Bachelor of Forest Science

First-year subjects

202-101 Chemistry for Land and Food Resources
See full subject details on page 1.

610-141 Chemistry A
See full subject details on page 2.

202-103 Biology for Land and Food Resources
See full subject details on page 1.

650-141 Biology of Cells and Organisms
See full subject details on page 1.

202-104 Information Technology and Communication
See full subject details on page 1.

202-107 Mathematics for Land and Food Resources
See full subject details on page 1.

207-113 Australian Rural Landscapes
See full subject details on page 1.

202-106 Land Resources
See full subject details on page 2.

610-142 Chemistry B
See full subject details on page 2.

207-101 Land, Food and Resource Economics
See full subject details on page 2.

207-103 Ecology
See full subject details on page 1.

650-142 Genetics & The Evolution of Life
See full subject details on page 1.

Second-year subjects

202-201 Plant Function
See full subject details on page 2.

202-202 Experimental Design/Statistical Methods
See full subject details on page 2.

202-203 Soil and Water Resources
See full subject details on page 3.

207-201 Resource Management Economics
See full subject details on page 2.

207-203 Techniques of Resource Assessment
See full subject details on page 1.

220-201 Native Forest Ecosystems & Biodiversity

Credit points: 12.5

Coordinator: Dr Chris Weston and Dr Tina Bell

Prerequisites: 654-142 Genetics and Evolution of Life; 207-103 Ecology or 606-204 Ecology: Communities & Ecosystems; 220-213 Trees and Forests.

Contact: Twenty-four hours lectures, 36 hours laboratory and field practicals *(Semester 2).*

Description: This subject covers:

- composition, structure and dynamics of global native forests and woodlands;
- the range of Australian forests and woodlands - environmental gradients, natural disturbance regimes, pre-settlement forests and their present condition;
- relationship between forest history, response to disturbance, and forest structure;
- the role of fungi and invertebrate fauna in sustaining forest biodiversity;
- natural and managed regeneration of different forest types, regeneration processes and sources of regeneration; phenology of important genera;
- role of treed and forested ecosystems for conservation and biodiversity, monitoring and understanding biodiversity, corridors and fragmentation;
- ecosystem services performed by forests and woodlands;
- contributions of plantations and farm forests to biodiversity.

On completion of this subject students should have:

- a profound respect for truth, intellectual and professional integrity, the principles of learning, and the ethics of scholarship;
- a capacity for independent critical thought, innovation, rational inquiry and self-directed learning and research;
- an ability to identify and describe the biophysical, social and economic resources of natural and modified ecosystems, and integrate this information on a catchment scale;
- an ability to interpret the ecological history of individual forest and woodland sites, including the history of disturbance and human intervention;
- an awareness of and ability to utilise appropriate communication technology and methods for the storage, management and analysis of data;
- highly developed oral communication skills to allow informed dialogue and liaison with peers, and with individuals and groups from industry, government and the community.

Assessment: One three-hour examination (40% of final marks), two project reports totalling 4000 words (40%) including an appropriately presented collection of relevant forest insects, and a group presentation (20%).

Prescribed texts: P Attiwill and B Wilson (eds), *Ecology: an Australian Perspective,* Oxford University Press, South Melbourne, Vic, 2003.

220-213 Trees and Forests

Availability: Parkville campus with use made of Creswick campus facilities through field trips.

Credit points: 12.5

Coordinator: Dr Peter Ades

Contact: Twenty-four hours of lectures and 24 hours of demonstrations and practical work, and one 3-day tour covering dendrology. Students are expected to undertake additional study of at least one hour for each hour of contact *(Semester 1).*

Description: This subject provides students with the basics of tree and forest biology, including dendrology (the natural history of trees), tree identification and uses, the characteristics of wood, and an introduction to tree and forest management.

On completion of the subject, students should:

- be aware of the biogeography and major evolutionary directions of woody species worldwide;
- be competent in the identification, taxonomy and morphology of eucalypts, conifers and deciduous hardwoods;
- be aware of the distribution, characteristics and uses of Australian forest species;
- be able to describe the features, composition and properties of a variety of woods, and methods used to identify timbers;
- be able to describe the type and status of global forest resources, including their products and uses;
- be aware of issues in management of trees and forest resources, of the objectives of forest management, and of methods for generating and evaluating alternative plans for the management of forest resources.

