the course work accounts for 40% of the overall mark.
2. 3 hour university examinations at the end of the semester for each course, for which the examination accounts for 60% of the overall mark.
3. Observation and measurement of tasks and demonstrations, participation in field practical training.
4. Evaluation of final special research projects and management plans.

Attributes of the graduates

It is anticipated that graduates from the B.Sc. (Forestry) who are trained using this curriculum will be able to work in a variety of areas including institutions of higher learning, research institutions, large scale forestry plantation projects, forestry industries, local and international NGOs., CBOs, self-employment, natural resources offices, and environmental programmes to mention only a few.

The Duration of the degree programme

The duration of the degree programme according to this curriculum will be 6 semesters for full time students and up to 12 semesters for part time students. This takes into consideration the semester guidelines and standards set by the University. Further, a minimum of 72 Credits will be required for a student to graduate and student will normally be expected to have a course load of at least 12 credits per semester consisting of all core courses and selected elective courses.

Admission and Examinations

Admission requirements and course assessments are presented in section 8 of the curriculum. However, special examination regulations for the B.Sc. (Forestry) programme have been revised and are presented in section 9. The pass mark for each examination (theory and practical/oral) has remained to be 50% and there shall be no compensation of marks scored in one examination for another. Students will continue to do their special projects in the last 2 semesters and will be examined. Students will also be required to
undertake and write a Forest Management plan during semester 6 and will be examined. The grading system and degree classification will be as stipulated in the General University Examination regulations.

**Course Structure**

The course structure for the B.Sc. (Forestry) programme is shown in Table 1.

**Table 1. BSc (Forestry) curriculum course structure**

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Field Practical Training

The Faculty continues to attach great importance to practical training, as an essential requirement of the degree programme. The field practical schedule is shown in following Table:

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However, according to this curriculum, field practical arrangements have been changed to reflect the current budgetary constraints without compromising academic excellence. Consequently, all field practical training will be conducted at SUA Training Facilities.
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1. BACKGROUND

The BSc. (Forestry) curriculum at this University started being used in 1973 at the inception of BSc. (Forestry) degree programme at the then Faculty of Agriculture of the University of Dar es Salaam (UDSM) at Morogoro. The curriculum aimed at preparing students for professional positions in forestry and forestry industries. The curriculum was used for 14 years until 1988 when it was reviewed.

In the early 1990s it was observed that the curriculum by then was not adequately addressing emerging societal needs, a feature which led to the revision of the curriculum. In recognition of the continued decline of Government grant over the years, SUA effective 1997 developed a Corporate Strategic Plan to the year 2005 and beyond, so that the University becomes more competitive by providing conducive working environment and demand driven programmes in a cost effective and yet flexible manner. To meet this objective the University proposed to ensure flexibility by introducing a Modular/Semester system, which among other things will allow part-time students, transfer of credits and the more capable students to be able to complete their training programmes in shorter time. Consequently, the semester system became effective in September 2001.

During the implementation of the semester system, training needs assessment, job market surveys and tracer studies were conducted among other things to examine the adequacy of our training in addressing actual demands in the field. As experience accumulated over the first five years of implementing the semester system, the following emerging issues called for attention:

- Inadequacies existed in the training programmes offered at the Faculty in relation to the expected performance of graduates in the field.
- The job market requires more versatile graduates who can cope with changing global demands in terms of poverty reduction, self employment, market economy and environmental concerns.
- Modalities of conducting field practicals were constrained by budgetary allocations and increasing number of students over years.
- Graduates generally lacked basic science and communication skills to perform their duties optimally, despite efforts to incorporate these aspects in previous curricula.

These observations have made it necessary to review the curriculum with the aim of making the training at Sokoine University of Agriculture more responsive to the demands of the dynamics in the forestry profession and the job market. The review also was meant to accommodate the shrinking levels of budgetary allocations and donor support.

2. JUSTIFICATION

New courses have been introduced to address new challenges in the forestry sector. Moreover, the revised curriculum is tailored towards the increased demand of professional foresters with new vision on sustainable management of natural resources. Also, issues hitherto inadequately covered such as environmental conservation, use of ICT, entrepreneurship skills, and crosscutting issues including gender are now given more emphasis.

Whereas the previous review (2001) addressed the need to increase field practicals for students, this review has adopted a more realistic and effective way of conducting field practicals given the low funding levels at the university and professional demands in the field.

3. OBJECTIVES OF THE CURRICULUM

The main objectives of the revised B.Sc. (Forestry) curriculum are to produce foresters who can spearhead the move to modernise forestry practices for sustainable development. Specifically it aims at:

- Providing the necessary background in technology and analytical skills, which will enable graduates to analyse and assess forestry systems for effective application to sustainable forestry practices in a multidisciplinary environment.
• Producing graduates with a view to acquiring relevant knowledge and skills in entrepreneurship for self-employment.
• Providing professionalism that permits graduates to fill responsible positions in forestry and forest industries development, environmental conservation, and forest research.
• Producing graduates who are competent in the technology and art of processing forestry products with the eventual aim of adding value to meet market demands.
• Providing a sound base from which graduates can embark on postgraduate training leading to research in forestry, academic, extension and higher management related professional careers.

4. PRINCIPAL LEARNING OUTCOMES

Upon successful completion of the degree programme, the graduates will be able to:
1. Demonstrate understanding of the basic theories and concepts of silviculture of natural and plantation forests and relate them to practical work-based situations;
2. Demonstrate an understanding of the new and emerging technologies for harvesting, and processing of timber into different forest products;
3. Demonstrate an understanding of the analytical and managerial strategies for sustainable forestry practices in multi-disciplinary environment;
4. Demonstrate skills, knowledge and understanding for the opportunity to progress to an appropriate postgraduate degree in forestry, forest management or an allied field;
5. Apply forestry management knowledge and skills to a range of resource management problems faced by forestry business industry, government departments; CBO’s and NGO’s;
6. Apply multi-disciplinary and interdisciplinary approaches to plan, design and execute appropriate researches in forestry;
7. Evaluate alternative forest economic investments, and marketing strategies for different enterprises;
8. Measure and evaluate forest stands for basic tree and stand parameters for forest management and marketing purposes;
9. Identify the principle tree species in the tropics and demonstrate knowledge of their uses, use relevant economic value and habitats;
10. Identify and manage the principle insect and disease pests of forest trees in the tropics;
11. Employ geographical information system and mapping software in forest management.
12. Use computer packages to solve natural resources management problems.

Learning and teaching Methods

The learning methods consist of a mixture of lectures, tutorials and computer labs.

Lectures combine traditional presentation with interactive discussion and real-time development of models supported by the use of Information Technology.

Problem-solving skills will be developed through students working in groups on selected case studies which are based on typical real-world problems – preparing for presentation and discussion of the problem in the class.

