Bachelor of Forest Science

Second year subjects

211-203 Forest Soils

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Chris Weston

Contact: 24 hours of lectures, 36 hours of field and laboratory based practical classes *(Semester 2).*

Description: On completion of this subject students should understand the attributes evident in a soil profile which contribute to the behaviour of the soil; understand soil groupings based on profile characteristics; understand soil composition and the physical processes that occur in soil; understand the important biological reactions which occur in soil and how they contribute to the chemical fertility of soil; and understand how a soil may be managed to conserve its structural and chemical attributes to benefit plant growth. Subject content includes components and properties of soils; soil organic matter and soil nitrogen, soil biota and decomposition reactions; phosphorus sorption and availability; reactions at surfaces, cation and anion exchange, pH, particle interaction and swelling; fertiliser chemistry and plant trace elements in soil; and carbon and nutrient cycling in forests.

Assessment: A 3-hour written examination. Marks will also be given for assignments and practical work.

Recommended texts: R E White, *Principles and Practice of Soil Science. 3rd ed*, Blackwell Science, 1997. • P M Attiwill, & G W Leeper, *Forest Soils & Nutrient Cycles*, MUP.

211-212 Forest Mensuration and Surveying

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Ian Wild

Prerequisites: 620-160 Experimental Design and Data Analysis or equivalent

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 1).*

Description: The subject teaches basic skills to carry out forest surveying and measurement. The content of the subject includes an introduction to basic surveying and mensuration equipment (including GPS systems), traversing, levelling, and the measurement and computation of forest stand and tree parameters (perimeters, areas, tree diameters and heights, bark, crown and stand heights). Students completing the subject should be able to measure and assess forest areas, apply standard statistical techniques of sampling (random, stratified random, systematic and probability-proportional-to-size) for both resource inventory and experimental research, account for slope and roads or tracks, and process the surveying and inventory data to map and estimate standing volumes and yields. The subject will also cover site productivity, stand density, stem geometry, stem analysis, and defect in trees and logs.

Assessment: One 3-hour written examination at the end of the semester. Practical assignments throughout the semester.

211-215 Forest Ecology

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Chris Weston

Corequisites: 211-254 Field Studies and Dendrology

Contact: 24 hours of lectures and 36 hours of practical work including field exercises throughout both semesters and a Semester 2 excursion *(Year long).*

Description: This subject aims to provide a sound theoretical and practical knowledge of interactions among the physical, chemical and biological components of forest ecosystems with particular reference to Australian forests. The content includes structure and floristics of Australian forest communities; systematics and taxonomy of major plant elements of Australian forests; the ecology of natural disturbance and succession in Australian forests; theories of forest community structure, dynamics and diversity; field sampling and data acquisition; and numerical analysis of forest flora and fauna data.

Assessment: Two 2-hour written examinations, one oral presentation and up to four practical assignments

Prescribed texts: R H Groves, *Australian Vegetation*, Cambridge University Press, 1981. • J P Kimmins, *Forest Ecology: A Foundation for Sustainable Management*, Prentice Hall, 1997. • I Clarke & H Lee, *Name that Flower*, MUP, 1987.

211-252 Forest Inventory and GIS

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Ian Wild

Prerequisites: 211-212 Forest Mensuration and Surveying

Contact: 24 hours lectures, 36 hours practical work *(Semester 2).*

Description: On completion of this subject students should understand the role of inventories in forest planning. Students will learn to design, implement and manage inventories for multiple forest use (multi-stage, multi-phase and variable probability); the basic terminology, principles and characteristics of remote sensing; the use of Geographic Information Systems (GIS) for interpreting, measuring and mapping natural resources; and should understand how to apply advanced statistical sampling theories and project management tools in the design and conduct of inventories using either remote sensing and/or ground inventory methods. Students will study photographic and digital remote sensing, and both vector and raster GIS, thematic map overlay, spatial modelling and its use in forest management and planning, and the technical and managerial requirements for introducing remote sensing and GIS technologies. Methods and processes for generating, evaluating and selecting alternative plans for the management of the resources (timber and others) will be introduced.