Assessment: A three-hour end-of-semester examination (50%), a term project (3000 words, 20%), two assignments (each up to 1500 words, each 15%).

Prescribed texts: L Costermans, *Native Trees and Shrubs of South-Eastern Australia,* Rigby, 1981. • P H Raven, R F Evert and S E Eichhorn, *Biology of Plants,* 6th edn, W H Freeman & Co/Worth Publishers, New York, 1999. • K Wilson and D J B White, *The Anatomy of Wood: its Diversity and Variability,* Stobart & Son Ltd, 1986.

654-207 Australian Wildlife Biology
See full subject details on page 2.

654-204 Ecology: Individuals and Populations
See full subject details on page 2.

625-101 Earth Sciences - The Global Environment
See full subject details on page 1.

Third-year subjects

202-004 Industry Placement#

Coordinator: Mr Mark Stewart

Prerequisites: As for 202-001 Industry Placement#.

Contact: As for 202-001 Industry Placement# *(Year long).*

Description: As for 202-001 Industry Placement#.

Assessment: As for 202-001 Industry Placement#.

202-306 Industry Project

Availability: Creswick campus

Credit points: 25

Coordinator: Dr Chris Weston

Prerequisites: As for 202-301 Industry Project.

Contact: As for 202-301 Industry Project *(Year long).*

Description: As for 202-301 Industry Project.

Assessment: As for 202-301 Industry Project.

202-312 Industry Project

Credit points: 25

Coordinator: Dr Chris Weston

Prerequisites: As for 202-306 Industry Project.

Contact: As for 202-303 Industry Project *(Semester 1, repeat 2).*

Description: As for 202-303 Industry Project.

Assessment: As for 202-303 Industry Project.

220-301 Forestry Field Camp

Note: Hurdle requirement

Availability: Creswick campus

Coordinator: Mr Mark Stewart

Contact: Two 2-week periods of field experience and training, one in summer semester between Year 1 and Year 2; the other between Year 2 and Year 3 *(Semester 1).*

Description: Students undertake a total of four weeks of field experience and training over the course of the degree, made up of two 2-week field camps. The camps are held early in the summer semester. Students may obtain credit for proven competencies in relevant areas. Content includes:

- development of basic field skills including first aid, bush driving and survival, Occupational Health and Safety and dealing with emergencies;
- care, use and maintenance of hand-tools and chain-saws;
- exposure to forest work gangs, experienced field supervisors, volunteer groups and Landcare groups;
- basic skills in fire survival and fire suppression methods;
- development of skills in communication, public speaking, dealing with the media, interview techniques, and techniques of public participation, conflict resolution, supervision, and personnel management.

On completion of the subject, students will have gained a range of skills and accredited forestry-related competencies including First Aid, Axes and Slashers, Chemical Handling and chainsaw use.

Assessment: Attendance at a minimum of 80% of field camp days and participation in the skills components of the course. Acquisition of 80% of listed competencies based on formal criteria.

220-302 Tree Growth and Ecophysiology

Credit points: 12.5

Coordinator: Dr Gerd Bossinger & A.Prof Michael Tausz

Prerequisites: 202-201 Plant Function or 606-201 Plant Structure and Function; 202-203 Soil and Water Resources.

Contact: Twenty-four hours lectures and 36 hours practical work *(Semester 1).*

Description: Subject content includes:

- life cycles and tree development;
- molecular aspects of wood, and the effect of genetics and silviculture on wood quality;
- flowering and tree developmental responses to environmental stresses;
- ecophysiology of water and nutrient use, tree performance and environmental constraints on tree growth, interactions between light, water, nutrients and genetic capacity in limiting growth;
- management of the interaction between light, water and nutrients to maximise carbon gain (growth) in planted trees;
- current tools for measurement of physiological performance;
- nutrient cycling in native forests and plantations, gas exchange and the C and N economies;
- process-based models for forest growth.