5. ASSESSMENT OF LEARNER OUTCOMES

Students will be assessed by:

1. Tests and quizzes of knowledge of processes, theories and management problems, for which the course work accounts for 40% of the overall mark.
2. 3 hour university examinations at the end of the semester for each course, for which the examination accounts for 60% of the overall mark.
3. Observation and measurement of tasks and demonstrations, participation in field practical training.
4. Evaluation of final special research projects and management plans.
6. ATTRIBUTES OF THE GRADUATES

As a result of the curriculum review, graduates of the B.Sc. in Forestry degree programme should be able to work in a variety of areas including:

- Institutions of higher learning.
- Research Institutions.
- Large scale forestry plantation projects.
- Forestry industries e.g. paper mills; sawmills; panel products mills.
- NGOs, CBOs.
- Self-employment.
- Natural Resources Offices.
- Environmental Programmes.
- Design and manufacturing forest machines and implements.

7. THE DURATION OF THE DEGREE PROGRAMME

- In accordance with the semester guidelines and standards, the duration of the degree programme will be 6 semesters for full time students and up to 12 semesters for part time students.

- In order to graduate, candidates in the B. Sc. (Forestry) degree programme will require a minimum of 72 Credits.

- A student will normally be expected to have a course load of at least 12 credits per semester consisting of all core courses and selected elective courses.

- A student in the programme will be allowed to take any elective/core courses from any degree programme in consultation with his/her academic advisor. The elective courses shown in the curriculum are not exhaustive but only indicative.
8. ADMISSION REQUIREMENTS

"A" level candidates

Possess two Principal level passes in Biology/Botany and Chemistry or Physics/Geography all passed at the same or separate sittings. The sum of the points from the three principal level passes should not be less than 4.

Diploma Candidates

(a) Diploma (second class or above) in Forestry or Beekeeping or Wildlife Management or Agriculture (with forestry component) from recognised colleges.

AND

(b) Passes in five subjects at "O" Level or equivalent. The five subjects must include Mathematics, Chemistry, Biology/ Botany and Physics/Geography

9. SPECIAL EXAMINATION REGULATIONS FOR B. SC. (FORESTRY)

In addition to the University’s general examination regulations, the following regulations will apply in the Bachelor of Science in Forestry degree programme.

Candidates must satisfy the examiners in written examinations, practicals (laboratory and field) and seminars. Examiners may require a candidate to appear for an oral examination.

(i) Coursework and end of semester assessments

Assessment of students for courses with practical components shall be as follows:

a) Student's reports on practical work in the laboratory/field shall carry 20% of the total marks.

b) Laboratory/field practical tests shall carry 20% of the total marks.

c) Tests, essays, seminars and assignments shall carry 20% of the total marks;

d) The end of semester university examination shall carry 40% of the total marks.

Assessment of students for courses with no practical components shall be by giving tests, essays, assignments and/or seminar presentations at appropriate stages during the semester. Course work assessment and end of semester examination shall carry 40% and 60% of the total marks respectively.

In addition to the above, field practicals/excursion must be passed.

(ii) Pass mark

The pass mark for each examination (theory and practical/oral) shall be 50%. There shall be no compensation of marks scored in one examination for another.

(iii) Special Projects

Each candidate shall be required to undertake a Special project in the last 2 semesters for which a report must be completed and submitted for examination at least 2 weeks before semester 6 University examinations begin. Each candidate shall be required to appear for an examinable oral presentation of his/her special project proposal in semester 5.

(iv) Forest Management Plan

Each candidate shall be required to undertake and write a Forest Management Plan during semester 6. The Management Plan report must be completed and submitted for examination 2 weeks before the beginning of semester 6 University examinations.

(v) Field Practical Training
The Faculty of Forestry and Nature Conservation attaches great importance to practical training, as an essential requirement of the degree programme. The relevant Department shall carry out the assessment of the field practical training.

10. GRADING SYSTEM

The grading system will be as stipulated in the General University Examination regulations.

11. CLASSIFICATION OF DEGREES

Classification of the degree will be as stipulated in the General University Examination regulations.
12. PROGRAMME COURSE STRUCTURE

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**SEMESTER 5**

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<td>FMM 301</td>
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<td>FBL 305</td>
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**SEMESTER 6**

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<td>FEC 302</td>
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## REVISED CURRICULUM FOR B.Sc. (Forestry) DEGREE PROGRAMME

### Conservation

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*L = lecture hours  *S = seminar hours  *P = practical hours  *CR = credit hours
13. **FIELD PRACTICALS AND EXCURSION PROGRAMME**

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<tr>
<td></td>
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<td>Forest Botany</td>
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<tr>
<td></td>
<td>Introduction to Surveying and Mapping</td>
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<tr>
<td></td>
<td>Tree Cutting and Work Studies</td>
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<tr>
<td><strong>SEMESTER 4</strong></td>
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<td></td>
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<tr>
<td></td>
<td>Silviculture, Tree improvement and Agroforestry</td>
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<td></td>
<td>Wildlife Management and Beekeeping</td>
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<td>Logging</td>
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<td>Wood properties and Utilisation</td>
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<td>Forest Resource Assessment</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>SEMESTER 6</strong></td>
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14. PROGRAMME DETAILED COURSE CONTENTS

SEMESTER 1

CORE COURSES

FEN 101 Introduction to Forest Engineering 2.0 Credits (45L 0S 30P)

Prerequisite: None

Learning outcomes:

Upon the completion of this course the student will be able to:
1. Demonstrate an understanding of the basic principles of performing forest operations.
2. Demonstrate an understanding of the fundamentals of engineering mechanics.
3. Demonstrate and understanding of principles of work studies in forestry.
4. Apply the acquired knowledge and skills of forest hand tool maintenance in the field.
5. Conduct forest work studies and present results in a scientific manner.


Practicals: Handling and maintenance of logging tools and machinery. Tree cutting practices. Basic operation and maintenance of chainsaws and tractors. Work studies of logging operations.

Required Readings

Recommended Readings
4. Search the Web for any related literature.

FMM 101 Introduction to Surveying and Mapping 1.0 Credits (20L 10S 10P)

Prerequisite: None

Learning outcomes

Upon completion of this course the student will be able to:
1. Demonstrate an understanding of basic surveying and mapping concepts.
2. To apply the learned principles to plan and conduct small-scale surveying and mapping projects for forest management planning.

Practicals: Distance measurements, angle measurements, ranging out, slope correction, dropping and erecting perpendiculars by using prism and plumb bob, off sets (perpendicular and oblique), levelling, chain triangulation, compass traverse, GPS traverse and mapping.