Assessment: One 3-hour written examination at the end of semester and practical assignments throughout the semester.

211-254 Field Studies & Dendrology

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Ron Hateley

Prerequisites: 600-141 Biology of Cells and Organisms, 600-142 Genetics and the Evolution of Life

Contact: 12 hours lectures, and 20 field days involving field-based activities, most of which are hands-on. An excursion of up to 10 days duration will involve bush camping *(Year long).*

Description: On completion of this subject, students should have a better understanding of the integrated nature of forestry and land management in Australia; have basic skills including first aid, bush survival and dealing with emergencies; care, use and maintenance of hand-tools and chain-saws; have an appreciation of the setting in which field activities are conducted through exposure to forest work gangs, experienced field supervisors and Landcare groups; understand the use of computers in forestry; have an ability to use keen observation to interpret and analyse field observations; and have basic skills in fire survival and fire suppression methods.

Students should also be:

- competent in the identification, taxonomy and morphology of eucalypts, conifers, deciduous hardwoods and important elements of the Australian flora; and
- aware of the distribution, characteristics and uses of many Australian forest species.

Assessment: One 2-hour written examination. Attendance and participation in all field days and excursions, and assessment of competencies included in the subject. A workbook detailing the activities and exercises will be graded.

Prescribed texts: L Costermans, *Native Trees and Shrubs of South-Eastern Australia*, Rigby, 1981.

211-256 Tree Physiology

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Steve Read

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 1).*

Description: On completion of this subject, students should have an understanding of the variety of molecules that are present in trees, the principles of metabolism and energy transfer, and the physiological processes that determine the growth and productivity of trees. The course thus covers the macromolecules of plant cells; membranes and permeability; water relations, transpiration and stomatal physiology; ion uptake, mineral nutrition and mineral deficiencies; photosynthesis, photorespiration, respiration and energy transfer; biomass assimilation and translocation; and cell wall structure and lignin biosynthesis. Practical classes provide an introduction to greenhouse techniques and methods for plant handling and measurement. The integration of these basic biochemical and physiological processes into the life cycle of a tree, and the effects of genetics and the environment, are covered in 211-302 Tree Development.

Assessment: One 3-hour written examination at the end of the semester. Marks will also be given for assignments and practical work.

Prescribed texts: L Taiz and E Zeigler, *Plant Physiology, 2nd ed.*, Sinauer Associates Inc., 1998.

211-257 Economics and Financial Management

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Brian Davidson

Contact: 24 hours of lectures and 36 hours of tutorials, seminars and practicals in total *(Semester 1).*

Description: On completion of this subject, students should be familiar with the fundamental concepts of microeconomics, macroeconomics and their application to forestry and resource management; understand management

structures, basic account keeping financial and business management; be able to prepare a budget; and be able to apply simple economic analyses to forestry problems. Microeconomic theory includes supply and demand; utility theory and indifference curves; marginal analysis, the theory of the firm; the economics of production; price theory; competition. Macroeconomics includes national accounting; government policy; foreign exchange and international markets. Forestry and natural resource applications of economic theory include land ren,: interest computations, internal rate of return, present net worth, and analysis of rotation lengths. Business management component included ownership of enterprises, accounting cycle, double entry systems, program management, purchasing systems and budgeting and financial control.

Assessment: Three hours of written examination. Practical assignments, projects and reports may also be given throughout the course.

Prescribed texts: W J Baumol,, A S Blinder, A W Gunther & J R L Hicks, *Economics, Principles & Policy,* 2nd ed., Harcourt, Brace & Jovanich, 1992.

