

FACULTY OF AGRICULTURE,
FOOD AND NATURAL RESOURCES
HANDBOOK 2011

Acknowledgements



The Arms of the University

Sidere mens eadem mutato

Though the constellations change, the mind is universal

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Official course information

Faculty handbooks and their respective online updates, along with the *University of Sydney Calendar*, form the official legal source of information relating to study at the University of Sydney. Please refer to the following websites:

sydney.edu.au/handbooks
sydney.edu.au/calendar

Amendments

All authorised amendments to this handbook can be found at sydney.edu.au/handbooks/handbooks_admin/updates2011

Resolutions

The Coursework Clause

Resolutions must be read in conjunction with the *University of Sydney (Coursework) Rule 2000 (as amended)*, which sets out the requirements for all undergraduate courses, and the relevant resolutions of the Senate.

The Research Clause

All postgraduate research courses must be read in conjunction with the relevant rules and resolutions of the Senate and Academic Board, including but not limited to:

1. The *University of Sydney (Amendment Act) Rule 1999 (as amended)*.
2. The *University of Sydney (Doctor of Philosophy (PhD)) Rule 2004*.
3. The resolutions of the Academic Board relating to the Examination Procedure for the Degree of Doctor of Philosophy.
4. The relevant faculty resolutions.

Disclaimers

1. The material in this handbook may contain references to persons who are deceased.
2. The information in this handbook was as accurate as possible at the time of printing. The University reserves the right to make changes to the information in this handbook, including prerequisites for units of study, as appropriate. Students should check with faculties for current, detailed information regarding units of study.

Price

The price of this handbook can be found on the back cover and is in Australian dollars. The price includes GST.

Handbook availability

Handbooks are available as a website, PDF download and print on demand. See the handbooks website at sydney.edu.au/handbooks for more information.

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Web and Print Production Website: sydney.edu.au/web_print

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Handbook enquiries

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Important dates

University semester and vacation dates for 2011

Summer/Winter School lectures	Dates
Summer School - December program	Begins: Monday 6 December 2010
Summer School - main program	Begins: Tuesday 4 January 2011
Summer School - late January program	Begins: Monday 17 January
Winter School - main program	Begins: Monday 27 June
Semester One	Dates
International student orientation (Semester One) - STABEX	Monday 14 February and Tuesday 15 February
International student orientation (Semester One) - full degree	Wednesday 16 February and Thursday 18 February
Lectures begin	Monday 28 February
AVCC Common Week/non-teaching Easter period	Friday 22 April to Friday 29 April
International application deadline (Semester Two) *	Thursday 29 April *
Last day of lectures	Friday 3 June
Study vacation	Monday 6 June to Friday 10 June
Examination period	Tuesday 14 June to Saturday 25 June
Semester ends	Saturday 25 June
AVCC Common Week/non-teaching period	Monday 4 July to Friday 8 July
Semester Two	Dates
International student orientation (Semester Two) - STABEX	Monday 18 July and Tuesday 19 July
International student orientation (Semester Two) - full degree	Wednesday 21 July and Thursday 22 July
Lectures begin	Monday 25 July
AVCC Common Week/non-teaching period	Monday 26 September to Friday 30 September
Last day of lectures	Friday 28 October
International application deadline (for Semester One, 2011) *	Saturday 29 October *
Study vacation	Monday 31 October to Friday 4 November
Examination period	Monday 7 November to Saturday 19 November
Semester ends	Saturday 19 November

* Except for the faculties of Dentistry, Medicine and the Master of Pharmacy course. See www.acer.edu.au for details.

Last dates for withdrawal or discontinuation for 2011

Semester One- units of study	Dates
Last day to add a unit	Friday 11 March
Last day for withdrawal	Thursday 31 March
Last day to discontinue without failure (DNF)	Friday 15 April
Last to discontinue (Discontinued - Fail)	Friday 3 June
Semester Two- units of study	Dates
Last day to add a unit	Friday 5 August
Last day for withdrawal	Wednesday 31 August
Last day to discontinue without failure (DNF)	Friday 9 September
Last day to discontinue (Discontinued - Fail)	Friday 28 October
Last day to withdraw from a non-standard unit of study	Census date of the unit, which cannot be earlier than 20 per cent of the way through the period of time during which the unit is undertaken.
Public holidays	Dates
Australia Day	Wednesday 26 January
Good Friday	Friday 22 April
Easter Monday	Tuesday 26 April
Anzac Day	Monday 25 April
Queen's Birthday	Monday 13 June
Labour Day	Monday 3 October



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Welcome from the Dean



Having marked its centenary year in 2010, the Faculty of Agriculture, Food and Natural Resources is proud to celebrate its rich and illustrious history. Our founding principles of thorough scientific investigation and teaching excellence have shaped our development into a community of distinguished international researchers and educators. Looking ahead, the faculty's offering is unique with modern, innovative degrees that produce highly skilled graduates equipped with the skills needed to address the changing world we live in. Our focus is on providing the knowledge that will underpin solutions to the most significant and challenging issues of our time and we welcome students who share our passion.

Finding solutions is an exciting career path, and opportunities for skilled graduates in "new science" areas are growing exponentially. Previously unheard of fields such as carbon and water trading, food futures and sustainability complement recent developments in science and technology. We recently prepared a vision statement that we call GR². This vision is to build the knowledge needed to tackle the massive challenge of feeding the world using less water, less energy, and probably less land. The title – GR² – stands for a "green resolution" – our resolution to tackle a problem that is now many fold more difficult than it was 40 years ago.

Our degrees offer rich educational experiences that encompass a comprehensive range of disciplines. The carefully constructed curriculum prepares graduates for a range of careers. We pride ourselves on teaching excellence and students are able to learn from internationally renowned research leaders. Units offered in the third and fourth year allow students to tailor their focus and develop cutting edge knowledge of their chosen fields of study.

Our emphasis on ecosystem science – those that truly impact at local, regional and global scales – meets head-on the challenges of the future. On behalf of the faculty, I warmly invite you to join us and begin your exciting career.

Professor Mark Adams
Dean



Undergraduate course requirements

BACHELOR OF AGRICULTURAL ECONOMICS (BAgrEc)

(Part-time study, during the daytime only, may be available in certain circumstances)

Assumed knowledge: Mathematics.

The focus of this economics degree is on the development of analytical, quantitative, computing and communication skills with an emphasis on commodity markets and agricultural and natural resource issues. Skills highly regarded by employers are gained in fourth year through the completion of a research thesis, research exercises and research project reports. A wide range of elective units is available.

Major studies: Include accounting (restricted entry), agribusiness management, agricultural economics, agricultural finance, agricultural marketing, agricultural policy, agricultural science, commercial law, econometrics, economics, finance, geography, government, international trade, management, marketing, modern languages, natural resource economics, psychology.

Professional experience: For students enrolling since 2008, this professional experience requirement is credited to the AFNR4001 unit of study. Overseas experience is encouraged.

Professional recognition: Undergraduates and graduates are eligible for membership of the Australian Agricultural and Resource Economics Society, the Economic Society of Australia, the Agribusiness Association of Australia and the American Agricultural Economics Association.

Career opportunities: Graduates are employed as applied economists and researchers with commodity and futures brokers, merchant banks and trading banks and by the Department of Agriculture, Fisheries and Forestry, ABARE, Meat and Livestock Australia and the Productivity Commission. They are also employed by accounting firms; management consultants, international agencies and agribusiness firms; the wider business community; large corporate farms; and in the media as economic journalists.

BACHELOR OF ENVIRONMENTAL SYSTEMS (BEnvSys)

Assumed knowledge: Mathematics and Chemistry

Major studies: Agricultural Systems, Natural Terrestrial Systems
This course has a strong scientific base. It has a clear focus on building knowledge and skills in quantitative analysis across disciplines and the application of systems thinking to the issues of the day such as climate change, food security, water and carbon emissions. It is a unique degree that addresses the tensions and synergies of agricultural and natural terrestrial ecosystems. Core units will span the plant sciences, hydrology, geomorphology, soil science and biosphere-atmosphere interactions.

Professional Experience: Not formally included in this degree.

Career opportunities: Examples include careers in sustainable agriculture and production in natural and managed environments, soil science, ecology, environmental management and protection, catchment management, land and water conservation and hydrology.

Additional information: Ensuring ecologically-sustainable primary production in natural and managed terrestrial ecosystems is perhaps the single greatest challenge facing humankind. This degree focuses on building knowledge and skills in quantitative analysis across disciplines and the application of systems thinking to the issues of the day such as climate change (and flow-on effects such as drought and

fire), food security, water and carbon emissions. It is a unique degree that addresses the tensions and synergies of agricultural and natural terrestrial ecosystems. Core units will span the plant sciences, hydrology, geomorphology, soil science and biosphere-atmosphere interactions.

BACHELOR OF HORTICULTURAL SCIENCE (BHortSc)

The last intake of students for this degree occurred in 2009. No new students will be permitted to commence this degree.

(Part-time study, during the daytime only, may be available in certain circumstances)

Assumed knowledge: Mathematics, Chemistry and Biology.

The course has a strong scientific base. The focus of the degree is on the development of analytical, quantitative, computing and communication skills. Highly regarded skills are gained in the fourth year through the completion of a research thesis.

Production horticulture deals with the application of scientific and economic principles to all phases of the production, post-harvest care and marketing of fruit, vegetables, cut flowers and nursery stock. Urban/amenity horticulture deals with the horticultural and ecological aspects of the management of parks, sports fields and golf courses, as well as plantings for streets, etc. Environmental impact deals with habitat preservation and ex-situ conservation of rare and endangered species including their marketing; strategies for integrated management for control of pests, diseases and weeds; and environmental legislation and testing.

Major studies: Fruit, vegetable and ornamental production, post-harvest biology and technology, urban horticulture and horticultural specialisations within areas of agribusiness, biometry, biotechnology, chemistry, economics, entomology, genetics and plant breeding, plant pathology, resource economics and soil science.

Professional experience: For students enrolling since 2008, this professional experience requirement is credited to the AFNR4001 unit of study. Overseas experience is encouraged.

Professional recognition: Admission for professional membership by the Australian Society of Horticultural Science and the Australian Institute of Agricultural Science.

Career opportunities: Examples include employment in horticultural research, horticultural consultancy, management of horticultural enterprises and as horticultural advisers with private, state and local government bodies. Opportunities exist in production horticulture, post-harvest technology, urban/amenity horticulture, sustainable horticulture, horticultural biotechnology, precision horticulture, viticulture, environmental impact analysis, endangered species conservation, habitat preservation, ornamental plant breeding for the world market, crop protection, plant ecology and irrigation science.