Required Readings

Recommended Readings

FWU 101 Wood Chemistry. 2.0 Credits (45 L 0S 30 P)

Prerequisite: None

Learning Outcomes
Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the basic principles of chemistry and biochemistry of wood.
2. Relate the chemical composition of wood to overall wood formation.
3. Apply the knowledge and skills learned to determine the contents of selected extractives.


Practicals: Determination of holocellulose, cellulose, hemicellulose, lignin and extraction of selected extractives.

Required Readings

Recommended Readings

**FWU 102 Wood Anatomy and Quality 1.5 Credits (30L 10S 20P)**

**Prerequisite:** None

**Learning Outcomes:**

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the principles of wood identification and its allocation to specific end-uses;
2. Identify different wood species and types using anatomical features of wood;
3. Allocate wood to specific end-uses.

**Contents:** 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. 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. Monocotyledon wood: bamboo and coconut wood; structure, anatomy, physical and mechanical properties. Relationship between wood anatomy and wood quality.

**Practicals:** Study structure of timber; identification of different timber species. Determination of moisture content.

**Seminars:** Seminars on selected topics.

**Required Reading**

**Recommended readings**

**FEC 101 Introduction to Economics 2.0 Credits (45L 30S 0P)**

**Prerequisite:** None

**Learning Outcomes**

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the theories of microeconomics; the economic behavior and decision-making of individual consumers, firms, and industries
2. Demonstrate an understanding of the basic concepts of macroeconomics and the overall aspects and workings of a national income accounting and the interrelationship among diverse economic sectors.

**Contents:** Basic concepts and definitions of economics. The consumption theories (demand, supply, elasticity and utility). The theory of production (production and production functions, cost and revenue

**Required Readings**


**Recommended Readings**


**SC 100 Communication Skills 2.0 Credits (45L 30S 0P)**

**Prerequisite:** None

**Learning Outcomes:**

Upon completion of this course, the student will be able:

1. Demonstrate the ability to study, communicate and collect different information effectively.
2. Demonstrate a broad understanding of literature, technical writing, creative writing in English
3. Effectively communicate in English

**Contents:** Remedial grammar: Grammatical aspects, which students are supposed to have acquired while doing university studies, e.g. sentence structure, the tense system, verb forms, use of conjunctions and connectors, etc.

Oral Presentation Skills: Speaking and listening skills, basic note taking, methods of oral presentation; Techniques: preparation (materials, audience and the presenter); presentation (use of appropriate language signals, appropriate vocabulary, and register; use of audio-visual aids (power point presentation).

Basic Writing Skills: Interpreting questions, planning essays and other texts; Writing: organising information and thought reduction and developing of ideas:-sentence/paragraph structure, text types and development; Essay writing; Reports writing: experiments, project, research, term papers; summary writing –abstract, summary and executive summary.

Academic Literacy Skills: literature review techniques, literature evaluation, bibliographic search, citation and referencing.

**Mode of learning and teaching:** The course will be offered through a mixture of workshops, seminars and group discussion. In each topic, students will be exposed to tasks/activities, which will be appropriate to the application of particular skills for academic communication. Where possible, activities will be drawn from students’ fields of specialisation.

**Required Readings**


**Recommended Readings**


**ELECTIVE COURSES**

**MB 100 Basic Mathematics 2.0 Credits (45L 30T 0P)**

**Prerequisite:** None

**Learning Outcomes**

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

1. Demonstrate an understanding of mathematical and quantitative mathematical programming principles.


**Required Readings**

1.

2.

**Recommended Readings**

1.

2.

**MB 130 General Mathematics I 2.0 Credits (45L 30T)**

**Prerequisite:** None

**Learning Outcome**

Upon completion of the course, the student will be able to:

1. Analyse different scientific and engineering systems and events.


**Required Readings**
1. ..... 
2. ..... 

**Recommended Readings**

1. ..... 
2. ..... 

**DS 100 Theories and Principles of Development 2.0 Credits (45L 30S 0P)**

**Prerequisite:** None

**Learning Outcomes:**

Upon successful completion of the course, the student will be able to:
1. Describe and discuss principles and theories of development.
2. Demonstrate an understanding of the principles of political economy, science and technology, international relations and population and development.
3. Demonstrate an understanding on democracy and governance.

**Contents:** Principles and theories of development; stages in human development; modes of production and socio-economic formations; indices of development and their evaluation; theories of development and underdevelopment; development theory and current development practices; the policy failure theory and structural adjustment programmes (SAPs) Comparative Socio-economic development: The subject matter of political economy; bourgeois and Marxist conceptions of political economy; phases of capitalist development; capitalist contradictions; the rise and decline of socialism. Science, Technology and Development: The evolution of science and technology; science and technology in development; the impact of science and technology to industrial and agricultural development; the challenges of scientific and technological development in Third World countries; Democracy and Governance: African nationalism; political parties; independence and one/multi-party states; the rise of liberalism in the world; models of democracy; escalation of civil society organisations; local governments and the devolution of power to the grassroots; the constitution and the question of human rights; freedoms and the rule of law. International Relations : Introduction to international relations; theories of international relations; approaches and models of international relations; inter-regional organisations; conflicts and co-operation between states; Inter-African state relations; foreign policy; diplomacy. Population and Development I: Introduction to demography; population policies, programmes and implementation performances in Africa; mankind, environment and development.

**Seminars:** Will involve students presenting their papers for discussion on the above topics.

**Required Readings**
1. 
2. 

**Recommended Readings**
1. 
2. 

**SEMESTER 2**

**CORE COURSES**

**FBL 101 Forest Botany 2.0 Credits (45 L 0S 30 P)**

**Prerequisite:** None

**Learning Outcomes:**
Upon successful completion of this course, the student will be able to:
1. Demonstrate an understanding of the principles of general botany and plant taxonomy, including evolutionary trends, patterns of speciation, biogeography, and floral biology.
2. Identify and describe important plant families in forestry.
3. Apply the acquired knowledge and skills to identify and classify plants into their respective classes.

Contents: Introduction: The concept of botany; characteristics of gymnosperms and angiosperms. Plant morphology: The plant body; the root, stem and leaf. Plant anatomy: The plant cell, plant meristems, tissues and tissue systems. Reproduction in flowering plants: inflorescence, the flower, pollination and fertilization, embryo and seed development. The fruit: fruit and seed dispersal. Plant taxonomy: definitions and concepts used in plant taxonomy, the need for plant classification, historical development of plant taxonomy, the process of classification, sources of taxonomic information; principles of botanical nomenclature. Ways and means to classification and identification; the herbarium and the experimental garden; identification keys. Plant description: identification and description of important plant families in forestry and wildlife.

Practicals: Collection and study of various plant structures. Microscopy work to study the internal structure of the plant body. Collection and description of various plant families.