211-258 Wood Science

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Branko Hermescec

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 2).*

Description: On completion of this subject, students should be able to describe the macroscopic and microscopic features of hardwood and softwood xylem and phloem; comprehend information regarding variability of wood; understand methods used to identify timbers; describe the processes of wood and bark formation including cell differentiation, cell wall layering and modifications; understand the effects of cell wall organisation on some wood properties; have a basic understanding of the chemical composition and properties of wood; understand anatomical, chemical and physical characteristics associated with heartwood formation, growth stresses, reaction wood and natural features in wood; and comprehend the meaning of a number of wood physical properties and basic wood-moisture relationships. Subject content includes: wood and bark structure, anatomy and ultrastructure; macroscopic and microscopic features of wood; tree growth and wood quality, woody cell development, reaction wood, variability of wood; identification methods, growth rings and measurement of wood properties; wood chemistry, extractives, collapse; chemical utilisation of wood; engineering properties of wood; and natural characteristics, and physical properties of wood.

Half the practical time will be devoted to wood anatomy, and half to wood physics, chemistry and adhesives.

Assessment: One 3-hour written examination at the end of the semester. Practical tests may be given throughout the semester. Marks may also be given for assignments, projects and practical work.

Prescribed texts: J G Haygreen & J L Bowyer, *Forest Products and Wood Science: an Introduction,* 2nd edition, Iowa State University Press.

Third year subjects

Compulsory subjects

211-316 Forest Products

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Branko Hermescec

Prerequisites: 211-258 Wood Science

Contact: 24 hours of lectures and 36 hours of practical work, including several site visits *(Semester 1).*

Description: On completion of this subject, students should be able to write a technical report which meets a minimum standard in terms of presentation and content; understand the basic principles, mechanisms, industry structure and issues involved in timber gluing, wood preservation, timber drying, and chemical modification of wood; understand the sawmilling process, types of products produced and timber grading; describe the basic manufacturing steps and industry structure for solid and composite wood products and pulp and paper products; and analyse, synthesise and evaluate information concerning wood and fibre properties, product properties, process and technology limitations, and basic market forces with regard to the use of forests for timber utilisation. Subject content includes wood adhesives, drying and preservation; sawmilling, timber grading, further processing and value-adding; raw material requirements, properties and markets; and production of solid and composite wood products, pulp and paper and alternative forest products.

Assessment: One 3-hour written examination at the end of the semester, plus assessment of project work.

211-333 Native Forest Silviculture

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Ron Hateley

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 1).*

Description: On completion of this subject, students should have an appreciation of a range of silvicultural techniques; understand the constraints placed on each by ecological and social factors; understand regeneration processes in Australian forests and woodlands; understand the significance of diseases in forestry, and strategies for their management; and be able to plan and supervise silvicultural operations involving regeneration and tending of a range of Australian forest types. The course includes the role of silviculture and its relationship to forest policy, internationally and within Australia; sources of regeneration, flowering and seed production, seedbed requirements, factors affecting seedling establishment and monitoring of seedling regeneration; regeneration biology of selected Australian forest types, and regeneration methods or silvicultural systems appropriate to them; and stand tending methods and their relevance to various Australian forest types.

Assessment: One 3-hour written examination at the end of the semester; assignments and reports on practical work may be required.

211-334 Plantation Silviculture

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Chris Weston

Contact: 24 hours of lectures and 36 hours of field based practical classes which includes a 2-day field trip to a major plantation district *(Semester 2).*

Description: On completion of this subject, students should understand the factors associated with the propagation of plants for plantation programs; understand the process of species and site selection for a plantation program; understand the factors that limit site productivity and how they can be ameliorated through site preparation, fertiliser addition, control of inter and intra specific competition; understand the regulation and quality of yield through espacement, thinning and pruning; understand the processes of tree improvement through tree breeding programs; and appreciate the changing political and environmental base of plantation programs in each Australian state.

Assessment: One 3-hour written examination at the end of semester, one major assignment of not more than 3,500 words and up to three short reports.

