UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

Department of Forest and Wood Science

Academic Programmes for 2013

Wood and Wood Product Science

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Contents:

This document is an extract from the Faculty of Agri-Sciences Calendar for 2013

Undergraduate Programmes

Bachelor's Programme

This undergraduate (bachelor's) programme leads to the Bachelor of Science in Forestry and Wood Sciences (BScFor) degree. Within the programme there are two fields of study, namely Forestry and Natural Resource Sciences, and Wood and Wood Products Sciences.

Admission Requirements

The general minimum undergraduate admission requirements of the Stellenbosch University (SU) are:

- A National Senior Certificate (NSC) or an IEB (Independent Examinations Board) school-leaving certificate as certified by Umalusi, with admission to bachelor's degree studies, which requires that a mark of at least 4 (50%) be obtained in each of four designated university entrance subjects.
- An average of at least 55% (excluding Life Orientation) for the NSC or IEB final examination.
- Write the compulsory National Benchmark Tests (NBTs).

For the field of study in Forestry and Natural Resource Science:

- Afrikaans or English (Home Language or First Additional Language) 4 (50%)
- Mathematics 4 (50%)
- Physical Sciences 4 (50%) OR
- Physical Sciences 3 (40%), and Life Sciences 4 (50%) or Agricultural Sciences 6 (70%)

For the field of study in Wood Products Science:

- Afrikaans or English (Home Language or First Additional Language) 4 (50%)
- Mathematics 6 (70%)
- Physical Sciences 5 (60%)

1. Wood and Wood Products Sciences (BScFor)

Wood and Wood Products Sciences modules are taken in the Faculties of AgriSciences, Science and Engineering from the first year of study. The Wood and Wood Products Sciences field of study includes a variety of modules concerned not only with the properties of wood as a material, but also with sawmilling, veneer manufacture, industrial furniture production and the construction and design of wood products. Wood and Wood Products Sciences modules are complemented by a series of engineering-based modules such as Industrial Ergonomics, Engineering Drawing, Engineering Mathematics, Industrial Management, Engineering Economics and Quality Assurance. Students in Wood and

Wood Products Sciences participate in practical sessions during vacations from their first to fourth year.

First Year (126 credits)
Compulsory Modules

Applied Mathematics B 124 (15) – Statics
Vectors; forces; sum of forces at a point; direction cosines and direction angles; components and component vectors; scalar products; vector products; moment of a force; force systems on rigid bodies; equivalent force systems; couples; line of action of the resultant; equilibrium of a rigid body; friction; center of mass; centroid; volumes; definite integration; moment of inertia of areas.

Home department: MATHEMATICAL SCIENCES

Communicaton 110 (0) - Communication
Language skills tests are written at the beginning of the first year. Students whose language skills are deficient in Afrikaans must take and pass Language Skills (Afrikaans) 176 and 276 in order to gain admission to third-year modules, while students whose language skills are deficient in English must take and pass Language Skills (English) 153 in order to gain admission to second-year modules.

Home department: ENGINEERING (ADMIN)

Computer Skills 171 (4) – Computer Skills
Study load: 26 lectures in total, presented as 2L per week for 13 weeks, distributed over the year
Introduction to general computer usage with the focus on the development of skills in using software for word processing, skills in using spreadsheets to perform calculations in creating meaningful graphs and and skills in using presentation software.
An optional test can be written during the first term to obtain exemption from the module.

The class mark will serve as the final mark.

Home department: MATHEMATICAL SCIENCES

Computer Programming 143 (12) – Computer Programming
Introduction to computer systems. Introduction to a programming environment; expressions; conditional statements; iterative structures; data types; static- and dynamic data structures; file handling; abstract data types; objects; structured programme design. Emphasis is placed on modular programming for engineering applications.

[Presented by the Department of Electrical and Electronic Engineering (75%) and by the Department of Mechanical and Mechatronic Engineering (25%)]
Examination

Home department: ELECTRIC AND ELECTRONIC ENGINEERING

Engineering Chemistry 123 (15) – Chemistry for Engineering Students
Basic concepts, units and dimensions, significant figures, conversion between unit systems; components of matter, atomic structure, the periodic table and chemical bonding; stoichiometry; chemical reactions (acid-base, precipitation and redox); properties of mixtures and solutions; chemical equilibrium; electrochemistry; gas laws, state functions and (T,P,V) relationships; thermodynamics and thermochemistry; introduction to basic engineering applications.