Required readings

Recommended readings

FBL 102 Principles of Ecology 2.0 Credits (45L 0S 30P)

Prerequisite: None

Learning Outcomes
Upon completion of the course, the student will be able to
1. Demonstrate the understanding of different ecological, physiological, and climatological processes and their relationship with environmental conservation
2. Demonstrate an understanding of different vegetation types, ecological processes and interrelationships of plant and animal communities with the environment.


Required Readings

Recommended Readings
Collins College Publishers California. 801 p.

FBL 103 Introduction to Soil Science. 1.5 Credits (30L 0S 30P)

Prerequisite: None

Learning Outcomes:

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the elementary aspects of soil formation;
2. Discuss basic soil physical chemical, biological and morphological properties;
3. Explain the behaviour of soils in managed and natural landscapes.

Contents: Principles of modern geology. The constitution of the earth's crust. Rock types and mineralogy.
Weathering of rocks. Soil development. Soil as a natural body. Soil profile, horizons and their nomenclature
with emphasis on forest soils. Physical and chemical properties of soil. Soil water – plant relationships. Soil
organisms. Soil organic matter formation and dynamics. Nutrient availability in forest soils. Use of soil
information on forest management. Impact of selected forest practices on soil properties. Impact of
environmental pollution on forest soil productivity.

Practicals: Soil formation. Determination of soil physical and chemical properties.

Required Readings
Saddle River, NJ 559 p.

Recommended Readings
2. Any web related literature

FMM 102 Introduction to Remote Sensing and GIS: 2.0 Credits (45L 0S 30P)

Prerequisite: None
Learning Outcomes:

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of principles of resource assessment and analysis using Remote Sensing and Geographical Information System (GIS).
2. Apply the acquired knowledge to assess forest resources in natural and plantations.
3. Use image processing and GIS software.


Practicals: Vegetation mapping using different GIS software

Required Readings

Recommended Readings
4. www.erdas.com

CIT 100 Fundamentals of Computing and Networks 2.0 Credits (30L 0S 60P)

Prerequisite: None

Learning Outcome
Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of the general concepts of microcomputers and their applications.


Required Readings

Recommended Readings

MB 101 Introductory Statistics 2.0 Credits (45 L 30T 0P)

Prerequisite: None

Learning Outcome:
Upon the completion of the course, the student will be:
1. Demonstrate an understanding of the basic concepts in statistics (theory and practice of statistics).

Contents: Descriptive statistics: definitions of relevant statistical terminologies; introduction to elementary statistics: types of data, methods of collection, sampling techniques, organisation, presentation of data; introduction to questionnaire design; statistical measures of central tendency and dispersion, measures of symmetry and skewness. Simple linear regression and correlation: introduction, fitting the model the least squares method. Coefficient of determination and correlation coefficients. Probability: elementary probability theory; introduction to probability distributions for discrete random variables e.g. Poisson, binomial, continuous probability distribution e.g. normal, descriptive methods for assessing normality, expected value of a random variable. Sampling distributions: sampling distributions e.g. student’s t, chi-square, F-distribution. Estimation theory: Point and interval estimation. Hypothesis testing: Elements of a test of hypothesis- null and alternative hypotheses, level of significance. Type I and II errors, one tailed (one sided) and two tailed (two sided) tests, test of hypothesis of a single population mean, comparing two population means, independent sampling, paired difference experiments. Introduction to statistical packages: e.g. SPSS, SAS. Introduction to non parametric statistics: sign tests, rank-sum tests and randomness tests.

Required Readings
1. 
2. 

Recommended Readings
1. 
2. 

ELECTIVE COURSES

FBL 104 Integrated Ecosystem Assessment 1.0 Credits (20L 0S 20P)

Prerequisite: None

Learning Outcomes:

Upon completion of this course, the student will be able to;
1. Demonstrate an understanding of the functioning of natural ecosystems
2. Identify ecosystems, and their products and services
3. Assess the products and services provided by different ecosystems in an integrated manner
4. Identify relevant human-ecosystem interrelationships and critical ecosystem
5. Planning for integrated ecosystem assessment and monitoring.

Practicals: Undertake integrated ecosystem assessment in a selected ecosystem.

Required Readings

Recommended Readings
2. Any other literature in journals and the web

FEN 102 Workshop Technologies and Design of Structures 2.0 Credits (30L 0S 60P)

Prerequisite: None

Learning Outcomes:
Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of the basic knowledge and skills in workshop technology: handling and maintenance of hand-tools, equipment and machine tools
2. Apply the acquired knowledge and skills to design equipment and structures used in forest operations.


Required Readings
Recommended Readings

DS 109 HIV/AIDS and Impact on Society 1.0 Credits (15L 30S 0P)

Prerequisite: None

Learning Outcomes:

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of HIV/AIDS.
2. Describe and explain the nature of HIV/AIDS, its socio-economic implications and interventions.


Required Readings
1.
2.

Recommended Readings
1.
2.
SEMESTER 3

CORE COURSES

FBL 201 Silviculture. 3.0 Credits (75L 0S 30P)

Pre-requisites: FBL 101, FBL 102, FBL 103 or HT 201

Learning Outcomes:

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of the knowledge on tree seeds, forest nurseries, stand establishment and management of natural forests and plantations.
2. Apply the learned knowledge to manage tree seed sources, forest nurseries, natural forest and plantations.

Contents: Seed and fruit formation, seed collection, processing, testing, treatment and storage. Forest nurseries: types, site selection, development, cultural techniques, grading, lifting, packing, transport, storage. Nursery records. Plantation establishment: site selection, choice of species, site preparation, spacing, planting/direct seeding. Forest fertilization. Weeding. Pruning and thinning operations. Maintaining long term site productivity. Silvicultural systems. Silviculture of individual tree species. Silvicultural management of forests (miombo woodlands, catchment forests and mangroves). Introduction to ecological zones of Tanzania: commercial species growing in each zone and the ecology of these species.

Practicals: Seed collection, processing, testing, treatment and storage. Nursery practices. Plantation pruning and thinning techniques.

Required Readings

Recommended Readings
2. Any other related literature in Journals and the web.

FBL 202 Tree Improvement 1.0 Credits (30L 0S 0P)

Prerequisite: None

Learning Outcomes

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of the basic concepts of genetics and biotechnology.
2. Apply the acquired knowledge to manage forest seed stands, seed orchards, species and provenance trials and plus trees.


Required Readings

**Recommended Readings**


**FEN 201 Logging and Ergonomics 2.0 Credits (45L 0S 30P)**

**Prerequisite:** FEN 101

**Learning Outcomes:**

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

1. Demonstrate an understanding of the basic knowledge and principles of planning and control of forest operations.
2. Demonstrate an understanding of the principles, methods, and machinery for logging operations.
3. Apply the learned knowledge to estimate logging productivity and costs of a logging system.
4. Demonstrate an understanding of the basic principles of ergonomics, occupational health and accident prevention.
5. Apply the knowledge to assess ergonomic problems in forestry operations and in designing work places that reduce energy expenditure by forest workers.