BACHELOR OF LAND AND WATER SCIENCE (BLWSc)

The last intake of students for this degree occurred in 2009. No new students will be permitted to commence this degree.

(Part-time study, during the daytime only, may be available in certain circumstances)

Assumed knowledge: Mathematics, Chemistry and Biology.

The course has a strong scientific base. The focus of this four-year applied degree is on the development of analytical, quantitative, computing and communication skills. Students learn how to apply the knowledge and principles of science to the understanding, management and conservation of our land and water resources. Highly regarded skills are gained in the fourth year through the completion of a research thesis.

Major studies: Include basic and applied aspects of biology, chemistry, geography, geographic information systems, geology, hydrology, soil science, statistics, sustainable agriculture and resource economics relevant to land and water science.

Professional Experience: For students enrolling since 2008, this professional experience requirement is credited to the AFNR4001 unit of study.

Professional recognition: Graduates are eligible for membership of professional societies including the International Association of Hydrogeologists and Australian Society of Soil Science Inc.

Career opportunities: Examples include technical experts and researchers in catchment management organisations, sustainable land and water management, environmental assessment, remediation and protection, landcare, environmental consultants, media researchers and journalists, national parks and wildlife services, educators.

BACHELOR OF RESOURCE ECONOMICS (BResEc)

(Part-time study, during the daytime only, may be available in certain circumstances)

Assumed knowledge: Extension 1 Mathematics.

Major studies: Resource economics, economics, environmental economics, fishery economics, mineral and energy economics, water and land economics, agricultural science, commercial law, finance, geography, geology, government, marine science, mathematics, soil science and statistics.

Professional Experience: For students enrolling since 2008, this professional experience requirement is credited to the AFNR4001 unit of study. Overseas experience is encouraged.

Professional recognition: Graduates and undergraduates are eligible for membership of the Australian Agricultural and Resource Economics Society, the Economic Society of Australia, the Australia and New Zealand Society of Ecological Economics, the Australian Institute of Agricultural Science and Technology and the American Agricultural Economics Association.

Career opportunities: Include environmental consulting firms, "green" organisations, mining and energy companies. State and Federal government opportunities include environmental agencies, land and water departments, agriculture departments, fisheries and forestry authorities. Economic analysis skills are transferable, allowing employment as economists in any sector of the economy.

Additional information: BResEc is a unique applied economics degree, blending a basic science foundation with a strong disciplinary base in economics. All students will take units of basic science, complete sequences in economics, resource economics, and quantitative analytical economics; undertake electives in economics and/or science; and examine a wide range of natural resource

management problems. Students will specialise in and complete a research project in a selected area of resource economics.

The focus is on developing broadly applicable analytical economic skills complemented with an adequate knowledge of ecological and other natural resource systems and skills in modelling those systems in order to contribute to the solution of challenging environmental and management problems.

The course is targeted at students interested in economic management of natural resources systems, environmental economics, fishery and forestry economics, ecosystems, conservation issues, and sustainability.

BACHELOR OF SCIENCE IN AGRICULTURE (BScAgr)

(Part-time study, during the daytime only, may be available in certain circumstances)

Assumed knowledge: Mathematics, Chemistry and Biology.

The course has a strong scientific base and offers a broad training in the scientific disciplines. The focus of this four-year applied degree is on the development of analytical, quantitative, computing and communication skills. Students learn how to apply the knowledge and principles of science to the understanding and management of the production and processing and marketing of agricultural products, and to the management and conservation of our natural resources. Highly regarded skills are gained in the fourth year through the completion of a research thesis.

Major studies: Agricultural economics, entomology, genetics, agricultural microbiology, agronomy, biometry, environmental chemistry, food science, livestock production, plant breeding, plant pathology, and soil science. Special interdisciplinary programs may also be approved in fourth year.

Professional experience: For students enrolling since 2008, this professional experience requirement is credited to the AFNR4001 unit of study.

Professional recognition: Membership of professional societies, such as the Australian Institute of Agricultural Science, is available.

Career opportunities: Examples include environmental scientists or research scientists in environmental protection, land and water conservation, conservation of endangered species, sustainable agriculture, precision agriculture, plant breeding, horticulture, agronomy, integrated pest management, animal nutrition, and molecular genetics (plant, animal and human); medical researchers; reproductive technologists in animal production enterprises and IVF clinics; biotechnologists (plant, animal and microbial); microbiologists (industrial and environmental); food scientists and cereal chemists; feedlot managers, managers of large scale intensive and extensive animal production enterprises; agricultural consultants (domestic and international); statisticians; media researchers and journalists; personnel for biosoil programs, environmental protection groups, national parks and wildlife services and forestry commissions; educators; applied marketing and agribusiness management.

Progress through the years

Under normal circumstances, the degree requirements may be satisfied in four years. If you fail to achieve a satisfactory standard in a unit of study at the first attempt, you may repeat the unit. Should you not achieve a satisfactory standard at the second attempt, you will be asked to show good cause or explain why you should be re-admitted to that unit of study and/or degree (see 'Satisfactory progress' in chapter 6). Students repeating units of study which belong to the first, second or third year groups of units of study may, with the permission of the faculty, enrol in one or more units of study prescribed for the next higher year. The faculty will normally grant permission for you to undertake units from the next year when:

1. the timetable arrangements are such that you can attend all lectures, practical classes, tutorials, seminars and excursions in all of the units of study undertaken
2. you have fulfilled all of the prerequisites, and
3. you can satisfy the corequisites for the units belonging to the higher year group of units.

Prerequisites are units of study which you must pass before proceeding to another unit.

Corequisites are units of study which should be studied in the same year as another unit if you have not already passed in them.

In the year groupings on the following pages, prerequisites and corequisites for each of the specified units of study are listed. There are circumstances, however, in which the faculty may waive the formal prerequisite and corequisite requirements if you are otherwise suitably qualified to enrol for a unit. The onus is on students to consult the various unit coordinators as to the waivers which may be granted for each unit. The approval of the degree coordinator must be obtained before you can proceed to a unit of study unless you have passed the necessary prerequisites.

Bachelor of Agricultural Economics (BAgrEc)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
All students complete an Agricultural Economics major and one non-Agricultural Economics major. Details of majors can be found in Tables 3 and 4.			
Year 1			
Year 1 will have a minimum of 48 credit points comprised of:			
AGEC1102 Agricultural Economics 1	6	A HSC Mathematics or HSC Mathematics Extension 1 N AGEC1002	Semester 1
AGEC1101 Agricultural and Resource Systems	6	A HSC Mathematics or HSC Mathematics Extension 1 N AGEC1001	Semester 2
ECON1001 Introductory Microeconomics	6	A Mathematics	Semester 1 Semester 2 Summer Main
ECMT1010 Business and Economic Statistics A	6	N ECMT1011, ECMT1012, ECMT1013, MATH1015, MATH1005, MATH1905, STAT1021, ECOF1010	Semester 1 Semester 2
ECON1002 Introductory Macroeconomics	6	A Mathematics	Semester 1 Semester 2 Summer Main
ECMT1020 Business and Economic Statistics B	6	P ECMT1010 or ECOF1010 N ECMT1021, ECMT1022, ECMT1023 <i>Other than in exceptional circumstances, it is strongly recommended that students do not undertake Business and Economic Statistics B before attempting Business and Economic Statistics A.</i>	Semester 1 Semester 2
and units from Table 1 (minimum of 12 credit points), with a view to completing a Table 4 non-AGEC major.			
Year 2			
AGEC2103 Production Economics	6	P ECON1001 or AGEC1006 or (AGECE1003 and AGEC1004) or RESEC1031 N AGEC2003	Semester 1
AGEC2105 Applied Econometric Modelling 1	6	P ECMT1010 and ECMT1020 N ECMT2110	Semester 1
Students wanting to take a second major in Econometrics must enrol in ECMT2110. Degree Co-ordinator permission will be required.			
ECOS2001 Intermediate Microeconomics	6	P ECON1001 C ECMT1010 N ECON2001, ECOS2901, ECON2901 <i>Certain combinations of Maths/Stats may substitute for Econometrics. Consult the Chair of the Discipline of Economics.</i>	Semester 1 Semester 2 Summer Main
or			
ECOS2901 Intermediate Microeconomics Honours	6	P ECON1001 and ECON1002 with a Credit average or better in the two units of study combined C ECOS2903 or MATH2070 and ECMT1010 N ECON2901, ECOS2001, ECON2001 <i>Note: Department permission required for enrolment</i>	Semester 1
ECOS2002 Intermediate Macroeconomics	6	P ECON1002 C ECMT1020 N ECON2002, ECOS2902, ECON2902 <i>Certain combinations of Maths/Stats may substitute for Econometrics. Consult the Chair of the Discipline of Economics.</i>	Semester 1 Semester 2 Summer Main
or			
ECOS2902 Intermediate Macroeconomics Honours	6	P ECON1001 and ECON1002 with a Credit average or better in the two units of study combined C ECMT1020 N ECON2902, ECOS2002, ECON2002 <i>Note: Department permission required for enrolment</i>	Semester 2
AGEC2101 Market and Price Analysis	6	P AGEC1006 or (AGEC1003 and AGEC1004) or AGEC1002 or AGEC1102 or RSEC1031 or AGEC1031 N AGEC2001	Semester 2
and units from Tables 1 and 2 (minimum 18 credit points), with a view to completing a Table 4 non-AGEC major.			
Year 3			
Year 3 will have a minimum of 48 credit points comprised of:			
AGEC3103 Applied Optimisation	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) N AGEC3101	Semester 1
or			
AGEC3101 Agribusiness Management	6	P AGEC2103 or AGEC2003 or AGEC1006 N AGEC3103 and AGEC3001	Semester 2
AGEC3102 Agricultural and Resource Policy	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) N AGEC3002	Semester 1
AGEC3104 Research Methods	6	P AGEC2105 N AGEC3004	Semester 2
and units from Table 2 (minimum 30 credit points), with a view to completing a Table 4 non-AGEC major.			
Year 4			
Year 4 will have a minimum of 48 credit points comprised of:			