Examination
C Engineering Mathematics 115

Home department: PROCESS ENGINEERING

Engineering Drawings 123 (15) – Orthographic Drawings

Projection planes; points, lines and planes in space; trace points of lines and trace lines of planes; true lengths and true angles between lines and planes; true angles between planes; new projection planes; interpenetrations; developments; isometric projections. Works Drawings: 1st and 3rd angle projections; line alphabet; dimensioning; scale; three view drawing layout; auxiliary views; hidden detail; introduction to sections and cross-hatching. Introduction to 2D-CAD and 3D parametric CAD.

Examination

Home department: MECHANICAL AND MECHATRONIC ENGINEERING

Engineering Mathematics 115 (15) – introductory Differential and Integral Calculus

Mathematical induction and the binomial theorem; functions; limits and continuity; derivatives and rules of differentiation; applications of differentiation; the definite and indefinite integral; integration of simple functions.

Home department: MATHEMATICAL SCIENCES

Engineering Mathematics 145 (15) – Further Differential and Integral Calculus

Complex numbers; transcendental functions; integration techniques; improper integrals; conic sections; polar coordinates; partial derivatives; introduction to matrices and determinants.

P Engineering Mathematics 115

Home department: MATHEMATICAL SCIENCES

Forest Science 171 (12) - Introduction

Introduction to forest and wood products science, global forest resources, the forest and wood products industry locally and internationally, plantation systems; silvicultural systems and agroforestry; an introduction to, and terminology of, forestry engineering; forest management, forest economics and forest policy. Composition of wood, decay, preservation, processing, sawmill layout, wood defects, grading, wood products, pulp and paper. One week of practical work in September is to be completed satisfactorily as part of this module.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Strength of Materials 143 (15) – Introduction: Mechanics of Deformable Bodies

Introduction to mechanics, internal forces and stresses, deformations and strain, material response: material law, axially loaded elements, Torsie of elements with circular cross section, symmetrical bending of beams, thin walled pressure vessels. Introductory materials science: crystalline and amorphous solids, crystalline structures, defects and applications.

[Presented by the Department of Civil Engineering (80%) and by the Department of Mechanical and Mechatronic Engineering (20%)]

Examination

C Engineering Mathematics 115
C Applied Mathematics B 124

Home department: CIVIL ENGINEERING

Wood Product Science 1*44* (*16*) – Wood anatomy and identification

Introduction to tree growth; macroscopic and microscopic anatomy and identification of types of woods; descriptions of cell wall ultrastructure, wood variability; wood quality.

Home department: FOREST AND WOOD SCIENCE

Elective Modules
Conditional:

Language skills (Afrikaans) 176 (8) *
This year module is attended by students in their first year of studies, on a beginner's level, whom the Faculty of AgriSciences has identified as needing to further develop their Afrikaans language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integral manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)

Language Skills (English) 153 (8) *
This semester module is attended by students in their first year of study, at an intermediate level, whom the Faculty of AgriSciences has identified as needing to further develop their English language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integral manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)

Language Skills (Afrikaans) 163 (8) *
This semester module is attended by students in their first year of studies, on an advanced level, whom the Faculty of AgriSciences has identified as needing to further develop their Afrikaans language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integral manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)

**Language Skills modules are only relevant to students who, as a result of the outcome of the language test, Communication 110, have shown that they need help in either Afrikaans or English; students who performed satisfactorily in both Afrikaans and English are exempt from the Language Skills modules. Language skills (Afrikaans) 176 is a year module presented at beginners level for students who want to further develop their Afrikaans language skills. Language skills (Afrikaans) 163 is a semester module presented at an advance level in the second semester for students who want to improve their Afrikaans language skills. Language skills (English) 153 is a semester module presented at intermediary level in the second semester for students who want to improve their English language skills.*

Second Year (129 credits)

Compulsory Modules

Engineering Economy 212 (8) – Engineering Economics
Introduction to accounting: financing, tax and growth of a business. Income, balance sheet and cash flow statements. Financial ratios.