Assessment: A 3-hour end-of-semester examination (50%), and two project reports totalling 3000 words (50%).

Prescribed texts: H Lambers, F S Chapin and T L Pons, *Plant Physiological Ecology*, Springer, 1998.

220-303 Forest Inventory

Credit points: 12.5

Coordinator: Prof Rod Keenan

Prerequisites: 220-213 Trees and Forests; 207-203 Techniques of Resource Assessment.

Contact: Twenty-four hours of lectures, 24 hours practical work and excursions and a three-day forest survey. Students are expected to undertake additional study of at least one hour for each hour of contact *(Semester 1).*

Description: The subject gives quantitative understanding of the role of inventory (forest and tree measurement and assessment) in planning the management of native and plantation forest resources. It includes planning and execution of a forest assessment, and processing of assessment data to a form suitable for input into forest management. Content includes:

- the importance of forest assessment, and the role of inventories in native forest and plantation resource planning for both wood and non-wood values;
- the use of standard equipment to estimate tree and stand parameters such as diameter, basal area, height, standing volume, bark and crown, stem geometry, stem analysis and defects;
- estimation of timber yields, and the effect of site productivity and stand density;
- the sources of assessment errors and their significance;
- use of remote sensing and GIS in forest inventories and project management;
- registration and rectification of maps and aerial photographs of forested areas;
- project planning, logistic, costs, and implementation issues, project management tools;
- advanced statistical techniques of design and sampling for inventory and research.

Assessment: One three-hour end-of-semester examination (50%), an essay (up to 1500 words, 20%), a group field inventory exercise (30%).

Prescribed texts: Lilles and Kiefer, *Remote Sensing and Image Interpretation.* • S A Aranoff, *Geographic Information Systems: A Management Perspective.* • P A Burrough, *Principles of Geographical Information Systems for Land Resources Assessment.* • M S Philip, *Measuring Trees and Forests.*

220-304 Silviculture

Credit points: 12.5

Coordinator: Mr Mark Stewart & Mr Simon Murphy

Prerequisites: 220-303 Forest Inventory; 220-201 Native Forest Ecosystems and Biodiversity; 220-302 Tree Growth and Ecophysiology

Contact: Twenty-four hours of lectures and thirty-six hours of practical/field excursions. Students are expected to undertake additional study of at least one hour for each hour of contact *(Semester 2).*

Description: This subject provides an insight into wood and timber markets and how this relates to the tending and managing of forests and plantations. The subject brings together the science underpinning the growth and development of trees with the products that trees provide for a range of human use, and describes the principles and practices of forest establishment, regeneration and management for timber and other objectives.

Assessment: One two-hour examination (50%), and up to four assessment tasks throughout the semester (totalling 5000 words, 50%).

220-307 Fire Ecology and Management

Availability: Creswick campus

Credit points: 12.5

Coordinator: Dr Kevin Tolhurst

Contact: Twenty-four hours lectures and 36 hours of practical work *(Semester 1).*

Description: On completing this subject, students should be competent in:

- basic fire-weather forecasting;
- understanding the principles of fire behaviour and the bases of fire danger ratings;
- understanding the principles of fire protection;

- having skills in planning and selecting appropriate fire-protection strategies;
- understanding the role and impact of fire in forest ecosystems; and
- having a knowledge of fire law.

The 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 three-hour written examination (60%) and practical assignments equivalent to about 2000 words totalling 40%.

220-311 Forest Values, Landscapes and Society

Availability: Creswick campus

Credit points: 12.5

Coordinator: Dr Kevin Tolhurst & A.Prof Leon Bren

Prerequisites: 207-113 Australian Rural Landscapes; 220-201 Native Forest Ecosystems and Biodiversity; 207-211 Resource Industry Economics

Contact: Twenty-four hours lectures and 36 hours practical work. Students are expected to undertake additional study of at least one hour for each hour of contact *(Semester 2).*

Description: Content includes:

- use of forests for production of wood and non-wood tangible products, water release and quality, carbon storage, biodiversity conservation and other ecosystem services, aesthetic and spiritual values, wilderness and recreation;
- community forest management, assessment of community values including aboriginal, industry and environmental organisations, and their incorporation in public and private forest management;
- landscape-level approaches to forest land-use planning, status, monitoring, and trends in selected forest and landscape indicators;
- environmental and social impacts of plantations and commercial forests.