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AGEC4112 Research Project A	9	P 2 units out of AGEC3102, AGEC3103, AGEC3104 or AGEC3004 C AGEC4113 N AGEC4012 <i>Note: Department permission required for enrolment</i> <i>Department permission required for enrolment.</i>	Semester 1
or			
AGEC4121 Research Exercises A	9	P 2 units out of AGEC3102, AGEC3103, AGEC 3104 or AGEC3004 C AGEC4122 N AGEC4012, AGEC4112	Semester 1
and			
AGEC4113 Research Project B	9	P 2 units out of AGEC3102, AGEC3103, AGEC3104 or AGEC3004 C AGEC4112 N AGEC4013 <i>Note: Department permission required for enrolment</i> <i>Department permission required for enrolment.</i>	Semester 2
or			
AGEC4122 Research Exercises B	9	P 2 units out of AGEC3102, AGEC3103, AGEC 3104, or AGEC3004 C AGEC4121 N AGEC4013, AGEC4113	Semester 2
AFNR4001 Professional Development	6	N AGRF4000 <i>Note: Department permission required for enrolment</i>	Semester 2
and units from below (normally 24 credit points), with no more than 12 credit points of RSEC units. Not all of these units will be offered in all years.			
AGEC4101 Agricultural Marketing Analysis	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) N AGEC4004	Semester 2
AGEC4102 Agricultural Development Economics	6	P AGEC2001 or AGEC2101 and AGEC2003 or AGEC2103	Semester 2
AGEC4104 Industrial Organization of Agribusiness	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103)	Semester 1
AGEC4107 Special Topics	6	N AGEC4007 <i>Note: Department permission required for enrolment</i>	Semester 1 Semester 2
AGEC4108 Quantitative Planning Methods <i>This unit of study is not available in 2011</i>	6	P AGEC3101 or AGEC3103 or AGEC3031 or AGEC3001 N AGEC4008	Semester 2
AGEC4109 Agricultural Finance and Risk	6	P {(AGEC3001 or AGEC3101) and (AGEC2003 or AGEC2103)} OR (AGEC1102 and AGEC3103) N AGEC4009	Semester 2
RSEC4131 Benefit-Cost Analysis	6	P (ECON2001 or ECOS2001) and (AGEC2103 or AGEC2003) N AGEC4037	Semester 1
RSEC4132 Environmental Economics	6	A (ECON2001 or ECOS2001), (ECON2002 or ECOS2002), AGEC3001, AGEC2101, AGEC2105 P ECON2001 or ECOS2001 or AGEC2103 or AGEC2003 N ECON3013, AGEC4035	Semester 1
RSEC4133 Economics of Mineral & Energy Industries <i>This unit of study is not available in 2011</i>	6	A (ECON2002 or ECOS2002), AGEC3001, AGEC2101, AGEC2105 P (ECON2001 or ECOS2001) and (AGEC2103 or AGEC2003) N ECON3013	Semester 2
RSEC4134 Economics of Water & Bio-resources	6	A (ECON2002 or ECOS2002), AGEC3001, AGEC2101, AGEC2105 P (ECON2001 or ECOS2001) and (AGEC2103 or AGEC2003) N ECON3013	Semester 2

Table 1 – BAgEc Years 1 and 2 elective units

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ACCT1001 Accounting IA	6	A HSC Mathematics N ACCT1003, ACCT1004 <i>Available for only for continuing degree students who commenced their studies prior to 2011</i>	Semester 1 Semester 2
or			
ACCT1005 Accounting, Business and Society	6	N ACCT1001, ACCT1002, ACCT1003, ACCT1004	Semester 1 Semester 2
ACCT1002 Accounting IB	6	P ACCT1001 N ACCT1003, ACCT1004 <i>Available for only for continuing degree students who commenced their studies prior to 2011</i>	Semester 1 Semester 2
or			
ACCT1006 Accounting and Financial Management	6	P ACCT1005 N ACCT1001, ACCT1002, ACCT1003, ACCT1004	Semester 1 Semester 2
ACCT1002 Accounting IB	6	P ACCT1001 N ACCT1003, ACCT1004 <i>Available for only for continuing degree students who commenced their studies prior to 2011</i>	Semester 1 Semester 2
ACCT1003 Financial Accounting Concepts	6	N ACCT1001, ACCT1002 <i>Terminating unit.</i>	Semester 1
ACCT1004 Management Accounting Concepts	6	N ACCT1001, ACCT1002 <i>Terminating unit.</i>	Semester 2
AFNR1001 The Rural Environment	6		Semester 1
AFNR1002 Climate and the Environment	6		Semester 2
BIOL1001 Concepts in Biology	6	A None. However, semester 1 students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1911 <i>It is recommended that BIOL (1001 or 1911) be taken concurrently with either BIOL1003 or BIOL1903. Students who have completed HSC Biology and scored 80+ should enrol in BIOL1911. Students who lack 80+ in HSC Biology but have a UAI of at least 93 may enrol in BIOL1911 with permission from the UEO. The completion of MBLG 1001 is highly recommended.</i>	Semester 1 Summer Main
BIOL1002 Living Systems	6	A HSC 2-unit Biology. Students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1902 <i>It is recommended that BIOL (1001 or 1911) be taken before this unit of study. This unit of study, together with BIOL (1001 or 1911) provides entry to all Intermediate units of study in biology in the School of Biological Sciences.</i>	Semester 2
CLAW1001 Foundations of Business Law	6		Semester 1 Semester 2 Summer Early
GEOS1001 Earth, Environment and Society	6	N GEOS1901, GEOG1001, GEOG1002, GEOL1001, GEOL1002, GEOL1902	Semester 1
GEOS1002 Introductory Geography	6	N GEOS1902, GEOG1001, GEOG1002	Semester 2
GOVT1101 Australian Politics	6		Semester 1
GOVT1104 Power in Society	6		Semester 2
GOVT1105 Geopolitics	6		Semester 1 Semester 2
GOVT1202 World Politics	6		Semester 1 Semester 2
INFS1000 Digital Business Innovation	6	N ISYS1003, INFO1000, INFO1003	Semester 1 Semester 2 Summer Main
MATH1011 Applications of Calculus	3	A HSC Mathematics N MATH1111, MATH1001, MATH1901, MATH1906, BIOM1003	Semester 1 Summer Main
MATH1013 Mathematical Modelling	3	A HSC Mathematics or MATH1111 N MATH1003, MATH1903, MATH1907	Semester 2 Summer Main
MKTG1001 Marketing Principles	6	N MKTG2001	Semester 1 Semester 2
MKTG1002 Marketing Research 1 <i>This unit of study is not available in 2011</i>	6	P MKTG1001 (or MKTG2001) N MKTG2003	Semester 2
PSYC1001 Psychology 1001	6		Semester 1 Summer Main
PSYC1002 Psychology 1002	6		Semester 2 Summer Main
WORK1003 Foundations of Work and Employment	6	<i>This is the compulsory unit of study for the Industrial Relations/Human Resource Management major.</i>	Semester 1 Semester 2

Unit of study	Credit points	A: Assumed knowledge	P: Prerequisites	C: Corequisites	N: Prohibition	Session
Modern Language (Level 1 or higher) units, with the approval of the Dean FAFNR						

Notes:

1. Students may count no more than 24 credit points of the units specified in the above table towards meeting the requirements of their degree, and no more than 12 credit points from the listed INFS, MATH, PSYC and Modern Language units.
2. ACCT1001/ACCT1005 and ACCT1003 are mutually exclusive.
3. ACCT1002/ACCT1006 and ACCT1004 are mutually exclusive.
4. Entry to ACCT1001/ACCT1005 and ACCT1002/ACCT1006 is restricted: the student's academic record must be as good as that needed for admission to the University's BCom program.
5. Prerequisites apply for many second semester units.

Table 2 – BAgREc Years 2 and 3 elective units

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AGEC2102 Agribusiness Marketing	6	P AGECE1006 or AGECE1102 or RSEC1031	Semester 1
LWSC2002 Introductory Hydrology	6	A AFNR1001, AFNR1002, ENSY1001 and (BIOM1003 or ENVX1001)	Semester 2
PLNT2002 Aust Flora: Ecology and Conservation	6	P 6 credit points of a Junior unit of study N PLNT2902	Semester 1
PLNT2003 Plant Form and Function	6	A 12 credit points of Junior Biology, or equivalent eg BIOL (1001 or 1101 or 1901 or 1911) and BIOL (1002 or 1902 or 1003 or 1903) N PLNT2903, BIOL2003, BIOL2903, CROP2001	Semester 2
RSEC4131 Benefit-Cost Analysis	6	P (ECON2001 or ECOS2001) and (AGECE2103 or AGECE2003) N AGECE4037	Semester 1
SOIL2003 Soil Properties and Processes	6		Semester 1
ENVX3001 Environmental GIS	6	A least 48 credit points in second year agriculture/science units.	Semester 2
Any level 2 or 3 semester units in Accounting (ACCT), Commercial Law (CLAW), Econometrics (ECMT), Economics (ECOS), Finance (FINC), Geography (GEOG or GEOS), Government (GOVT), Industrial Relations and Human Resource Management (WORK), Information Systems (INFS), Marketing (MKTG), Psychology (PSYC). Units in Asian Studies (ASNS) or Modern Languages may also be taken (with the approval of the Dean FAFNR)			
Any level 4 units in Agricultural Economics (AGEC) other than those which are core requirements for Year 4.			
Other units of study from the BScAgr, BHortSc and BLWSc degrees, with approval of the Dean FAFNR and the Degree Coordinator concerned.			
AGEC2102 Agribusiness Marketing can only be included for Year 2.			
Prerequisites and/or corequisites apply for most units.			
Electives must be chosen such that the student will complete a non-AGEC major as specified in the Table of Majors.			

Majors in the BAgREc Degree

The definitions of majors in the following tables apply for students commencing in 2005 or later. These students are required to complete 48 credit points in their chosen majors. Their majors must comply with the requirements for the BAgREc degree as set out below, and also with the minimum requirements of the discipline teaching that major.

Students who commenced in 2004 or earlier will be required to complete 44 credit points to obtain a major. The major will be defined according to the criteria as currently determined by the discipline teaching that major. The current requirements for majors in the Faculty of Economics and Business and the Faculty of Science can be found in the respective faculty handbooks.

All students must complete an Agricultural Economics major and a non Agricultural Economics major. The Agricultural Economics major is defined in Table 3. The other majors available in the BAgREc degree are defined in Table 4. Up to three majors will be noted on a student's transcript.