Examination

Home department: INDUSTRIAL ENGINEERING

Engineering Mathematics 214 (15) – Differential Equations and Linear Algebra
Ordinary differential equations of first order; linear differential equations of higher orders; Laplace transforms and applications. Matrices: linear independence, rank, eigenvalues. Laplace transforms and applications.

PP Engineering Mathematics 115 or 145
P Engineering Mathematics 145

Home department: MATHEMATICAL SCIENCES

Forest Science 171 (8) – Introduction (until 2013)

Introduction to forest science, global forest resources, the forest industry locally and internationally, and plantation systems; silvicultural systems and agroforestry; introduction to, and terminology of, forest engineering; forest management, forest economics and forest policy. One week of practical work in September is to be satisfactorily completed as part of this module.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Wood Products Sciences students must take Forest Science 171 in their second year of study, considering that it was not included in their first year of study in 2012.

Forest Science 274 (16) – Forest Botany

Taxonomy; commercially important taxa of forest tree species; tree morphology terminology; description of the diagnostic characteristics of commercially important forest tree species that are useful to identify trees with the aid of keys; silvicultural characteristics of the most important commercial species of the genera *Pinus*, *Eucalyptus* and *Acacia*, as well as selected tropical and temperate hardwood and softwood species.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Industrial Programming 244 (15) – Industrial programming

Use of spreadsheets; data manipulation, numerical methods, graphs, basic financial calculations, planning and analysis of scenarios and optimising; *Visual Basic for Applications* for spreadsheet use. Basic computer communication; theory and application of forecasting with emphasis on spreadsheet applications.

Continuous
P Engineering Mathematics 214

Home department: INDUSTRIAL ENGINEERING

Production Management 212 (8) – Production and Operations Management

Introduction to the operational environment, strategy and productivity, process flow analysis, service processes, lean operations management, facility location, scheduling techniques.

Examination

Home department: INDUSTRIAL ENGINEERING

Professional Communication 113 (12) – Professional Communication

Effective communication with various target audiences with specific objectives in mind; particular focus on the planning and writing of a technical report; other document types in the professional environment such as proposals and correspondence; text skills, such as coherence, appropriate style and text structure; appropriate referencing methods; introduction to oral presentation skills; written communication in teams.

Project

Home department: ENGINEERING (ADMIN)

Wood Product Science 234 (16) – Wood chemistry and preservation

Analysis of beams, columns and axially loaded elements. Elastic behaviour and deformation of materials. Design and scaling. Timber as a structural material: Influence of moisture, long-term load, pressure treatment, load sharing. Strength grading of timber. The SABS timber design code.

P Strength of Materials 143

Home department: FOREST AND WOOD SCIENCE

Wood Product Science 244 (16) – Mechanics of wood products

Introduction to the chemistry relating to wood and wood products. Chemical composition (lignin, cellulose, hemicelluloses, extractives) and chemical utilisation of wood. Biological degradation of lignocellulosics. Wood preservatives and pressure impregnation procedures. Environmental aspects of preservatives and treated products.

C Engineering Chemistry 123 or Chemistry 154

Home department: FOREST AND WOOD SCIENCE

Wood Product Science 264 (16) – Wood physics and drying
The physics of water in and around wood, moisture content, the concept of humidity, equilibrium moisture content density, sorption, shrinkage and swelling of wood; electrical, thermal and acoustical properties of wood. The why and how of wood drying, description of various methods, kiln types and schedules, drying defects.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Elective Modules
Conditional:

Language Skills (Afrikaans) 276 (12)
This year module is attended by students in their second year of studies, on a post-beginner's level, whom the Faculty of AgriSciences has identified as needing to further develop their Afrikaans language skills. The focus is on developing the student's generic language and thinking skills. All four language skills (speaking, listening, reading and writing) are developed in an integral manner, although emphasis is placed on academic reading and writing skills.