Assessment: One 3-hour written examination (50%) and two practical reports (3000 words) each worth 25% of final mark.

220-331 Forest Health and Restoration

Availability: Creswick campus

Credit points: 12.5

Coordinator: Dr Ian Smith & Dr Nick Collett

Contact: Twenty-four hours of lectures and 36 hours practical work. Students are expected to undertake additional study of at least one hour for each hour of contact *(Semester 2).*

Description: Forest health and restoration requires an understanding of the factors affecting ecosystem development, stability and the productivity of major species, the theory and practice of rehabilitating degraded forests and the role of human intervention in maintaining ecosystem sustainability, community-based restoration management, restoration science and technology, adaptive restoration and ecosystem monitoring. Content includes:

- forest pathology: the significance of forest diseases, the principal groups of pathogens, host-parasite relationships, epidemiology and disease control;
- forest entomology: biology, frequency, control and importance of insects and other forest invertebrates;
- assessment of individual trees, plantations, and blocks of native forest;
- rehabilitation of damaged areas and enhancement of habitat and biodiversity, forest restoration;
- effects of forest management on forest health.

Assessment: A 3-hour written examination (50%) and up to three assignments totalling 50% (5000 words in total).

Fourth and Fifth-year subjects

220-404 Methods for Forest & Ecosystem Research

Credit points: 12.5

Coordinator: Dr Peter Ades & Dr Stefan Arndt

Prerequisites: Eligibility for honours or postgraduate degree; 202-202 Experimental Design/Statistical Methods (or equivalent)

Contact: Twenty-four hours of lectures and 24 hours of demonstrations and practical work *(Semester 1).*

Description: Understanding the principles of scientific method, experimental design, and sound data evaluation capability is crucial for successful research in forest and ecosystem science. The subject should expand understanding of scientific method, experimental design, statistics, and data evaluation and presentation in students undertaking research in forest and ecosystem science.

On completion of the subject, students should be:

- able to formulate testable research hypotheses in forest and ecosystem science;
- competent in experimental design for both laboratory and field-based research in forest and ecosystem science;
- aware of the problems associated with field-based, ecological research such as limitations in replication;
- able to design effective experiments to address their research questions and test a well-stated hypothesis;
- able to understand the statistical principles of data evaluation and presentation in forest and ecosystem science;
- able to effectively communicate scientific results orally and know how to structure a paper for publication in a peer-reviewed journal.

Assessment: A two-hour end-of-semester examination (50%), and a semester project (3000 words and oral presentation, 50%).

220-406 International Forest Policy

Availability: Parkville campus

Credit points: 12.5

Coordinator: Prof Rod Keenan

Contact: Twenty-four hours lectures, 24 hours seminars, tutorials and self-directed study. Students are expected to undertake additional study of at least one hour for each hour of contact *(Semester 1).*

Description: The subject covers:

- principles of sustainable land use and environmental management systems;
- standards and certification systems, including ISO 14001, FSC and AFS systems;
- history of and international approaches to community forest management and implications for forest policy
- the regulatory framework for forest management including the Montreal Process, international conventions and national biodiversity and sustainability policies
- hierarchy of planning and management processes;
- land-use planning and landscape interpretation in decision-making;
- codes of practice, implementation, and review;
- international developments in forest policy.

Assessment: A three-hour written examination (50%), a written assignment (up to 3000 words, 30%) and an individual presentation on a forest policy issue (20%).

207-410 Agroforestry

Availability: Parkville campus

Credit points: 12.5

Coordinator: Mr Rowan Reid

Contact: Twenty-four hours lectures and 36 hours practical work *(Semester 1).*

Description: This course covers in detail the technical aspects of farm revegetation planning. Students will be expected to participate in field-based learning exercises and information gathering, and to contribute to discussion and debate. By the end of the subject students should:

- have a working knowledge of agroforestry diagnosis and design as an approach to the development of farm tree management opportunities on farms in Australia and overseas;
- have an understanding of the role of trees in providing for private landowner needs and aspirations;
- appreciate the importance of assessing landowners' needs, aspirations and performance criteria when designing agroforestry projects and development strategies;
- be able to develop technical design criteria for effective revegetation for resource conservation, agricultural production and direct commercial purposes;
- be able to undertake a multipurpose revegetation design project;
- be familiar with the opportunities for landowners to produce commercial forest products from private native forests; and

- be familiar with approaches to tree monitoring and evaluation.