211-354 Timber Management & Harvesting

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Leon Bren

Pre or Corequisites: 211-212 Forest Surveying and Mensuration, 211-252 Forest Inventory and GIS

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 2).*

Description: On completion of the subject, students should understand the concepts and methods for managing forest for sustainable timber production. They will learn about different methods and criteria for evaluating alternative management strategies, become familiar with basic methods of timber harvesting and will required to prepare simple forest management and harvesting plans. Students will also learn about the role of forest management information systems (including GIS) in decision-making. Students will study wood production in even-aged and uneven-aged forests, growth and yield prediction, yield regulation and be introduced to computer modelling in decision support systems. They will be introduced to various modern harvesting technologies and the management of their use in timber harvesting operations. Students will also be introduced to legislation and regulations concerning the control of harvesting operations (including the Code of Forest Practice), and to environmental, scheduling and management issues associated with forest harvesting. Practical work will include the use of GIS to prepare and monitor a harvesting schedule.

Assessment: One 3-hour written examination and practical work as directed.

211-358 Forest Entomology and Pathology

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Peter Ades

Prerequisites: 211-215 Forest Ecology

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 2).*

Description: On completion of this subject, students should have an understanding of: the biology of forest pathogens and insect pests; the effects of these organisms on production forestry; and the extent to which forest management practices can increase or reduce problems; and what measures can be taken to avoid, reduce or overcome damage caused by pests and diseases.

Forest entomology covers classification, anatomy, morphology, biology, frequency of distribution, and control and importance of insects in forestry. Forest pathology covers the significance of fungal diseases in forestry, the principal groups of pathogens, host-parasite relationships, epidemiology and disease control.

Assessment: One 3-hour written examination, and up to four practical assignments.

211-359 Fire Ecology & Management

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Ken Tolhurst

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 1).*

Description: On completing this subject, students should be competent in basic fire-weather forecasting; understand the principles of fire behaviour and the bases of fire danger ratings; understand the principles of fire protection; have skills in planning and selecting appropriate fire-protection strategies; understand the role and impact of fire in forest ecosystems; and have a knowledge of fire law.

Topics to be covered will include fire history in Australia, combustion theory, forest fire behaviour prediction, fuel hazard assessment, fire weather observation and forecasting, fire danger rating systems, ecological effects of fire in forests, prescribed burning techniques, fire planning, fire suppression strategies and techniques, and fire law and fire management principles.

Assessment: A 3-hour written examination at the end of the semester and practical assignments throughout the semester.

211-363 Field Studies 2

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Ron Hateley

Contact: 20 field days and one excursion of up to 10 days *(Year long).*

Description: On completion of this subject, students should have a detailed understanding of the integrated nature of forestry and land management in Australia; be able to contrast and compare issues and practices; and have skills in communication, conflict resolution, supervision, dealing with the media and personnel management. The course includes 20 field days, most conducted in the field, including one week involving the harvesting of trees from a coupe and the processing of logs in a sawmill. Small projects involve students managing local areas of land for specified purposes. An excursion of up to 10 days will examine the forestry and land management issues of regions too remote to be serviced by the field days.

Assessment: Attendance and participation in the field days and excursions, and assessment of all competencies included in the subject. A workbook detailing the activities and exercises will be graded.

Fourth year subjects

Compulsory subjects

211-442 Forestry Work Experience#

HECS-band: 2

Coordinator: Mr Mark Stewart

Contact: At least 16 weeks practical work in forestry throughout the BForSc course *(Year long).*

Description: This subject involves practical work experience, or a series of such experiences, during employment with organisations approved by the School of Forestry. Advice on the suitability of different types of work experience, and assistance with finding these, is available from the School. Academic reports will be written on the work experience undertaken, in which students comment on the major tasks performed, discuss the roles of professional forest scientists and managers in relation to those tasks, and demonstrate how those tasks relate to the responsibilities, policies, and objectives of the employing organisations. The course will enable graduates to demonstrate confidence in applying their forestry training to new work challenges.