Table 3 – Agricultural Economics major

Agricultural Economics
Junior (Level 1) units AGEC(1101 or 1001) AGEC(1102 or 1002)
Level 2 and 3 units AGEC(2101 or 2001) and AGECE(2103 or 2003) AGECE(3002 or 3102) and AGECE(3001 or 3101 or 3103) Two level 4 AGECE elective units

Table 4 – Non AGECE majors available in the BAgREc Degree

Accounting
Junior (Level 1) units ACCT1001*/ACCT1005*, ACCT1002*/ACCT1006* Level 2 and 3 units ACCT2011 and ACCT2012 And four of the following units: ACCT3011, ACCT3012, ACCT3013, ACCT3014, ACCT3031, ACCT3032, CLAW2201 See FEB Handbook *Note: Restricted entry

Agribusiness
Junior (Level 1) units ACCT1004 and either (INFS1000 and CLAW1001) or WORK1003 Level 2 and 3 units AGECE2102 AGECE4104 One of AGECE4101, 4109 Either 12 credit points INFS level 2/3 units or 18 credit points WORK level 2/3 units

Agricultural Finance
Junior (Level 1) units ACCT1001* or ACCT1003 and either ECMT1010 or ECON1001 Level 2 and 3 units Two FINC2000 units as for a Finance major Two FINC3000 units AGECE4104, AGECE4108, AGECE4109 *Note: Restricted entry

Agricultural Marketing
Junior (Level 1) units MKTG1001 MKTG1002 or AGECE3104 Level 2 and 3 units MKTG2112 and (MKTG3111 or MKTG3118) Two other MKTG3000 units AGECE4101, AGECE4104

Agricultural Science
Junior (Level 1) units AFNR1001 and AFNR1002 Level 2 and 3 units PLNT2003, SOIL2003 Four other Level 2/3/4 Agricultural Science units of study

Commercial Law
Junior (Level 1) units CLAW1001 And any CLAW2000 or CLAW3000 unit of study Level 2 and 3 units CLAW2201 and any five further CLAW2000 or 3000 units See FEB Handbook

Econometrics
Junior (Level 1) units ECMT1010 and ECMT1020 Level 2 and 3 units ECMT2110 and ECMT3110 Four further ECMT2000 and ECMT3000 units See FEB Handbook

Economics

Junior (Level 1) units
ECON1001 and ECON1002

Level 2 and 3 units
ECOS2001 and ECOS2002 Any four further ECOS2000 or ECON3000 or ECOS3000 units, of which at least two must be at the 3000 level.
See FEB Handbook

Finance

Junior (Level 1) units
ACCT1001* or ACCT1003 and either ECMT1010 or ECON1001

Level 2 and 3 units
FINC2011 and FINC2012
Any four further FINC3000 units or three further FINC3000 units and one of ACCT3013 or CLAW3201.
See FEB Handbook
**Note: Restricted entry*

Geography

Junior (Level 1) units
GEOS1001 or GEOS1003
GEOS1002 or other level 1 science unit

Level 2 and 3 units
Two GEOG or GEOS2000 units
Four GEOG or GEOS3000 units
See FSc Handbook

Government and International Relations

Junior (Level 1) units
Two level 1000 Government (GOVT) units

Level 2 and 3 units
Six GOVT2000 units
See FEB Handbook

Management

Junior (Level 1) units
WORK1003
One GOVT1000 unit or ECON1001

Level 2 and 3 units
WORK2201
Five units from: ECOS3003, 3005, 3008, 3012, GOVT2552, 2557, WORK 2204, 2205, 2209, 2210, 2211, 2217, 2218, 2219, 2221
See FEB Handbook

Marketing

Junior (Level 1) units
MKTG1001 and MKTG1002

Level 2 and 3 units
MKTG2112 Four other MKTG2000 or 3000 units
See FEB Handbook

Psychology

Junior (Level 1) units
PSYC1001 and PSYC1002

Level 2 and 3 units
PSYC2011, 2012, 2013 and 2014
24 credit points PSYC3000 units
See FEB Handbook

**Note: A Psychology major requires the completion of 60 credit points of PSYC units*

Notes:

- For disciplines based in other faculties (e.g. Geography is based in the Faculty of Science) the specification of a major here may differ from that in its 'home' faculty. The requirement for a major within the BAgREc degree is no less, nor more liberal, than in the discipline's 'home' faculty.
- A student can count a particular unit of study towards only one major.
- Where a student could count a unit of study towards more than one major, the student must nominate by the end of their final year the particular major to which the unit is to be allocated.

Bachelor of Environmental Systems (BEnvSys)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Year 1			
Year 1 will have the following 48 credit point structure:			
BIOL1001 Concepts in Biology	6	A None. However, semester 1 students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1911 <i>It is recommended that BIOL (1001 or 1911) be taken concurrently with either BIOL1003 or BIOL1903. Students who have completed HSC Biology and scored 80+ should enrol in BIOL1911. Students who lack 80+ in HSC Biology but have a UAI of at least 93 may enrol in BIOL1911 with permission from the UEO. The completion of MBLG 1001 is highly recommended.</i>	Semester 1 Summer Main
or			
BIOL1911 Concepts in Biology (Advanced)	6	P 80+ in HSC 2-unit Biology (or equivalent) or Distinction or better in a University level Biology unit, or by invitation. N BIOL 1001 <i>Note: Department permission required for enrolment It is recommended that BIOL (1001 or 1911) be taken concurrently with all other Junior units of study in Biology. The completion of MBLG1001 is highly recommended.</i>	Semester 1
CHEM1001 Fundamentals of Chemistry 1A	6	A There is no assumed knowledge of chemistry for this unit of study, but students who have not undertaken an HSC chemistry course are strongly advised to complete a chemistry bridging course before lectures commence. N CHEM1101, CHEM1901, CHEM1109, CHEM1903	Semester 1
or			
CHEM1101 Chemistry 1A	6	A HSC Chemistry and Mathematics C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1109, CHEM1901, CHEM1903	Semester 1 Semester 2 Summer Main
or			
CHEM1901 Chemistry 1A (Advanced)	6	P ATAR of at least 95.4 and HSC Chemistry result in band 5 or 6, or by invitation. C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1101, CHEM1109, CHEM1903 <i>Note: Department permission required for enrolment</i>	Semester 1
ENSY1001 Australian Environments and Climate	6		Semester 1
ENVX1001 Introductory Statistical Methods	6	A 70 or more in HSC Mathematics	Semester 1
BIOL1002 Living Systems	6	A HSC 2-unit Biology. Students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1902 <i>It is recommended that BIOL (1001 or 1911) be taken before this unit of study. This unit of study, together with BIOL (1001 or 1911) provides entry to all Intermediate units of study in biology in the School of Biological Sciences.</i>	Semester 2
or			
BIOL1902 Living Systems (Advanced)	6	P UAI (or ATAR equivalent) of at least 93 and HSC Biology result in the 90+, or Distinction or better in a University level Biology unit, or by invitation. N BIOL1002 <i>Note: Department permission required for enrolment</i>	Semester 2
CHEM1002 Fundamentals of Chemistry 1B	6	P CHEM (1001 or 1101) or equivalent N CHEM1102, CHEM1108, CHEM1902, CHEM1904	Semester 2
or			
CHEM1102 Chemistry 1B	6	P CHEM (1101 or 1901) or a Distinction in CHEM1001 or equivalent C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1108, CHEM1902, CHEM1904	Semester 1 Semester 2 Summer Main
or			
CHEM1902 Chemistry 1B (Advanced)	6	P CHEM (1901 or 1903) or Distinction in CHEM1101 or equivalent C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1102, CHEM1108, CHEM1904 <i>Note: Department permission required for enrolment</i>	Semester 2
ENSY1002 Ecological Sustainability	6		Semester 2
RSEC1031 Resource Economics 1	6	N AGE1031	Semester 2
Year 2			
Year 2 will have the following structure: 36 credit points of core units including:			
ENSY2001 Systems Complexity and Dynamics	6	P BIOM1003 or ENVX1001	Semester 1
ENVX2001 Applied Statistical Methods	6	P ENVX1001 or BIOM1003 or MATH1011 and MATH1015	Semester 1
SOIL2003 Soil Properties and Processes	6		Semester 1
ENVX3001 Environmental GIS	6	A least 48 credit points in second year agriculture/science units.	Semester 2
LWSC2002 Introductory Hydrology	6	A AFNR1001, AFNR1002, ENSY1001 and (BIOM1003 or ENVX1001)	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
PLNT2003 Plant Form and Function	6	A 12 credit points of Junior Biology, or equivalent eg BIOL (1001 or 1101 or 1901 or 1911) and BIOL (1002 or 1902 or 1003 or 1903) N PLNT2903, BIOL2003, BIOL2903, CROP2001	Semester 2
and 12 credit points of elective units from either Table AS1 or Table NTS1			
Table AS1 Agricultural Systems Stream			
one of:			
AGCH2004 Agricultural Chemistry	6	P 12 credit points of Junior Chemistry N AGCH2003, PLNT2001	Semester 1
AGEC2103 Production Economics	6	P ECON1001 or AGECE1006 or (AGECE1003 and AGECE1004) or RESEC1031 N AGECE2003	Semester 1
GENE2001 Agricultural Genetics 2	6	P At least one of (BIOL1001, BIOL1002, BIOL1101, BIOL1901, BIOL1911)	Semester 1
and one of:			
AGEC2101 Market and Price Analysis	6	P AGECE1006 or (AGECE1003 and AGECE1004) or AGECE1002 or AGECE1102 or RESEC1031 or AGECE1031 N AGECE2001	Semester 2
AGRO3004 Managing Agro-Ecosystems	6	P AFNR1001, AFNR1002, PLNT2003, SOIL2003 and (BIOM2001 or ENVX2001)	Semester 2
ENTO2001 Agricultural Entomology	6	P 12 credit points of first year biology	Semester 2
ENVI2112 Atmospheric Processes and Climate <i>This unit of study is not available in 2011</i>	6	P 24 credit points of Junior Science units, including 12 credit points of Junior Chemistry or Physics N ENVI2002	Semester 2
MICR2024 Microbes in the Environment	6	P 12 credit points of first year Biology N MICR2001, MICR2901, MICR2003, MICR2007, MICR2011, MICR2021, MICR2921, MICR2909	Semester 2
SOIL2004 The Soil Resource	6		Semester 2
Table NTS1 Natural Terrestrial Systems Stream			
one of:			
ENVI2111 Conservation Biology and Applied Ecology	6	P BIOL (1001 or 1911) and 6 additional credit points of Junior Biology (BIOL/MBLG/EDUH). 12 credit points of Junior Chemistry. N ENVI2911	Semester 1
GEOS2113 Making the Australian Landscape <i>This unit of study is not available in 2011</i>	6	P 24 credit points of Junior units of study, including GEOS1002 or GEOS1003 or GEOS1902 or GEOS1903 or GEOG1001 or ENVI1002 or GEOL1001 or GEOL1002 or GEOL1902 N GEOS2913	Semester 1
PLNT2002 Aust Flora: Ecology and Conservation	6	P 6 credit points of a Junior unit of study N PLNT2902	Semester 1
and one of			
ENVI2112 Atmospheric Processes and Climate <i>This unit of study is not available in 2011</i>	6	P 24 credit points of Junior Science units, including 12 credit points of Junior Chemistry or Physics N ENVI2002	Semester 2
GEOG2321 Fluvial and Groundwater Geomorphology	6	P 24 credit points of Junior units of study including 6 credit points of Junior Geoscience. Students in the BEnvSys should have ENSY1001, 12 credit points of Chemistry, 6 credit points of Biology, BIOM1003 or ENVX2001 N GEOG2002, GEOG2302, GEOG2303, MARS2002, MARS2006	Semester 2
MICR2024 Microbes in the Environment	6	P 12 credit points of first year Biology N MICR2001, MICR2901, MICR2003, MICR2007, MICR2011, MICR2021, MICR2921, MICR2909	Semester 2
SOIL2004 The Soil Resource	6		Semester 2
Year 3			
Year 3 will have the following structure: 24 credit points of core units including:			
LWSC3007 Advanced Hydrology and Modelling	6	P LWSC2002	Semester 1
SOIL3009 Contemporary Field and Lab Soil Science	6	P SOIL2003	Semester 1
PLNT3001 Plant, Cell and Environment	6	P 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent N PLNT3901	Semester 2
and a new 6 credit point unit of study dealing with biosphere-atmosphere interactions, which will be introduced in 2012			
and 24 credit points from either Table AS2 or Table NTS2			
Table AS2 Agricultural Systems Stream			
two of:			
AFNR3001 Agro-ecosystems in Developing Countries	6	<i>Note: Department permission required for enrolment</i>	S1 Intensive
AGRO4003 Crop and Pasture Agronomy	6	P AGRO3004	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AGRO4004 Sustainable Farming Systems	6	P AGRO3004	Semester 1
ENVI3111 Environmental Law and Ethics	6	A Intermediate Environmental Science. P 12 credit points of Intermediate Science or Agriculture units. N ENVI3001, ENVI3003	Semester 1
ENVX3002 Statistics in the Natural Sciences	6	P ENVX2001 or BIOM2001 or STAT2012 or STAT2912	Semester 1
LWSC3005 Environmental Water Quality	6	P LWSC2002 or GEOG2321 or AGCH2003 or 6 credit points of intermediate Chemistry <i>Note: Department permission required for enrolment</i>	Semester 1
PPAT4005 Soil Biology	6	P MICR2024 or 6cp intermediate microbiology	Semester 1
RSEC4131 Benefit-Cost Analysis	6	P (ECON2001 or ECOS2001) and (AGEC2103 or AGECE2003) N AGECE4037	Semester 1
and a new 6 credit point unit of study dealing with agro-forestry, which will be introduced in 2012.			
and two of			
ENVX4001 GIS, Remote Sensing and Land Management	6	A Recommended units include GEOS2111/GEOS2911 (Natural Hazards: a GIS approach), ENVX3001 (Environmental GIS), SOIL3004 (The Soil Resource), GEOS3014/GEOS3914 (GIS in Coastal Management) <i>Note: Department permission required for enrolment Consent of the unit coordinator required.</i>	Semester 2
ENTO4003 Integrated Pest Management	6	P ENTO2001 or ENTO2002 or BIOL2017 or BIOL2917 (Note: BIOL2017/BIOL2917 are only for BSc students who elect to take this UoS)	Semester 2
PLNT3002 Plant Growth and Development	6	P 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent N PLNT3902, BIOL3021, BIOL3931	Semester 2
RSEC4134 Economics of Water & Bio-resources	6	A (ECON2002 or ECOS2002), AGECE3001, AGECE2101, AGECE2105 P (ECON2001 or ECOS2001) and (AGECE2103 or AGECE2003) N ECON3013	Semester 2
SOIL3010 The Soil at Work	6	P SOIL2003 or SOIL2004	Semester 2
Table NTS2 Natural Terrestrial Systems Stream			
two of			
BIOL3006 Ecological Methods	6	A BIOL (2011 or 2911 or 2012 or 2912) or PLNT (2002 or 2902). P 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915). N BIOL3906	Semester 1
ENVI3111 Environmental Law and Ethics	6	A Intermediate Environmental Science. P 12 credit points of Intermediate Science or Agriculture units. N ENVI3001, ENVI3003	Semester 1
ENVX3002 Statistics in the Natural Sciences	6	P ENVX2001 or BIOM2001 or STAT2012 or STAT2912	Semester 1
GEOS3018 Rivers: Science, Policy and Management	6	P 24 credit points of Intermediate units of study including 6 credit points of Intermediate Geoscience (GEOG or GEOS) units of study N GEOS3918	Semester 1
LWSC3005 Environmental Water Quality	6	P LWSC2002 or GEOG2321 or AGCH2003 or 6 credit points of intermediate Chemistry <i>Note: Department permission required for enrolment</i>	Semester 1
PLNT3003 Systematics and Evolution of Plants	6	P 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. N PLNT3903	Semester 1
PPAT4005 Soil Biology	6	P MICR2024 or 6cp intermediate microbiology	Semester 1
and a new 6 credit point unit of study dealing with fire ecology and management, which will be introduced in 2012			
and a new 6 credit point unit of study dealing with agro-forestry, which will be introduced in 2012			
and two of			
BIOL3007 Ecology	6	A Although not prerequisites, knowledge obtained from BIOL3006/3906, and BIOL3008/3908 and/or BIOL3009/3909, is strongly recommended. P 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL, and one of ENVI (2111 or 2911) or GEOS(2115 or 2915). N BIOL3907	Semester 2
BIOL3009 Terrestrial Field Ecology	6	A BIOL (3006 or 3906). Prior completion of one of these units is very strongly recommended. S2 Intensive P 12 credit points of Intermediate Biology or ANSC2004 and BIOM2001. N BIOL3909 <i>One 6 day field trip held in the pre-semester break (17 - 22 July 2011), and 4x4 hr practical classes during weeks 1-4 in Semester 2.</i>	Semester 2
ENVI3112 Environmental Assessment	6	A Intermediate Environmental Science. P 12 credit points of Intermediate Science or Agriculture units. N ENVI3002, ENVI3004	Semester 2
GEOS3015 Environmental Geomorphology <i>This unit of study is not available in 2011</i>	6	A Intermediate geomorphology/ physical geography/ geology. P 24 credit points of Intermediate units, including 6 credit points of Intermediate Geoscience N GEOS3915	Semester 2
PLNT3002 Plant Growth and Development	6	P 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent N PLNT3902, BIOL3021, BIOL3931	Semester 2
New Units of Study covering biosphere-atmosphere interactions (introduced in 2012), agro-forestry (introduced in 2012), and fire ecology and management (introduced in 2012), will be progressively introduced as the first cohort of BEnvSys students move through the degree.			