Home department: ENGINEERING (ADMIN)

**Language Skills (Afrikaans) 276 is only relevant to students who completed Language Skills (Afrikaans) 176.*

Third Year (124 credits)
Compulsory Modules

Engineering Statistics 314 (15) – Engineering Statistics
Applied probability theory; applications based on discrete and continuous random variables and their probability distributions, such as the normal, gamma, lognormal, Log Pearson type 3 (LP3), Gumbel (EV1) distributions; queuing processes; joint distributions; descriptive statistics and graphical presentations; moments, averages, median and standard deviations; moment generating functions; variation coefficient; skewness coefficient; Peaking coefficient; sampling theory; point and interval estimation; hypothesis testing; μ2 and K-S testing; simple linear and non linear regression and correlation analyses; introduction to multiple linear regression; introduction to analysis of variance and experimental design.

Examination
PP Engineering Mathematics 115, 145

Home department: Statistics and Actuarial Science

Forest Science 354 (16) – Forest growth and yield science
Theory of tree growth, site evaluation; development of site index equations; growing stock and stand density; prediction of current yield; prediction of future yield, growth modelling.
One week of practical work in June to be completed satisfactorily as part of this module.

Subject to continuous assessment.
P Forest Science 254

Home department: FOREST AND WOOD SCIENCE

Forest Science 355 (16) – Forest finance, economics and marketing
Forestry finance; financial analysis and feasibility studies of forestry projects; valuation of land and plantations; forest resource economics; basic principles of forest product marketing; international forestry marketing; timber and non-timber forestry products; forestry business environment.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Industrial Management 354 (15) – Industrial management

Portfolio theory and portfolio management; the relationship between risk and return; the efficient market hypothesis; valuation and risk of fixed income securities; evaluation of share investments; properties of derivative instruments; derivative strategies; valuation of options and futures; measurement and evaluation of portfolio returns.

P Business Management 142
P Statistical Methods 176 or P Statistics 186 or P Probability Theory and Statistics 114 or 144

Home department: BUSINESS MANAGEMENT

Operations Research (Eng) 345 (15) –

The systems approach to problem solving; problems leading to linear programming, network, integer and non-linear programming models; algorithms for solving such models; tasks, including exercises with computer packages.

Examination
P Engineering Mathematics 214

Home department: INDUSTRIAL ENGINEERING

Quality Assurance 344 (15) – Quality Assurance

Definition of quality, methods and techniques of quality assurance, statistical process design, sampling. Principles of robust design. Formulation of measures of system performance and quality. Identification of quality noise factors. Formulation and implementation of techniques to reduce effects of noise. Synthesis and selection of design concepts for robustness.

Continuous
P Engineering Statistics 314

Home department: INDUSTRIAL ENGINEERING

Wood Product Science 334 (16) – Design and construction of wood products

Introduction to wood products design; theory, ergonomics and product development; technical documentation and technical drawings used in the woodworking industry.

Home department: FOREST AND WOOD SCIENCE

Wood Product Science 335 (16) – Wood adhesives and composite production

Adhesion; types and properties of adhesives. The manufacturing of particleboard, veneer, plywood, fibreboard, wood cement and wood plastic composites, laminated wood and paper. Processing methods, physical and chemical properties of the products and analysis methods.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Fourth Year (132 credits)

Compulsory Modules

Business Design 444 (15) – Enterprise Design

Systems engineering, approaches towards enterprise modelling and supply chain management. Concepts like knowledge management, innovation, and different life cycles will be applied through the complete design of an enterprise within formal information, manufacturing and organisational architectures.

Examination
Final-year enrolment

Home department: INDUSTRIAL ENGINEERING

Environmental Engineering 442 (8) – Engineering and the Environment

for 7 weeks.