Assessment: Reports of 500 words should be submitted after each major experience or group of minor experiences. These reports will be marked to pass level. Degrees are not conferred until the practical work experience requirement is satisfied.

211-448 Environmental Mgt Systems & Policy

Credit points: 12.5 **HECS-band:** 2

Coordinator: Professor Ian Ferguson

Contact: Equivalent to 24 hours of lectures and 36 hours of practical work *(Semester 2).*

Description: On completion of this subject students should have an understanding of the principles and policies relating to environmental management systems for sustainable land use; including the legal and institutional processes, and the roles and relationships of land use planning, management plans and codes of practice. Covered in the subject are principles of sustainable land use and environmental management systems; standards and certification systems, including ISO 14001 and FSC systems; hierarchy of planning and management processes; land use planning; management plans and planning techniques for multiple uses; codes of practice; implementation; and review. The second half of the subject on policy will comprise lectures by visiting experts and reading assignments on policy.

Assessment: A 3-hour written examination at the end of the semester and up to two practical reports each up to 2000 words contributing to the final assessment.

212-416 Resource Economics & Management

See full subject details on page 631.

Plus at least two of

211-401 Industrial Forestry

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Ian Wild

Pre or Corequisites: 211-354 Timber Management and Harvesting

Contact: 24 hours of lectures and 36 hours of practical work *(Semester 2).*

Description: On completion of the subject, students should have an understanding of the principles of commercial forestry; an ability to undertake financial analysis of various management alternatives; and understand and have skills in using advanced forest planning techniques. The content of the subject includes commercial objectives; advanced budgeting; financial Management and valuation; advanced silviculture; long and short term planning systems; linear programming and simulation models as applied to forest management alternatives; and cost competitiveness, technological improvement and product mix.

Assessment: One 3-hour written examination at the end of semester and practical assignments throughout the semester.

211-441 Advanced Agroforestry

See full subject details on page 632.

211-444 Parks and Recreation

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Leon Bren

Contact: 24 hours lectures and 36 hours practical work *(Semester 2).*

Description: On completion of this subject, students should have an appreciation of the complexities of issues involving park management, and some competence in preparing plans to meet the challenge of these issues. Content includes factors important to the management of parks; tangible and intangible aims; conflicts of values and the concept of 'balance'; role of legislation in the management of such areas; difficulties in implementation of legislation in the field; methods for protection of natural values from visitor pressure; differing philosophies of management aims, and the translation of these to management practices; conflict between priced and non-priced goods and services; and management of visitor areas and facilities.

Assessment: One 3-hour written examination at the end of the semester. A number of smaller tests may be administered in the course of the subject. Practical work as directed.

Elective subjects

Note: Insufficient enrolments may lead to a subject being suspended.

211-411 Processes in Forest Ecosystems

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Chris Weston

Prerequisites: Any one of 211-203 Forest Soils, 211-215 Forest Ecology, 606-204 Plant Ecology and 606-207 Flora of Victoria

Contact: Contact: 24 hours lectures, 36 hours practical work, including a ten-day excursion in February *(Summer semester).*

Description: This subject will cover the ecosystem processes that determine the distribution, diversity and productivity of forests and woodlands in south-eastern Australia, and their regeneration potential. The subject aims to provide a sound theoretical and practical basis for understanding processes and methods in forest ecology. The subject will include:

- vegetation and soils of forest ecosystems of south eastern Australia, including assessment of floristic and faunal diversity, and animal-plant interactions;
- quantitative analysis of forest biomass, nutrient and bio-geochemical data at stand and catchment levels;
- forest productivity and nutrient cycling;
- the relevance of forests and forest soils in global carbon cycling and the emerging carbon economy; and
- and the potential of reafforestation for sequestration and storage of atmospheric carbon.

The subject involves the preparation, writing and oral presentation of a scientific report developed from the field practical.