Bachelor of Horticultural Science (BHortSc)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Year 3*			
Year 3 will have the following structure: a core (30 credit points) of:			
HORT3005 Production Horticulture	6	A AFNR1001, AFNR1002 and HORT2002 P Two of PLNT2001, PLNT2901, PLNT2002, PLNT2902, PLNT2003, PLNT2903	Semester 1
GENE2001 Agricultural Genetics 2	6	P At least one of (BIOL1001, BIOL1002, BIOL1101, BIOL1901, BIOL1911)	Semester 1
PPAT3003 Plant Disease	6	P MICR2024	Semester 1
PLNT3002 Plant Growth and Development	6	P 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent N PLNT3902, BIOL3021, BIOL3931	Semester 2
or			
PLNT3902 Plant Growth and Development (Advanced)	6	P 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent. These requirements may be varied and students with lower averages should consult the unit Executive Officer. N PLNT3002, BIOL3021, BIOL3931	Semester 2
PLNT3001 Plant, Cell and Environment	6	P 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent N PLNT3901	Semester 2
or			
PLNT3901 Plant, Cell and Environment (Advanced)	6	P 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent with average grade of distinction N PLNT3001 <i>Note: Department permission required for enrolment</i>	Semester 2
And three electives (18 credit points) from Table A			
Year 4*			
Year 4 will have the following structure: a core (42 credit points) of:			
AFNR4101 Research Project A	12	P 144 credit points of level 1000-3000 units of study	Semester 1
HORT4004 Issues in Horticultural Science 4A	6	P HORT3001 or HORT3004	Semester 1
AFNR4001 Professional Development	6	N AGRF4000 <i>Note: Department permission required for enrolment</i>	Semester 2
AFNR4102 Research Project B	12	P AFNR4101	Semester 2
HORT4005 Research and Practice in Hort Science	6	P HORT3005	Semester 2
and one elective from Table A.			
* A student may apply to the degree coordinator for permission to enrol in up to one (6 cp) elective University of Sydney unit of study in year 3 and up to one (6 cp) University of Sydney unit of study in year 4 which is not listed in Table A. The application must (1) be made prior to enrolment in the unit (2) be submitted with a written academic justification for enrolment by the student and (3) be submitted with written approval of the relevant unit of study coordinator.			
Table A			
Agribusiness			
AGEC2102 Agribusiness Marketing	6	P AGECE1006 or AGECE1102 or RSEC1031	Semester 1
AGEC3101 Agribusiness Management	6	P AGECE2103 or AGECE2003 or AGECE1006 N AGECE3103 and AGECE3001	Semester 2
Food Science			
AGCH3025 Chemistry and Biochemistry of Foods	6	P AGCH2004 or BCHM2071 or BCHM2971 or BCHM2072 or BCHM2972 or PLNT2001 or PLNT2901 or 6 credit points of Intermediate units in Chemistry	Semester 1
AGCH3026 Food Biotechnology	6	P AGCH2004 or BCHM2071 or BCHM2971 or BCHM2072 or BCHM2972 or PLNT2001 or PLNT2901 or 6 credit points of Intermediate units in Chemistry C AGCH3025	Semester 1
Environmental Science			
AGCH3032 Land and Water Ecochemistry	6	P AGCH2003 or AGCH2004 or PLNT2001 or CHEM24XX or BCHM2XXX or ENVI2001 N AGCH3030, AGCH3031 <i>Note: Department permission required for enrolment</i>	Semester 2
Agronomy			
AGRO3004 Managing Agro-Ecosystems	6	P AFNR1001, AFNR1002, PLNT2003, SOIL2003 and (BIOM2001 or ENVX2001)	Semester 2
Entomology			
ENTO4004 Insect Taxonomy and Systematics	6	P ENTO2001 or ENTO2002 or BIOL2017 or BIOL2917 (Note: BIOL2017/BIOL2917 are only for the BSc students who elect to take this unit of study)	Semester 1
ENTO4003 Integrated Pest Management	6	P ENTO2001 or ENTO2002 or BIOL2017 or BIOL2917 (Note: BIOL2017/BIOL2917 are only for BSc students who elect to take this UoS)	Semester 2