**Contents:** Terrain transport systems. Planning of logging operations. Reduced Impact Logging (RIL) and factors affecting logging productivity. Estimation of logging production costs: computation of machine and labour costs, machinery replacement time and cost evaluation of alternative projects. Introduction to principles of ergonomics, its contribution and importance to forest workers. Workplace design and physical working capacity. Occupational health hazards in forestry. Accidents and safety measures in Forestry.

**Practicals:** Log skidding. Preparation of logging plans. Cable yarding systems. Exercises in ergonomics: estimation of physical workload; anthropometry and use of ergonomic checklists.

**Required Readings**


**Recommended Readings**

3. Any web related literature.

**FEC 201 Resource Economics 2.0 Credits (45 L 0S 30P)**

**Prerequisite:** FEC 101 or AA 101

**Learning Outcomes:**

Upon completion of this course, the student will be able to;

1. Demonstrate an understanding of economic principles and their application to forest management and development.
2. Conduct evaluations of forest investments using learned financial tools, provide recommendations, and prepare sound summaries of findings.

Practicals: Preparation of accounts, budgets, administration procedures, cost accounting and record keeping in forestry investments.

Required Readings

Recommended Readings

FMM 202 Forestry Biometry 2.0 Credits (45L 0S 30P)

Prerequisite: MB 101

Learning Outcomes:

Upon successful completion of this course, the student will be able to:
1. Demonstrate an understanding of the basic principles of forest sampling and regression analysis.
2. Apply the acquired knowledge in forest resource assessment.

Contents: Principles of experimental design: layout; analysis of variance (ANOVA): one-way and two-way classifications e.g. completely randomized design, randomized complete block design, Latin square design, factorial experiments. Balanced and unbalanced data. Multiple comparisons. Sampling in forestry. Simple random sampling; stratified (random and systematic) sampling. Double sampling. Multi stage sampling.
Ratio estimator. Simple linear regression estimator and data transformations. Simple linear correlation, analysis of frequency data e.g. frequency tables.

Practicals: Setting experiments, data collection and analysis. Interpretation of experimental results.

Required Readings

Recommended Readings

ELECTIVE COURSES

**FEC 202 Introduction to Natural Resource and Environmental Economics 2.0 Credits (45 L, 30S)**

Pre-requisites: FEC 101

Learning Outcomes:

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the principles, procedures, methods and reasons for carrying out EIAs in forestry.
2. Apply the acquired knowledge for application of resource economic principles to environmental issues.


Required Readings
House.


**Recommended Readings**


**FBL 203 Wildlife Management and Beekeeping 2.0 Credits (60 L 0S 0P)**

**Prerequisite:** None

**Learning Outcomes:**

Upon completion of this course, the student will be able to;

1. Demonstrate an understanding of the basic principles of wildlife management and beekeeping;
2. Demonstrate an understanding of Tanzania wildlife and beekeeping policies.


**Required Readings**


**Recommended Readings**

2. Any related literature in the web.

**FBL 207 Ecological Impact Assessment and Environmental Planning 2.0 Credits (45L 0S 30P)**

**Prerequisite:** FBL 101, FBL 102, FBL 103

**Learning Outcomes:**
Upon completion of this course, the student will be able to;
1. Demonstrate an understanding of the theory and methodology for analysis and evaluation of impacts on the natural environment.
2. Predict the response of ecosystems to human activities.
3. Undertake ecological impact assessment in selected ecosystems.


Practicals: Designing and undertaking ecological impact assessment in selected areas/ecosystems of interest.

Required Reading

Recommended Readings
1. Any related literature in the web.

DS 200 Intervention Strategies of Development 2.0 Credits (45L 30S 0P)

Prerequisite: DS 100

Learning Outcomes:

Upon completion of this course, the student will be able to;
1. Demonstrate an understanding of the theory of rural development and gender
2. Demonstrate an understanding of the theory of rural industrialisation, social policy, and, population, natural resources, environment and development

Contents: Rural Development: Approaches to and strategies of rural development; colonial policy and practice; post-independence strategies and practices; poverty nature and alleviation: policies; food security; urban - rural dynamics. Industrialisation in Developing countries: Colonial industrial policy and practice; post-independence industrialisation policies and their achievements and problems; problems of nationalisation of major means of production; industrialisation in Africa after the fall of socialist ideology; possible solutions to problems of industrialisation in developing countries. Social policy and development: Social service policies and implementation: the impact of structural adjustment programmes (SAPs) on social services in developing countries; social services as merit goods; introduction of user fees (cost sharing) in social services. Gender and Development: The basic concepts of gender and development; the distinction between sex and gender; major schools of thought in gender and development; major trends in research and practice in gender (WID; WAD and GAD); projects targeting women, including credit schemes and educational health programmes for women; gender and environment. Population and Development II: Linkage between population, environment, resources and development; the impact of economic activities on environment; problems of environment and rural/urban development. Natural resources, environment and development: The political economy of natural resources; The concept of natural resources; pre-conditions of use of natural resources; the impact of development on the environment.

Seminars: Will involve students presenting their papers for discussion on the above topics.

Required Readings
Recommended Readings

**DS 201: Introduction to Gender and Development**

2.0 Credits (45 L 30 S 0 P)

**Prerequisite:** None

**Learning Outcomes:**

Upon completion of this course, the student will be able to:
1. Differentiate gender from sex and gender from women;
2. Describe "women in development," "women and development" and "gender and development";
3. Demonstrate an understanding of the concepts and approaches to design and implement projects targeting at benefitting women in developing countries;
4. Discuss contributions of women to economic development and environment management.
5. Discuss gender and sex roles.


**Required Readings**

**Recommended Readings**
SEMESTER 4

CORE COURSES

FBL 204 Soil Classification, Survey and Land Evaluation 1.0 Credit (20L 0S 20P)

Prerequisite: FBL 103

Learning Outcomes
Upon completion of this course, the student will be able to;
1. Demonstrate an understanding of principles of soil survey and classification and land evaluation techniques.
2. Classify soils and undertake soil evaluation for forest purposes.


Practical: Soil survey techniques.

Required Readings

Recommended Reading

FBL 205 Agroforestry 2.0 Credits (45L 0S 30P)

Prerequisite: None

Learning Outcomes:
Upon completion of this course, the student will be able to;
1. Demonstrate an understanding of agroforestry as a sustainable land use system.
2. Apply the acquired knowledge to design agroforestry systems and technologies.