Ethics; ECSA Code of Conduct for Professional Engineers; energy and the environment; ecological systems and energy flow, ethical elements of environmental management and socio-ecological factors in decision making, environmental pollution, impact of engineering projects on the environment, environmental impact studies; water and air pollution; pollution standards and regulations, ISO 14000 certification; world-atmospheric changes (damage to ozone layer) and the greenhouse effect and impact on renewable energy sources, nuclear power and nuclear waste. Analysis, measurement and control of soil, water and air pollution caused by engineering systems, water consumption and re-use. (7 weeks)

[Presented by the Department of Process Engineering (50%) and by the Department of Civil Engineering (50%)]

Examination

Prerequisite for Engineering students: All the prescribed modules for the first 2 years of the relevant BEng programme

Prerequisite for AgriSciences students: All the modules for the first 2 years of the Wood Products Science programme

Home department: PROCESS ENGINEERING

Industrial Ergonomics 414 (15) – Industrial Ergonomics

Operation analysis; work standards; reduction of setup times; training practices; remuneration; anthropometry; workstation and tool design; man/machine interfaces; work physiology and biomechanics; the work environment, cognitive work; shift work; aspects of occupational health and safety.

Examination

Home department: INDUSTRIAL ENGINEERING

Operations Research (Eng) 415 (15) –

Analysis of problems leading to deterministic and stochastic dynamic programming models; Markov chains and waiting-line models; techniques for solving such models; decisions under uncertainty; Bayes' theorem; multi-criteria decision-making.

Examination
P Engineering Statistics 314

Home department: INDUSTRIAL ENGINEERING

Quality Management 444 (15) – Quality Management

Definition of reliability and maintainability; reliability management; methods and techniques for reliability modelling; allocation; prediction and maintainability assurance; fault tree analysis; failure mode analysis; quality management; history and background; ISO 9000; total quality management; leadership, 6-sigma; cost considerations; quality audits; experimental design with Statistica.

Examination
P Engineering Statistics 314

Home department: INDUSTRIAL ENGINEERING

Wood Product Science 414 (16) – Wood products manufacturing I

Basic wood products manufacturing with a focus on the primary manufacturing sector. Background to and economics of wood products manufacturing. Production of solid wood (industrial or furniture wood) in sawmills and further processing in secondary industries. Processing equipment; introduction to computer-based equipment.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Wood Product Science 434 (16) – Wood products manufacturing II

The manufacturing of secondary wood products such as furniture and joinery products. Fundamental principles, wood cutting principles, manufacturing methodologies (such as nested-based manufacturing). Material preparation, material machining, CNC technologies, case studies of manufacturers, woodworking machinery.

Home department: FOREST AND WOOD SCIENCE

Wood Product Science 444 (16) – Bio-energy

Conversion of biomass into energy, processing methods, determination of calorific values and other properties, comparison of different biofuels, environmental aspects, emissions and emissions reduction, introduction to life cycle analysis for biofuels and bio-energy.

Subject to continuous assessment.

Home department: FOREST AND WOOD SCIENCE

Wood Product Science 464 (16) – Industrial wood finishing

Composition and properties of various coatings and finishes used in the wood products industry. Surface preparation, coating application technologies (spraying, dipping, roller coating, etc.), curing technologies of finishes, testing of coatings and dry films, environmental aspects of finishing.

Home department: FOREST AND WOOD SCIENCE

Compulsory Practical Vacation Work

All students for whom practical work is prescribed, must submit, in accordance with the instructions, reports of their practical work to the satisfaction of the lecturers concerned. Students must themselves bear any expenses incurred in respect of demonstrations and practical work. In addition to the above, students may also be expected to carry out other practical work during vacations.

Please note: **The University is not liable for any injury sustained during practical work or tours or for any claims arising from such injuries.**

Wood and Wood Products Sciences Students

All students taking the BScFor (Wood and Wood Products Sciences) programme must complete two periods of practical vacation work and submit satisfactory reports to the Department Forest and Wood Science before the degree can be awarded. The compulsory practical work consists of the following:
Three weeks of practical work at Furntech, Cape Town, in the December/January holidays (end of the first year or beginning of second year). A satisfactory written report must be submitted to the Department within two weeks after completion of the work.
One week chainsaw course in the September holiday of the second year. A satisfactory certificate must be presented to the Department.

Application process:

Prospective students can visit the following links for applications:

- Undergraduate studies: http://www.maties.com/
- Postgraduate studies: http://www0.sun.ac.za/pgstudies/

For more information on the programmes offered at the Department of Forest and Wood Science, please visit the following links:

- Calendar 2013: http://www.sun.ac.za/university/jaarboek/
- Website of department: http://www.sun.ac.za/forestry