Undergraduate course requirements

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Environmetrics			
ENVX3002 Statistics in the Natural Sciences	6	P ENVX2001 or BIOM2001 or STAT2012 or STAT2912	Semester 1
Plant Pathology			
BIOL3017 Fungi in the Environment	6	P 12 credit points of Intermediate Biology or Plant Science, or 6 credit points of Intermediate Biology, or Plant Science, and 6 Intermediate credit points of either Microbiology or Geography. N BIOL3917 <i>Dates: 14-25 February 2011. The completion of 6 credit points of MBLG units is highly recommended.</i>	S1 Intensive
or			
BIOL3917 Fungi in the Environment (Advanced)	6	P Distinction average in 12 credit points of Intermediate Biology and Plant Science, or 6 credit points of Intermediate Biology, or Plant Science, and 6 Intermediate credit points of either Microbiology or Geography. N BIOL3017 <i>The completion of 6 credit points of MBLG units is highly recommended.</i>	S1 Intensive
PPAT4004 Advanced Mycology and Plant Pathology	6	P PPAT3003	Semester 1
PPAT4005 Soil Biology	6	P MICR2024 or 6cp intermediate microbiology	Semester 1
Plant Sciences			
PLNT3003 Systematics and Evolution of Plants	6	P 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. N PLNT3903	Semester 1
or			
PLNT3903 Systematics and Evolution of Plants Adv	6	P Distinction average in 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. These requirements may be varied and students with lower averages should consult the Unit Executive Officer. N PLNT3003	Semester 1
Soil Science			
SOIL3009 Contemporary Field and Lab Soil Science	6	P SOIL2003	Semester 1
SOIL2004 The Soil Resource	6		Semester 2
SOIL3010 The Soil at Work	6	P SOIL2003 or SOIL2004	Semester 2

Bachelor of Land and Water Science (BLWSc)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Year 3*			
Year 3 will have a core (24 credit points) of:			
LWSC3005 Environmental Water Quality	6	P LWSC2002 or GEOG2321 or AGCH2003 or 6 credit points of intermediate Chemistry <i>Note: Department permission required for enrolment</i>	Semester 1
ENVX3001 Environmental GIS	6	A least 48 credit points in second year agriculture/science units.	Semester 2
ENVX3002 Statistics in the Natural Sciences	6	P ENVX2001 or BIOM2001 or STAT2012 or STAT2912	Semester 1
SOIL2004 The Soil Resource	6		Semester 2
And 24 credit points selected from Table B.			
Year 4*			
In Year 4 students will complete:			
AFNR4101 Research Project A	12	P 144 credit points of level 1000-3000 units of study	Semester 1
LWSC3007 Advanced Hydrology and Modelling	6	P LWSC2002	Semester 1
SOIL3009 Contemporary Field and Lab Soil Science	6	P SOIL2003	Semester 1
AFNR4001 Professional Development	6	N AGRF4000 <i>Note: Department permission required for enrolment</i>	Semester 2
AFNR4102 Research Project B	12	P AFNR4101	Semester 2
And one unit of study from Table C.			
* A student may apply to the degree coordinator for permission to enrol in up to one (6 cp) elective University of Sydney unit of study in year 3 and up to one (6 cp) University of Sydney unit of study in year 4 which is not listed in Tables B or C. The application must (1) be made prior to enrolment in the unit (2) be submitted with a written academic justification for enrolment by the student and (3) be submitted with written approval of the relevant unit of study coordinator.			
Table B			
Agricultural Economics			
AGEC3101 Agribusiness Management	6	P AGECE2103 or AGECE2003 or AGECE1006 N AGECE3103 and AGECE3001	Semester 2
AGEC2101 Market and Price Analysis	6	P AGECE1006 or (AGECE1003 and AGECE1004) or AGECE1002 or AGECE1102 or RSEC1031 or AGECE1031 N AGECE2001	Semester 2
AGEC3102 Agricultural and Resource Policy	6	P (AGECE2001 or AGECE2101) and (AGECE2003 or AGECE2103) N AGECE3002	Semester 1
Agronomy			
AGRO3004 Managing Agro-Ecosystems	6	P AFNR1001, AFNR1002, PLNT2003, SOIL2003 and (BIOM2001 or ENVX2001)	Semester 2
Geography/Science			
GEOS3018 Rivers: Science, Policy and Management	6	P 24 credit points of Intermediate units of study including 6 credit points of Intermediate Geoscience (GEOG or GEOS) units of study N GEOS3918	Semester 1
ENVI3111 Environmental Law and Ethics	6	A Intermediate Environmental Science. P 12 credit points of Intermediate Science or Agriculture units. N ENVI3001, ENVI3003	Semester 1
ENVI3112 Environmental Assessment	6	A Intermediate Environmental Science. P 12 credit points of Intermediate Science or Agriculture units. N ENVI3002, ENVI3004	Semester 2
Plant Science			
PLNT3003 Systematics and Evolution of Plants	6	P 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. N PLNT3903	Semester 1
PLNT3001 Plant, Cell and Environment	6	P 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent N PLNT3901	Semester 2
or			
PLNT3901 Plant, Cell and Environment (Advanced)	6	P 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent with average grade of distinction N PLNT3001 <i>Note: Department permission required for enrolment</i>	Semester 2
PLNT3002 Plant Growth and Development	6	P 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent N PLNT3902, BIOL3021, BIOL3931	Semester 2
Table C			
Agricultural Chemistry			

Undergraduate course requirements

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AGCH4007 Instrumentation in Analytical Chemistry	6	P PLNT2001 or AGCH2003 or AGCH2004 or any Intermediate unit in Chemistry	Semester 1
Agronomy			
AGRO4003 Crop and Pasture Agronomy	6	P AGRO3004	Semester 1
AGRO4004 Sustainable Farming Systems	6	P AGRO3004	Semester 1
Ecology			
PLNT3003 Systematics and Evolution of Plants	6	P 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. N PLNT3903	Semester 1
BIOL3009 Terrestrial Field Ecology	6	A BIOL (3006 or 3906). Prior completion of one of these units is very strongly recommended. P 12 credit points of Intermediate Biology or ANSC2004 and BIOM2001. N BIOL3909 <i>One 6 day field trip held in the pre-semester break (17 - 22 July 2011), and 4x4 hr practical classes during weeks 1-4 in Semester 2.</i>	S2 Intensive
GIS			
ENVX4001 GIS, Remote Sensing and Land Management	6	A Recommended units include GEOS2111/GEOS2911 (Natural Hazards: a GIS approach), ENVX3001 (Environmental GIS), SOIL3004 (The Soil Resource), GEOS3014/GEOS3914 (GIS in Coastal Management) <i>Note: Department permission required for enrolment Consent of the unit coordinator required.</i>	Semester 2
Resource Economics			
RSEC4131 Benefit-Cost Analysis	6	P (ECON2001 or ECOS2001) and (AGEC2103 or AGECE2003) N AGECE4037	Semester 1
RSEC4132 Environmental Economics	6	A (ECON2001 or ECOS2001), (ECON2002 or ECOS2002), AGECE3001, AGECE2101, AGECE2105 P ECON2001 or ECOS2001 or AGECE2103 or AGECE2003 N ECON3013, AGECE4035	Semester 1
Soil Science			
PPAT4005 Soil Biology	6	P MICR2024 or 6cp intermediate microbiology	Semester 1
SOIL3010 The Soil at Work	6	P SOIL2003 or SOIL2004	Semester 2

Bachelor of Resource Economics (BResEc)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Year 1			
Year 1 will have a minimum of 48 credit points comprised of:			
ECON1001 Introductory Microeconomics	6	A Mathematics	Semester 1 Semester 2 Summer Main
AFNR1001 The Rural Environment	6		Semester 1
or			
BIOL1001 Concepts in Biology	6	A None. However, semester 1 students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1911 <i>It is recommended that BIOL (1001 or 1911) be taken concurrently with either BIOL1003 or BIOL1903. Students who have completed HSC Biology and scored 80+ should enrol in BIOL1911. Students who lack 80+ in HSC Biology but have a UAI of at least 93 may enrol in BIOL1911 with permission from the UEO. The completion of MBLG 1001 is highly recommended.</i>	Semester 1 Summer Main
or			
BIOL1911 Concepts in Biology (Advanced)	6	P 80+ in HSC 2-unit Biology (or equivalent) or Distinction or better in a University level Biology unit, or by invitation. N BIOL 1001 <i>Note: Department permission required for enrolment</i> <i>It is recommended that BIOL (1001 or 1911) be taken concurrently with all other Junior units of study in Biology. The completion of MBLG1001 is highly recommended.</i>	Semester 1
or			
CHEM1001 Fundamentals of Chemistry 1A	6	A There is no assumed knowledge of chemistry for this unit of study, but students who have not undertaken an HSC chemistry course are strongly advised to complete a chemistry bridging course before lectures commence. N CHEM1101, CHEM1901, CHEM1109, CHEM1903	Semester 1
or			
CHEM1101 Chemistry 1A	6	A HSC Chemistry and Mathematics C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1109, CHEM1901, CHEM1903	Semester 1 Semester 2 Summer Main
or			
CHEM1901 Chemistry 1A (Advanced)	6	P ATAR of at least 95.4 and HSC Chemistry result in band 5 or 6, or by invitation. C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1101, CHEM1109, CHEM1903 <i>Note: Department permission required for enrolment</i>	Semester 1
MATH1001 Differential Calculus	3	A HSC Mathematics Extension 1 N MATH1011, MATH1901, MATH1906, MATH1111	Semester 1 Summer Main
or			
MATH1901 Differential Calculus (Advanced)	3	P HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. N MATH1111, MATH1011, MATH1001, MATH1906	Semester 1
MATH1002 Linear Algebra	3	A HSC Mathematics Extension 1 N MATH1902, MATH1012, MATH1014	Semester 1 Summer Main
or			
MATH1902 Linear Algebra (Advanced)	3	P HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. N MATH1002, MATH1012, MATH1014	Semester 1
ECON1002 Introductory Macroeconomics	6	A Mathematics	Semester 1 Semester 2 Summer Main
AFNR1002 Climate and the Environment	6		Semester 2
or			
BIOL1002 Living Systems	6	A HSC 2-unit Biology. Students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1902 <i>It is recommended that BIOL (1001 or 1911) be taken before this unit of study. This unit of study, together with BIOL (1001 or 1911) provides entry to all Intermediate units of study in biology in the School of Biological Sciences.</i>	Semester 2
or			
BIOL1902 Living Systems (Advanced)	6	P UAI (or ATAR equivalent) of at least 93 and HSC Biology result in the 90+, or Distinction or better in a University level Biology unit, or by invitation. N BIOL1002 <i>Note: Department permission required for enrolment</i>	Semester 2
or			
CHEM1002 Fundamentals of Chemistry 1B	6	P CHEM (1001 or 1101) or equivalent N CHEM1102, CHEM1108, CHEM1902, CHEM1904	Semester 2
or			
CHEM1102 Chemistry 1B	6	P CHEM (1101 or 1901) or a Distinction in CHEM1001 or equivalent C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1108, CHEM1902, CHEM1904	Semester 1 Semester 2 Summer Main