Contents: Agroforestry: concepts, definitions, features, systems, technologies and practices. Quantitative and qualitative benefits of agroforestry including the edaphic, biological and agro-meteorological effects, nutrient relations, symbiotic relationships with mycorrhiza and rhizobia. Component interactions. Screening and evaluation of the woody perennials including species and provenance tests. Examples of agroforestry systems in the tropics and the world. Resources management systems evaluation and agroforestry intervention. Participatory Diagnosis and Design (D & D) methodology and other evaluation techniques.

Practicals: Excursions to see and differentiate between various resources management systems and possible use of agroforestry interventions for improvement. Carry out D & D survey practicals in selected villages.
Required Readings

Recommended Readings

FMM 205 Forest Resource Assessment 2.0 Credits (45L 0S 30P)

Prerequisite: FMM 102, MB 101

Learning Outcomes:

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of the principles of forest resources assessment.
2. Apply the acquired knowledge to conduct natural and plantation forest inventories.
3. Evaluate natural and plantation forest tree and stand parameters.


Excursion: Visit Forestry and Beekeeping Division headquarters inventory, survey and mapping sections.

Required Readings

Recommended Readings

FWU 201 Wood Properties and Utilization 2.0 Credits (45L 10S 20P)

Prerequisite: FWU 101 & FWU 102

Learning Outcomes:
Upon successful completion of this course, the student will be able to:
1. Demonstrate an understanding of properties and utilisation of wood and wood preservation.
2. Identify and assess wood properties of different tree species.
3. Explain wood processing and correlate this with wood properties.


Practicals: Determination of physical properties; shrinkage, swelling; wood density; mechanical properties, and calorific value of wood. Pressure impregnation of wood. Tour a wood preservation plant.

Required Readings

Recommended readings
1. BS 373 1957. Methods for testing small clear specimens.

FWU 202 Sawmilling 2.0 Credits (40L 10S 30P)

Prerequisite: None

Learning Outcomes:
Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of principles of efficient and effective running of sawmill operations: sawmilling timber seasoning.
2. Describe different sawmill types, timber seasoning and preservation methods.
Contents: Selection of sawmill location, sawmill layout, sawmill machinery and safety, sawing technology, production planning (master production schedule and raw material requirement planning), capacity planning, process and product quality, evaluation of sawmill performance, use of ICT in managing sawmills, timber drying and drying defects.

Practicals: Tour to sawmills and impregnation plants and laboratory work (setting timber drying schedules, lumber size analysis, use of simulation in sawmills).

Seminars: Presentation of group works on given subjects/articles.

Required Readings

Recommended readings

ELECTIVE COURSES

FWU 203 Non-Timber Forest Products 2.0 Credits (45L 15S 15P)

Prerequisite: None

Learning Outcomes:

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of different types of non-timber forest products and their sustainable utilization.
2. Identify and classify different types of non-timber forest products

Contents: Definition and importance of non-timber forest products (NTFP). Types and categories of NTFP. Indirect benefits of the forest: environmental services, watershed protection, protection of species and genetic diversity (biodiversity), climate regulation: cycling of carbon and other vital elements, soil protection and nutrient storage, recreation: ecotourism, hunting and fishing, spiritual, cultural heritage and aesthetic values. Constraints to develop NTFP. Value-addition, sustainable management of NTFP.

Practicals: Excursions to see different non-timber forest products.

Seminars: Presentation of papers by students on selected topics.

Required Readings


Recommended readings

**FBL 208 Climate Change 2.0 Credits (45L 0S 30P)**

**Prerequisite:** None

**Learning Outcome:**

Upon completion of the course, the student should be able to:
1. Demonstrate an understanding of general and scientific principles of climate change, climate change mitigation and adaptation

**Contents:** Definition of climate change. Climate change theory and science, Principles underlying climate change. Greenhouse gases: types, sources and sinks. Ecological, social and economic impacts of climate change: global and regional impacts on natural ecosystems, human health, agriculture, forestry, wildlife, biodiversity, fisheries, water resources, energy production and use. Climate change mitigation - the role of forestry and technology. Vulnerability and adaptation to climate change. The role of policies and decisions for sustainable development in climate change mitigation. International Conventions on Climate Change – the United Nations Framework Convention on Climate. Change (UNFCCC), UNFCCC mechanisms e.g. the Kyoto Protocol – CDM, REDD policy. Global Carbon Markets – CDM and Voluntary Markets.

**Practicals:** Designing Carbon Emission Mitigation Projects.

**Required Readings**

**Recommended Reading**
2. Any related literature in the WEB.
SEMESTER 5

CORE COURSES

FBL 301 Forest Protection 2.0 Credits (45L 0S 30P)

Prerequisite: FBL 201 or CS 102 or CS 101

Learning Outcomes:

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

1. Identify major forest pests and diseases and know their significance.
2. Demonstrate an understanding of tropical fire regimes, and how to manage fire in different forest ecosystems.
3. Integrate different insects and diseases management strategies for sustainable forest production.
4. Monitor and evaluate tree health and value.


Required Readings


Recommended Readings

1. Entomology and Pathology eBook: http://www.lulu.com/content/775213

FBL 302 Integrated Watershed Management 1.5 Credits (30L 0S 30P)

Prerequisites: FBL 103, FBL 204

Learning Outcome:

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of the principles of integrated watershed management for conservation of water resources, forest resources and bio-diversity.


**Practicals:** Measurements and analysis of hydrologic parameters, development of watershed management plans.

**Required Readings**

**Recommended Readings**
1. Any relevant literature in the WEB.

**FEN 301 Timber Transportation Planning and Roads 2.0 Credits (45L 0S 30P)**

**Prerequisites:** FEN 101 & FEN 201

**Learning Outcomes:**

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of principles of timber transportation and the concepts of operations research in forest operations.
2. Demonstrate an understanding of the basic principles of forest road planning, construction and maintenance.
3. Apply operations research methods in planning forest operations in logging.
4. Design, layout forest roads in the field.

**Contents:** Principles of forest road planning, construction and maintenance. Secondary log transport systems. Terminal operations and equipment. The application of operations research methods in planning and control of logging operations (Linear programming (LP), Transportation Problems (TP) and Critical Path Method (CPM)).

**Practicals:** Road planning and layout in the field. Exercises on application of Operations Research methods in solving logging problems.

**Required Readings**

Recommended Readings

**FEC 303 Resource Policy, Legislation and Land Use Economics 1.5 Credits (35L 20S 0P)**

**Prerequisite:** FEC 201

**Learning Outcomes:**

Upon successful completion of the course, the student will be able to:
1. Demonstrate an understanding of the natural resources policies, laws and land use economics.
2. Demonstrate an understanding of Tanzania laws relevant to conservation of natural resources


**Seminars:** Will involve presentation of case studies illustrating the process of policy formulation, legislation and law enforcement. Interpretation of international agreements, conventions and protocols.