Assessment: Two projects (total 50%) and three-hour examination (50%).

207-414 Social Research Methods

See full subject details on page 4.

202-302 Human Resource Management

See full subject details on page 3.

220-403 Forest Planning and Business Management

Availability: Parkville campus. Not offered in 2007.

Credit points: 12.5

Coordinator: A.Prof Leon Bren & Mr Simon Murphy

Prerequisites: 207-201 Resource Industry Economics; 220-304 Silviculture; 220-311 Forest Values, Landscapes and Society.

Contact: Twenty-four hours of lectures, 24 hours tutorials and practical work. Students are expected to undertake additional study of at least one hour for each hour of contact partly involved with group forest planning assignment *(Not Offered).*

Description: This subject covers the management of forest businesses and decision-making for public and private forest organisations. Students will be required to work as part of a team to investigate a forested area, analyse appropriate forest information and prepare and present a balanced forest plan that includes recommendations for future management options. Content includes:

- commercial objectives of forestry enterprises;
- management of forest businesses and decision-making;
- advanced budgeting, financial management and valuation, and assessment of silvicultural options;
- long-term and short-term planning systems;
- linear programming and simulation models for forest planning;
- cost-competitiveness and technological improvement;
- marketing and product mix;
- development of multi-purpose management plans for native, industrial, farm or community forests.

Assessment: A two-hour end-of-semester examination (30%), oral presentation (20%) and 2000-word report (20%) on selected paper, group forest planning assignment (30%).

Prescribed texts: L S Davis and K N Johnston, *Forest Management.*

220-402 Wood and Timber Products

Availability: Parkville campus

Credit points: 12.5

Coordinator: Mr Philip Blackwell

Prerequisites: 220-213 Trees and Forests; 220-304 Silviculture

Contact: Twenty-four hours of lectures, 24 hours of tutorials and practical work, taught in block mode, plus a 3-day field trip. Students are expected to undertake additional study of at least one hour for each hour of contact *(Semester 2).*

Description: This subject covers the properties of wood, the range of wood-based products, and their production processes. Content includes the chemistry and physics of wood, its microstructure and ultrastructure, including defects and performance in demanding environments; the concept of wood quality and its impact on utility; the link between silvicultural practices and wood properties; and the stages of harvesting, saw-milling, timber grading, further processing and value-adding.

Assessment: Two projects (each up to 2000 words, each 20%), a 2-hour practical examination (20%) and a 2-hour written exam (40%).

Prescribed texts: K Wilson and D J B White, *The Anatomy of Wood: Its Diversity and Variability,* Stobart & Son Ltd, 1986.

220-407 Parks and Recreation

Availability: Parkville campus

Credit points: 12.5

Coordinator: A. Prof Leon Bren

Contact: Twenty-four hours of 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.

The 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;
- conflict between priced and non-priced goods and services; and
- management of visitor areas and facilities.

Assessment: One three-hour examination (50%), a practical test (10%), and two practical work assignments equivalent to 2500 words (20% each).

207-413 Community Natural Resource Management

Availability: Parkville campus

Credit points: 12.5

Coordinator: Dr Lucia Boxelaar

Contact: Thirty-six hours of equivalent contact time and 24 hours independent study, plus assignment work *(Semester 2).*

Description: On completion, students should be able to demonstrate sound understanding of theories underpinning community participation in management, and will have practised techniques and processes in group facilitation and community assessment, planning and management of resources.

The content is presented under seven main headings:

- philosophy and evolution of participation and community management;
- models of community management of forests and other natural resources - overseas and in Australia;
- policy and institutional issues in community management;
- process and techniques in community enquiry, planning and research;
- issues in Koori community resource management;
- forms of evaluation in community management programs; and
- collaboration and conflict management.