Undergraduate course requirements

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
or			
CHEM1902 Chemistry 1B (Advanced)	6	P CHEM (1901 or 1903) or Distinction in CHEM1101 or equivalent C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1102, CHEM1108, CHEM1904 <i>Note: Department permission required for enrolment</i>	Semester 2
MATH1003 Integral Calculus and Modelling	3	A HSC Mathematics Extension 2 or MATH1001 or MATH1011 N MATH1013, MATH1903, MATH1907	Semester 2 Summer Main
or			
MATH1903 Integral Calculus and Modelling Advanced	3	A HSC Mathematics Extension 2 or Credit or better in MATH1001 or MATH1901 P HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. N MATH1003, MATH1013, MATH1907	Semester 2
MATH1005 Statistics	3	A HSC Mathematics N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010	Semester 2 Summer Main
or			
MATH1905 Statistics (Advanced)	3	P HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. N MATH1015, MATH1005, STAT1021, STAT1022, ECMT1010	Semester 2
or			
ECMT1020 Business and Economic Statistics B	6	P ECMT1010 or ECOF1010 N ECMT1021, ECMT1022, ECMT1023 <i>Other than in exceptional circumstances, it is strongly recommended that students do not undertake Business and Economic Statistics B before attempting Business and Economic Statistics A.</i>	Semester 1 Semester 2
RSEC1031 Resource Economics 1	6	N AGEC1031	Semester 2
And units from Table RE1 (a minimum of 6 credit points)			
Note: The second core science unit must be taken in the same discipline as the first core science unit.			
Year 2			
Year 2 will have a minimum of 48 credit points comprised of:			
AGEC2103 Production Economics	6	P ECON1001 or AGEC1006 or (AGEC1003 and AGEC1004) or RESEC1031 N AGEC2003	Semester 1
AGEC2105 Applied Econometric Modelling 1	6	P ECMT1010 and ECMT1020 N ECMT2110	Semester 1
Students wishing to take a second major in Econometrics must enrol in ECMT2110. Degree Co-ordinator permission required.			
or			
GEOS2113 Making the Australian Landscape <i>This unit of study is not available in 2011</i>	6	P 24 credit points of Junior units of study, including GEOS1002 or GEOS1003 or GEOS1902 or GEOS1903 or GEOG1001 or ENVI1002 or GEOL1001 or GEOL1002 or GEOL1902 N GEOS2913	Semester 1
ECOS2001 Intermediate Microeconomics	6	P ECON1001 C ECMT1010 N ECON2001, ECOS2901, ECON2901 <i>Certain combinations of Maths/Stats may substitute for Econometrics. Consult the Chair of the Discipline of Economics.</i>	Semester 1 Semester 2 Summer Main
or			
ECOS2901 Intermediate Microeconomics Honours	6	P ECON1001 and ECON1002 with a Credit average or better in the two units of study combined C ECOS2903 or MATH2070 and ECMT1010 N ECON2901, ECOS2001, ECON2001 <i>Note: Department permission required for enrolment</i>	Semester 1
ECOS2002 Intermediate Macroeconomics	6	P ECON1002 C ECMT1020 N ECON2002, ECOS2902, ECON2902 <i>Certain combinations of Maths/Stats may substitute for Econometrics. Consult the Chair of the Discipline of Economics.</i>	Semester 1 Semester 2 Summer Main
or			
ECOS2902 Intermediate Macroeconomics Honours	6	P ECON1001 and ECON1002 with a Credit average or better in the two units of study combined C ECMT1020 N ECON2902, ECOS2002, ECON2002 <i>Note: Department permission required for enrolment</i>	Semester 2
AGEC2101 Market and Price Analysis	6	P AGEC1006 or (AGEC1003 and AGEC1004) or AGEC1002 or AGEC1102 or RSEC1031 or AGEC1031 N AGEC2001	Semester 2
And units from Tables RE1 and RE2 (normally a minimum of 12 credit points)			
Year 3			
Year 3 will have a minimum of 48 credit points comprised of:			
ENVI3111 Environmental Law and Ethics	6	A Intermediate Environmental Science. P 12 credit points of Intermediate Science or Agriculture units. N ENVI3001, ENVI3003	Semester 1
AGEC3102 Agricultural and Resource Policy	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) N AGEC3002	Semester 1
AGEC3103 Applied Optimisation	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) N AGEC3101	Semester 1

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AGEC3104 Research Methods	6	P AGEC2105 N AGEC3004	Semester 2
Economics level 3 ECOS3000 unit (6 credit points)			
Level 2/3 Faculty of Economics and Business unit (6 credit points)			
And units from Table RE2 (normally a minimum of 12 credit points)			
Year 4			
Year 4 will have a minimum of 48 credit points comprised of:			
RSEC4131 Benefit-Cost Analysis	6	P (ECON2001 or ECOS2001) and (AGEC2103 or AGEC2003) N AGEC4037	Semester 1
RSEC4132 Environmental Economics	6	A (ECON2001 or ECOS2001), (ECON2002 or ECOS2002), AGEC3001, AGEC2101, AGEC2105 P ECON2001 or ECOS2001 or AGEC2103 or AGEC2003 N ECON3013, AGEC4035	Semester 1
RSEC4141 Resource Economics Project A	9	P AGEC3104 or AGEC3004 or AGEC4041 C RSEC4142 N AGEC4012, AGEC4112 <i>Note: Department permission required for enrolment</i>	Semester 1
or			
AGEC4121 Research Exercises A	9	P 2 units out of AGEC3102, AGEC3103, AGEC 3104 or AGEC3004 C AGEC4122 N AGEC4012, AGEC4112	Semester 1
RSEC4142 Resource Economics Project B	9	P AGEC3104 or AGEC4112 or AGEC4041 C RSEC4141 N AGEC4013, AGEC4113 <i>Note: Department permission required for enrolment</i>	Semester 2
or			
AGEC4122 Research Exercises B	9	P 2 units out of AGEC3102, AGEC3103, AGEC 3104, or AGEC3004 C AGEC4121 N AGEC4013, AGEC4113	Semester 2
AFNR4001 Professional Development	6	N AGRF4000 <i>Note: Department permission required for enrolment</i>	Semester 2
Plus an aggregate of 12 credit points of the following elective units, of which at least 6 credit points must be elective RSEC units:			
AGEC4101 Agricultural Marketing Analysis	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) N AGEC4004	Semester 2
AGEC4102 Agricultural Development Economics	6	P AGEC2001 or AGEC2101 and AGEC2003 or AGEC2103	Semester 2
AGEC4103 International Agricultural Trade	6	P (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) N AGEC4003	Semester 1
AGEC4107 Special Topics	6	N AGEC4007 <i>Note: Department permission required for enrolment</i>	Semester 1 Semester 2
AGEC4108 Quantitative Planning Methods <i>This unit of study is not available in 2011</i>	6	P AGEC3101 or AGEC3103 or AGEC3031 or AGEC3001 N AGEC4008	Semester 2
AGEC4109 Agricultural Finance and Risk	6	P {(AGEC3001 or AGEC3101) and (AGEC2003 or AGEC2103)} OR (AGEC1102 and AGEC3103) N AGEC4009	Semester 2
RSEC4133 Economics of Mineral & Energy Industries <i>This unit of study is not available in 2011</i>	6	A (ECON2002 or ECOS2002), AGEC3001, AGEC2101, AGEC2105 P (ECON2001 or ECOS2001) and (AGEC2103 or AGEC2003) N ECON3013	Semester 2
RSEC4134 Economics of Water & Bio-resources	6	A (ECON2002 or ECOS2002), AGEC3001, AGEC2101, AGEC2105 P (ECON2001 or ECOS2001) and (AGEC2103 or AGEC2003) N ECON3013	Semester 2
When needed to complete a major, 6 credit points from the above elective units can be substituted with level 3 units from other disciplines, with approval of the degree coordinator.			

Table RE1: Elective units of study available for inclusion in years 1 or 2 of the BResEc degree

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ACCT1001 Accounting IA	6	A HSC Mathematics N ACCT1003, ACCT1004 <i>Available for only for continuing degree students who commenced their studies prior to 2011</i>	Semester 1 Semester 2
or			
ACCT1005 Accounting, Business and Society	6	N ACCT1001, ACCT1002, ACCT1003, ACCT1004	Semester 1 Semester 2
ACCT1003 Financial Accounting Concepts	6	N ACCT1001, ACCT1002 <i>Terminating unit.</i>	Semester 1
AFNR1001 The Rural Environment	6		Semester 1
AFNR1002 Climate and the Environment	6		Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
BIOL1001 Concepts in Biology	6	A None. However, semester 1 students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1911 <i>It is recommended that BIOL (1001 or 1911) be taken concurrently with either BIOL1003 or BIOL1903. Students who have completed HSC Biology and scored 80+ should enrol in BIOL1911. Students who lack 80+ in HSC Biology but have a UAI of at least 93 may enrol in BIOL1911 with permission from the UEO. The completion of MBLG 1001 is highly recommended.</i>	Semester 1 Summer Main
BIOL1002 Living Systems	6	A HSC 2-unit Biology. Students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1902 <i>It is recommended that BIOL (1001 or 1911) be taken before this unit of study. This unit of study, together with BIOL (1001 or 1911) provides entry to all Intermediate units of study in biology in the School of Biological Sciences.</i>	Semester 2
BIOL1902 Living Systems (Advanced)	6	P UAI (or ATAR equivalent) of at least 93 and HSC Biology result in the 90+, or Distinction or better in a University level Biology unit, or by invitation. N BIOL1002 <i>Note: Department permission required for enrolment</i>	Semester 2
CHEM1001 Fundamentals of Chemistry 1A	6	A There is no assumed knowledge of chemistry for this unit of study, but students who have not undertaken an HSC chemistry course are strongly advised to complete a chemistry bridging course before lectures commence. N CHEM1101, CHEM1901, CHEM1109, CHEM1903	Semester 1
CHEM1101 Chemistry 1A	6	A HSC Chemistry and Mathematics C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1109, CHEM1901, CHEM1903	Semester 1 Semester 2 Summer Main
CHEM1901 Chemistry 1A (Advanced)	6	P ATAR of at least 95.4 and HSC Chemistry result in band 5 or 6, or by invitation. C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1101, CHEM1109, CHEM1903 <i>Note: Department permission required for enrolment</i>	Semester 1
CHEM1002 Fundamentals of Chemistry 1B	6	P CHEM (1001 or 1101) or equivalent N CHEM1102, CHEM1108, CHEM1902, CHEM1904	Semester 2
CHEM1102 Chemistry 1B	6	P CHEM (1101 or 1901) or a Distinction in CHEM1001 or equivalent C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1108, CHEM1902, CHEM1904	Semester 1 Semester 2 Summer Main
CHEM1902 Chemistry 1B (Advanced)	6	P CHEM (1901 or 1903) or Distinction in CHEM1101 or equivalent C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1102, CHEM1108, CHEM1904 <i>Note: Department permission required for enrolment</i>	Semester 2
CLAW1001 Foundations of Business Law	6		Semester 1 Semester 2 Summer Early
ECMT1010 Business and Economic Statistics A	6	N ECMT1011, ECMT1012, ECMT1013, MATH1015, MATH1005, MATH1905, STAT1021, ECOF1010	Semester 1 Semester 2
GEOS1001 Earth, Environment and Society	6	N GEOS1901, GEOG1001, GEOG1002, GEOL1001, GEOL1002, GEOL1902	Semester 1
GEOS1002 Introductory Geography	6	N GEOS1902, GEOG1001, GEOG1002	Semester 2
GEOS1003 Introduction to Geology	6	N GEOS1903, GEOL1002, GEOL1902, GEOL1501	Semester 2 Summer Late
GOVT1101 Australian Politics	6		Semester 1
GOVT1202 World Politics	6		Semester 1 Semester 2
PSYC1001 Psychology 1001	6		Semester 1 Summer Main
PSYC1002 Psychology 1002	6		Semester 2 Summer Main
Modern Language (Level 1 or higher) units, with the approval of the Dean FAFNR			