**Required Readings**
5. The Land Act of 1999

**Recommended Readings**
2. Community Based Forest Management Guidelines of 2001

**FMM 301 Forest Management Planning I 2.0 Credits (45L 30S 0P)**
Learning Outcome:

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the principles of forest management planning


Seminars: Students presentations of selected topics.

Required Readings

Recommended Readings
2. Web based literature

FEC 304 Entrepreneurship skills and Development 2.0 Credits (45L 0S 30P)

Prerequisites: FEC 201

Learning Outcomes:

Upon the completion of this course, the student will be able to:
1. Generate business ideas, screen and evaluate feasible business plans for start-ups.
2. Undertake feasibility studies and write reports.


Required Readings

Recommended Readings
2. Any literature in the WEB.

**FSP 300 Special Project 1.0 Credits (0L 0S 60P)**

**Learning Outcomes:**

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of research methods and analytical methods, and different writing styles.
2. Apply the knowledge learned to plan, design a research study and write a research proposal.

**Contents:** Writing scientific reports theory: formulating objectives; literature review; methodology; data analysis, interpretation and discussion, conclusions and recommendations.

**Practical Output:** Research proposal.

**Required Reading**
1. Klem, G.S. 1980. Writing scientific reports; Lecture Notes, Division of Forestry, UDSM. 19 p.

**Recommended Readings**
2. Any related literature in the Web.

**ELECTIVE COURSES**

**FBL 303 Forest Soils Management 2.0 Credits (45L 0S 30P)**

**Prerequisite:** None

**Learning Outcome:**

Upon completion of this course the student will be able to
1. Demonstrate an understanding of principles of managing forest soils in order to have sustainable forest resources.

**Contents:** Soil/tree root interface. The interaction of the forest floor and soil organisms. Mineral soil properties in relation to forest productivity. Concept of forest nutrition in forest management. Soil fertility management in forest stands. Methods of forest nutrition assessment. Nutrient inventories in forest ecosystems. Major nutrient cycles. Response of forest trees and forest stands to inorganic fertilizers. Fate of inorganic fertilizers in forest soils. Organic fertilizers in low-input forest management. Biological nitrogen fixation in forest stands. The role of mycorrhiza in forest nutrition. Effect of different forest practices on soil properties. Use of soil information in intensive forest management and long term site productivity.

**Practicals:** Soil and tree nutrition assessment.

**Required Readings**

**Recommended Reading**

FBL 305 Biodiversity Measuring and Monitoring 2.0 Credits (45L 0S 30P)

Prerequisite: FBL 101, FBL 102

Learning Outcomes

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the different methods of identification, assessment, valuation and monitoring of the biodiversity of different taxa.
2. Demonstrate an understanding of the concept of biodiversity and the links to livelihoods and sustainable development.


Practicals: Field techniques in assessment and measuring of biodiversity of different taxa.

Required Readings

Recommended Readings
2. Any related literature in the WEB.

FEC 305 Introductory Marketing & Financial Accounting 25L 15S 0P. 1.0 Credit

Pre-requisites: FEC 101/AEA 104; FEC 201/AEA 201

Learning Outcomes:

Upon completion of the course, the student will be able to:
1. Demonstrate an understanding of the fundamental principles of marketing and financial accounting.
2. Apply the acquired knowledge to prepare basic accounts and interprets financial statements of an enterprise.


Seminars will involve presentation of different case studies illustrating the major principles of accounting and business administration.
Required readings

Recommended readings

DS 301 Issues in Gender and Development 2 Credits (45L 30 S O P)

Prerequisite: DS 201 Introduction to Gender and Development

Learning Outcome
Upon completion of this course, the student will be able to:
1. Plan and implement gender sensitive development programmes.


Required Readings

Recommended Readings
SEMESTER 6

CORE COURSES

FEC 305 Introductory Marketing and Financial Accounting 1.5 Credit (30L 30 S 0 P)

Prerequisites: FEC 101/AEA 104, FEC 201/AEA 201

Learning Outcomes:

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of fundamental principles of marketing and financial accounting.
2. Prepare basic accounts and interprets financial statements of an enterprise.


Required Readings

Recommended Reading

FEC 302 Extension Education in Nature Conservation 1.5 Credits (30L 15S 15P)

Prerequisite: None

Learning Outcomes:

Upon completion of this course, the student will be able to
1. Demonstrate an understanding of the principles of nature conservation
2. Undertake forest extension and nature conservation activities.


Practicals: Application of various extension teaching methods. PRA exercises and production of extension teaching materials.

Seminars: There will be seminars on selected topics.

Required Readings

**Recommended Readings**

1. Any related literature in the WEB

**FMM 302 Forest Management Planning II 3.0 Credits (30L 0S 120P)**

**Prerequisite:** FMM 301

**Learning Outcome:**
Upon completion of this course, the student will be able to
1. Prepare a forest management plan for a plantation and/or natural forests.

**Contents:** Biophysical and socio-economic data collection and analysis. Revision of an existing plan. Preparation of forest management plan 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).

**Practicals:** Preparation of a forest management plan.

**Required Readings**


**Recommended Readings**

2. Forest management and economics. [www.americanforestmanagement.com](http://www.americanforestmanagement.com)

**FWU 301 Wood Based Materials 2.0 Credits (45L 30S 0P)**

**Prerequisite:** FWU 101 and FWU 201

**Learning Outcomes:**

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of the principles of production, properties and utilisation of wood based materials.
2. Demonstrate an understanding of the different methods of modifying and joining solid wood.
3. Demonstrate an understanding of the properties of modified and joined solid wood for different applications.


**Seminars:** Students presentations of selected topics.

**Required Readings**


**Recommended Readings**


**SC 303 Job Market Preparation Skills 1.0 (20L 20S 0P)**

**Prerequisite:** None

**Learning Outcomes:**

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

1. Demonstrate an understanding of career opportunities and labour markets.
2. Demonstrate attitudes and practices that will enhance his/her employability.

**Contents:** Understanding career opportunities: career opportunities in Tanzania regionally and globally; the process of career management; career analysis and choice; preparation for career; personality traits for entering specific career (e.g. aggressiveness, motivation).

Empowerment and Labour Market: Current employment orientation in Tanzania; an overview of regionalisation/globalisation; conditions for regionalisation/globalisation; globalisation and employment patterns; how to cope with regionalisation/globalization.

Personal Preparation for Job Seeking: Job search strategy, Preparation of application letters (cover letters), Preparation of a Curriculum Vitae (CV); preparation for interviews, Mock interviews.

Job Retention: Corporate culture, Personal altitude, Job descriptions, Job characteristics.