Assessment: One major report, an oral presentation and a 3-hour written examination.

Prescribed texts: R H Groves, *Australian Vegetation. 2nd Ed*, Cambridge University Press, 1994. • P M Attiwill and G W Leeper, *Forest Soils and Nutrient Cycles*, Melbourne University Press, 1987.

211-412 Advanced Topics in Genetics & Breeding

See full subject details on page 608.

211-423 Project In Forest Science 1

Note: Credit can be gained for only one of 211-423 and 211-445.

Credit points: 25 **HECS-band:** 2

Coordinator: Dr Peter Ades

Prerequisites: Students must have a grade average of H3 or better for the two semesters preceding their enrolment in this subject.

Contact: Equivalent to 48 hours of lectures and 72 hours of practical work *(Semester 1, repeat 2).*

Description: On completion of this subject, students should be able to search the literature, design a project, analyse the results, communicate the results, and obtain detailed knowledge on a topic. The subject includes a supervised research project, on any topic for which supervision by a lecturer in the forest science course can be arranged. The project comprises a review of the literature, a research task and the preparation of a report on the task. Enrolment will be subject to quota.

Assessment: A written project proposal signed by the student and the prospective supervisor and submitted within the first two weeks of classes in Semester 1 for approval by the subject coordinator. A written report of less than 10 000 words. A seminar given by the student.

211-445 Project In Forest Science 2

Note: Credit can be gained for only one of 211-423 and 211-445.

Credit points: 25 **HECS-band:** 2

Coordinator: Dr Peter Ades

Prerequisites: Students must have a grade average of H3 or better for the two semesters preceding their enrolment in this subject.

Contact: Equivalent to 48 hours of lectures and 72 hours of practical work *(Year long).*

Description: On completion of this subject, students should be able to search the literature, design a project, analyse the results, communicate the results, obtain detailed knowledge on a topic. The subject includes a supervised research project on any topic for which supervision by a lecturer in the forest science course can be arranged. The project comprises a review of the literature, a research task and the preparation of a report on the task. The subject will be carried over two semesters and enrolment will be subject to a quota.

Assessment: A written project proposal signed by the student and the prospective supervisor and submitted within the first two weeks of classes in Semester 1 for approval by the subject coordinator. A written report of less than 10 000 words. A seminar given by the student.

212-412 Social Research Methods

See full subject details on page 631.

212-430 Communicating Ag.& Environ Technology

Note: This subject may be offered in a block teaching mode. This will include full days off campus within industry and relevant working environments and some weekend work.

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Kath Williams

Contact: 36 hours of lectures plus an industry placement *(Semester 1).*

Description: This subject provides an understanding of the principles of effective communication, the practical skills to communicate effectively, and the development of skills in critical analysis of communication problems.

Topics include the communication of agricultural and environmental technology as processes of information exchange which assist information users make better decisions; the communication skills of writing, speaking, body language, establishing rapport, questioning and listening; community consultation and mass media techniques; working with groups, leadership, conflict management, managing difficult people, and assertiveness; marketing as a communication process; determining clients' needs; adult learning models, and influencing human behaviour; interpretation of natural resources, including forest, to the general public; business decision making; project management; evaluating the effects of communication projects; public and private extension, Australian and overseas extension models; the ethics of social influence applied to extension and communication; and case studies.

The industry project provides an opportunity to study communication and marketing techniques used by an agricultural or forestry business or government department and to apply the issues studied in lectures to industry. Students will be expected to visit and observe or work with a business for two days and during that time undertake a project related to communication or marketing.

Assessment: A 2-hour end-of-semester written examination; one written assignment (up to 2000 words); a report on industry placement.

Prescribed texts: H Mackay, *Why Don't People Listen?*, Pan, 1994. • A W van den Ban and H S Hawkins, *Agricultural Extension*, Longmans, 1988.

654-308 Conservation Biology

See full subject details on page 877.