Assessment: A 3000-word assignment in specialist interest area (40% of final marks); a practical exercise (30% of final marks); a two-hour final examination (30% of final marks).

Recommended texts: M Buchy and S Hoverman, *Understanding Public Participation in Forest Planning in Australia. How Can We Learn from Each Other?,* ANU Forestry Occasional Paper 99.2, 1999. • M Hobley, *Participatory Forestry: The Process of Change in India and Nepal,* Overseas Development Institute, 1996. • I Scoones and J Thompson (eds), *Beyond Farmer First: Rural People's Knowledge, Agricultural Research and Extension Practice,* International Technology Publications, 1994. • K Wilson and G E B Morren, *Systems Approaches for Improvement in Agriculture and Resource Management,* McMillan, 1990.

207-339 Hydrology and Catchment Management

See full subject details on page 2.

202-001 Industry Placement#

See full subject details on page 9.

202-301 Industry Project

See full subject details on page 9.

202-303 Industry Project

See full subject details on page 3.

202-401 Honours Research Project

See full subject details on page 4.

202-403 Honours Research Project (MYE)

See full subject details on page 4.

202-409 Honours Research Project

Availability: Creswick campus

Credit points: 62.5

Coordinator: Prof Roger Cousens

Prerequisites: As for 202-401 Honours Research Project.

Contact: As for 202-401 Honours Research Project *(Year long).*

Description: As for 202-401 Honours Research Project.

Assessment: As for 202-401 Honours Research Project.

207-301 Global Environment and Sustainability

See full subject details on page 3.

220-409 Commercial Forest Management

Availability: Parkville campus

Credit points: 12.5

Coordinator: Mr Mark Stewart

Prerequisites: 207-309 Timber Management and Harvesting

Contact: Twenty-four hours of lectures: 36 hours practical work *(Semester 2).*

Description: On completion of the subject, students should have:

- an understanding of the principles of commercial forestry;
- an ability to prepare budgets and undertake financial management; and
- an understanding and skills in using forest planning techniques.

The content includes:

- commercial objectives;
- advanced budgeting, financial management and valuation, advanced silviculture;
- long and short-term planning systems;
- linear programming and simulation models for forest planning;
- cost-competitiveness and technological improvement;
- marketing; and
- product mix.

Assessment: A three-hour examination (50%) and two practical reports of 3000 words (each 25%).

220-411 Processes in Forest Ecosystems

Availability: Parkville campus

Credit points: 12.5

Coordinator: Dr Chris Weston & Dr Steve Livesley

Contact: Twenty-four hours lectures, 36 hours practical work, including a 3-day field trip in April *(Semester 1).*

Description: This subject will cover the ecosystem processes that determine the distribution, diversity and productivity of forests and woodlands in south-eastern Australia The subject aims to provide a sound theoretical and practical understanding of the major ecological processes in forest ecosystems. A 3-day field trip and associated practical work will ensure that students obtain practical experience in state-of-the-art methods used to analyse ecosystem processes such as nutrient and carbon cycling. The subject will include:

- vegetation and soils of forest ecosystems of south-eastern Australia;
- practical experience in the quantitative analysis of forest biomass, nutrients, nutrient and carbon cycling;
- relationships between forest ecosystems and nutrient cycling;
- the dependence and delineation of forest ecosystems based on water availability;
- forests and their role in the hydrological cycle; and
- the relevance of forests and forest soils in the global carbon cycle.

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

References and resources for this subject will be made available through the University Library System and during lectures and practical sessions.

Assessment: One major report (30% of final marks), an oral presentation (20% of final marks) and a 3-hour written examination (50% of final marks).

202-415 Honours Research Project (MYE)

Availability: Creswick campus

Credit points: 62.5

Coordinator: Prof Roger Cousens

Prerequisites: As for 202-403 Honours Research Project (MYE).

Contact: As for 202-403 Honours Research Project (MYE) *(Semester 1, repeat 2).*

Description: As for 202-403 Honours Research Project (MYE).

Assessment: As for 202-403 Honours Research Project (MYE).