Case studies: Successful/experienced human resource specialists will be invited to discuss various features of employment: Description of the career path and development of an individual, Work motivation of one to be (self) employed into a particular job, Motivation for starting, How he/she sought employment (e.g., when, how, timing, training), Job change and labour market interventions.

**Required Readings**

**Recommended Readings**
FSP 300 Special Project II 2.0 Credits (0L 0S 120P)

**Prerequisite:** Completion of Special Project I

**Learning Outcomes:**

Upon completion of this course, the student will be able to:
1. Demonstrate an understanding of principles of research design
2. Design a forest research project, conduct (collect, analyse data, interpret the results) and write a scientific special project report.
3. Conduct research in forestry and write a scientific paper for presentation in any international forum.

**Practical output:** A typed final special project research report.

**Required Readings**
1. Klem, G.S. 1982. Writing and presenting research reports. Text prepared for M.Sc (For) students. Division of Forestry, Morogoro. 52p

**Recommended Readings**
2. Any related literature in the Web.

**ELECTIVE COURSES**

FBL 304 Ecological Restoration 2.0 Credits (45L 0S 30P)

**Prerequisites:** FBL 201, FBL 205

**Learning Outcome**

Upon the completion of this course, the student will be able to:
1. Demonstrate an understanding of the principles and approaches to restoration and management of degraded landscapes


**Practicals:** Designing small-scale restoration projects – identification of degraded sites, nature of degradation, information acquisition and analysis.

**Required Readings**

**Recommended Readings**
2. Any related literature in the Web.
FEC 301 Principles of Organizational Management & Administration 2.0 Credits (45 L 15 S 15P)

Prerequisite: None

Learning Outcome

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

1. Demonstrate an understanding of the principles and theories of organizational management in relation to contemporary organization theory, organizational reforms and human resources management.


Excursion & Practical: Field excursions to governmental and non-governmental organizations.

Required Readings

Recommended Reading

DS 300: Planning and Management of Development 2.0 Credits (45L 30S 0P)

Prerequisites: DS 100 and DS 200

Learning Outcomes:

Upon completion of the course, the students will be able to:
1. Demonstrate an understanding of principles of planning and management of development projects.
2. Write social science research proposals;
3. Appraise, monitor and evaluate development projects.

Contents: Planning and management of development: Types and purposes of plans; principles of planning; the planning process; scope of management, elements/functions of management.

Social science research methods: Introduction to social science research; stages of a social science research; writing a social science research proposal; basics of scientific writing. Design and appraisal of development projects: The project concept and identification, project cycle; financial analysis including, IRR, compounding and discounting, NPV, benefit/cost ratio and PBP. Monitoring and evaluation of development projects: Interdependence between monitoring and evaluation; logical framework matrix including narrative summary, verifiable indicators, means of verification and important assumptions.

Seminars: Will involve students presenting their papers for discussion on the above topics.

Required Readings

Recommended Readings
FIELD PRACTICAL AND EXCURSION CONTENTS

The Faculty attaches great importance to practical training as an essential requirement of the degree programme. Students taking the B.Sc. (Forestry) are required to complete the following practical training programme:

Main Objective:
- To impart practical skills to students so that they complement theory with practical field experience

SEMMESTER 2

FIELD PRACTICALS

The duration for field practicals for the second semesters shall be 4 weeks and shall include the following:

1. Forest Ecology and Forest Botany (2 weeks)

Objective:
- To give students practical field experience in the identification and classification of vegetation types and species composition


2. Introduction to Surveying and Mapping (1.0 week)

Objective:
- To equip students with practical skills in surveying and mapping


3. Tree Cutting and Work Studies (1.0 Week)

Objectives:
- To impart to students practical skills in forest operations and maintenance techniques of handtools
- To impart to students skills of conducting work studies

Contents: Making hand tool handles, and performing saw maintenance. Directional tree cutting practices. Use and maintenance of crosscut saws and chainsaws. Work Studies of forest operations.

SEMMESTER 4

1. Silviculture, Tree Improvement and Agroforestry (2 weeks)

Objective:
- To equip students with practical skills in nursery practices, tree improvement and agroforestry practices

Contents: Silviculture: forest nursery practices. Site preparation for planting. Planting, weeding, pruning and thinning. Natural forest management. Tree improvement: Species and provenance trials, seed stands,
seed orchards, and progeny trials. Agroforestry: land use systems, problems, opportunities, interventions, productivity sustainability and adaptability.

2. **Wildlife Management and Beekeeping (1 week)**

Being an elective course, practicals shall be conducted only to students who have opted for the course.

**Objective:**
- To introduce students to practical skills in wildlife management and beekeeping practices.

**Contents:** Identification of wild animals including social organization and behaviour. Habitat classification. Estimation of animal numbers. Game controlled areas and national park management practices. Excursions to various beekeeping sites.

3. **Logging and Ergonomics (1 weeks)**

**Objectives:**
- To impart to students skills of carrying out ergonomic studies
- To impart to students skills of performing logging production and cost estimation

**Contents:** Logging time studies and production forecasting.

4. **Forest Resource Assessment (2 weeks)**

**Objective:**
- To equip students with practical skills in forest resource assessment, single tree and stand parameter measurements

**Contents:** Basic measurements of standing trees (diameter at breast height, height). Basal area and volume estimations. Log measurements. Volume table construction (local and standard). Growth and yield forecasting. Site classification. Planning and executing forest inventory in plantations and natural forests.

5. **Sawmilling, Timber Drying, Preservation and Wood Based Materials (1 Week)**

**Objective:**
- To equip students with hands on experience in sawmilling, timber drying, preservation and wood based materials


**SEMESTER 6**

1. **Forest Management Plan Field Work (3 weeks)**

**Objective:**
- To enable students collect data, analyse data, and formulate and write a forest management plan including a budget, plan of operations for a selected natural or plantation forest area

**Contents:** Preparation of a management plan of a forest area or analysis and revision of an existing management plan. Drafting a short-term budget and plan of action, including labour and equipment input and marketing plan.
2. Forest Roads (1 Week)

**Objective:**
- To equip students with practical skills in forest road design, location and layout

**Contents:** Forest road planning, location and layout and geometrical design.

3. Financial Accounting, Law Enforcement and Extension (1 week)

**Objective:**
- To equip students with practical skills in financial accounting, preparation of budgets, law enforcement, economics of ecotourism and extension education

**Contents:** Preparation of accounts budgets. Financial procedures, Accounting. Law enforcement and economics of ecotourism. Practical PRA sessions and Extension teaching methods. Excursions and field exercises in relevant firms/organizations and sites.
15. EXAMINATION SCHEME
All examinations will be of 3 hours duration. The schedule is as presented in Table 1.