Notes:

- Students may count no more than 12 credit points of the units specified in this table as elective units towards meeting the requirements of their degree (equivalently, 24 credit points in total when the units of compulsory Year 1 science are counted).
- ACCT1001/ACCT1005 and ACCT1003 are mutually exclusive.
- Entry to ACCT1001/ACCT1005 is restricted: the student's academic record must be as good as that needed for admission to the University's BCom program.
- Prerequisites apply for many second semester units.

Table RE2: Elective units of study available for inclusion in years 2 or 3 of the BResEc degree

Units of study in the following discipline areas (level 2000 or level 3000 unless otherwise specified):

Agricultural Economics (level 3000), Agricultural Chemistry, Animal Science, Biology (including plant science units), Chemistry, Commercial Law, Crop Science, Econometrics, Economics, Environmental Science, Finance, Geography, Geology, Government, Land and Water Science, Mathematics (including Statistics), Marine Science, Psychology, Soil Science

- Notes:**
AGEC2102 is permitted for Year 2 only.

Prerequisites and/or corequisites apply for most units.

Majors in the BResEc degree

The definitions of majors in the following tables apply for students commencing in 2005 or later. These students are required to complete 48 credit points in their chosen majors. Their majors must comply with the requirements for the BResEc degree as set out below, and also with the minimum requirements of the discipline teaching that major.

Students who have commenced in 2004 or earlier will be required to complete 44 credit points to obtain a major. The major will be defined according to the criteria as currently determined by the discipline teaching that major. The current requirements for majors in the Faculty of Economics and Business and the Faculty of Science can be found in the respective 2006 faculty handbooks.

All students must complete a Resource Economics major. In addition, students may also complete major(s) in other disciplines.

Resource Economics major

Resource Economics
Junior (Level 1) units RSEC1031 Two of (MATH1001, 1002, 1003 and 1005) or ECMT1010 Level 2 and 3 units AGE2101 and 2103 Three of AGE23103 and Level 4 RSEC units

Non-Resource Economics majors available in the BResEc Degree

Agricultural Science
Junior (Level 1) units AFNR1001 AFNR1002 Level 2 and 3 units PLNT2003 SOIL2003 Four other level 2/3/4 Agricultural Science units of study

Biology
Junior (Level 1) units Two BIOL1000 units Level 2 and 3 units Two BIOL2000 units Four BIOL3000 units See FSc Handbook

Chemistry
Junior (Level 1) units One or two CHEM1000 units Two of MATH1001, 1002, 1003 and 1005 Level 2 and 3 units Two specified CHEM2000 units Four CHEM2000 units See FSc Handbook

Commercial Law
Junior (Level 1) units CLAW1001 And either any CLAW2000 or CLAW3000 level units of study Level 2 and 3 units CLAW2201 Any five further CLAW2000 or 3000 units See FEB Handbook

Econometrics
Junior (Level 1) units ECMT1010 and ECMT1020 Level 2 and 3 units ECMT2110 and ECMT3110 Four further ECMT2000 and ECMT3000 units See FEB Handbook

Economics
Junior (Level 1) units ECON1001 and ECON1002 Level 2 and 3 units ECOS2001 and ECOS2002 Any four further ECOS2000 or ECOS3000 units, of which at least two must be at the 3000 level. See FEB Handbook

Finance
Junior (Level 1) units ACCT1001* or ACCT1003 and either ECMT1010 or ECON1001 Level 2 and 3 units FINC2011 and FINC2012 Any four further FINC3000 units, or three further FINC3000 units and one of either ACCT3013 or CLAW3201 See FEB Handbook *Restricted entry

Geography
Junior (Level 1) units GEOS1001 GEOS1003 GEOS1002 or other level 1 science unit Level 2 and 3 units Two GEOG or GEOS2000 units Four GEOG or GEOS3000 units See FSc Handbook

Geology
Junior (Level 1) units GEOS1003 and CHEM1001 Level 2 and 3 units Two GEOL2000, GEOS2000 or MARS2000 units Four GEOS3000 or MARS3000 units See FSc Handbook

Government and International Relations
Junior (Level 1) units Two Level 1000 Government (GOVT) units Level 2 and 3 units Six GOVT2000 units See FEB Handbook

Marine Science
Junior (Level 1) units Two units (12 credit points) of Level 1 units in AFNR, BIOL or CHEM See FSc Handbook

Mathematics
Junior (Level 1) units MATH1001, 1002, 1003 and 1005 (or parallel advanced units)
Level 2 and 3 units Two of MATH2061, MATH2065, MATH2070 Six 4 credit point MATH3000 units See FSc Handbook

Soil Science
Junior (Level 1) units Two CHEM1000 units
Level 2 and 3 units AGCH2003 SOIL2003 24 credit points of SOIL3000 units

Statistics
Junior (Level 1) units MATH1001, 1002, 1003 and 1005 (or parallel advanced units)
Level 2 and 3 units STAT2011 and STAT2012 and 24 credit points of STAT3000 units See FSc handbook

Notes:

- For disciplines based in other faculties (e.g. Geography is based in the Faculty of Science), the specification of a major here may differ from that in its 'home' faculty. The requirement for a major within the BResEc degree is no less, nor more liberal, than in the discipline's 'home' faculty.
- A student can count a particular unit of study towards only one major.
- Where a student could count a unit of study towards more than one major, the student must nominate by the end of their final year the particular major to which the unit is to be allocated.

Bachelor of Science in Agriculture (BScAgr)

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
Year 1			
Year 1 will have the following 48 credit point structure:			
AFNR1001 The Rural Environment	6		Semester 1
BIOL1001 Concepts in Biology	6	A None. However, semester 1 students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1911 <i>It is recommended that BIOL (1001 or 1911) be taken concurrently with either BIOL1003 or BIOL1903. Students who have completed HSC Biology and scored 80+ should enrol in BIOL1911. Students who lack 80+ in HSC Biology but have a UAI of at least 93 may enrol in BIOL1911 with permission from the UEO. The completion of MBLG 1001 is highly recommended.</i>	Semester 1 Summer Main
or			
BIOL1911 Concepts in Biology (Advanced)	6	P 80+ in HSC 2-unit Biology (or equivalent) or Distinction or better in a University level Biology unit, or by invitation. N BIOL 1001 <i>Note: Department permission required for enrolment It is recommended that BIOL (1001 or 1911) be taken concurrently with all other Junior units of study in Biology. The completion of MBLG1001 is highly recommended.</i>	Semester 1
CHEM1001 Fundamentals of Chemistry 1A	6	A There is no assumed knowledge of chemistry for this unit of study, but students who have not undertaken an HSC chemistry course are strongly advised to complete a chemistry bridging course before lectures commence. N CHEM1101, CHEM1901, CHEM1109, CHEM1903	Semester 1
or			
CHEM1101 Chemistry 1A	6	A HSC Chemistry and Mathematics C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1109, CHEM1901, CHEM1903	Semester 1 Semester 2 Summer Main
or			
CHEM1901 Chemistry 1A (Advanced)	6	P ATAR of at least 95.4 and HSC Chemistry result in band 5 or 6, or by invitation. C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1001, CHEM1101, CHEM1109, CHEM1903 <i>Note: Department permission required for enrolment</i>	Semester 1
ENVX1001 Introductory Statistical Methods	6	A 70 or more in HSC Mathematics	Semester 1
AFNR1002 Climate and the Environment	6		Semester 2
AGEC1006 Economic Environment of Agriculture	6	A HSC Mathematics N AGEC1003 and AGEC1004	Semester 2
BIOL1002 Living Systems	6	A HSC 2-unit Biology. Students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1902 <i>It is recommended that BIOL (1001 or 1911) be taken before this unit of study. This unit of study, together with BIOL (1001 or 1911) provides entry to all Intermediate units of study in biology in the School of Biological Sciences.</i>	Semester 2
or			
BIOL1902 Living Systems (Advanced)	6	P UAI (or ATAR equivalent) of at least 93 and HSC Biology result in the 90+, or Distinction or better in a University level Biology unit, or by invitation. N BIOL1002 <i>Note: Department permission required for enrolment</i>	Semester 2
CHEM1002 Fundamentals of Chemistry 1B	6	P CHEM (1001 or 1101) or equivalent N CHEM1102, CHEM1108, CHEM1902, CHEM1904	Semester 2
or			
CHEM1102 Chemistry 1B	6	P CHEM (1101 or 1901) or a Distinction in CHEM1001 or equivalent C Recommended concurrent units of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1108, CHEM1902, CHEM1904	Semester 1 Semester 2 Summer Main
or			
CHEM1902 Chemistry 1B (Advanced)	6	P CHEM (1901 or 1903) or Distinction in CHEM1101 or equivalent C Recommended concurrent unit of study: 6 credit points of Junior Mathematics N CHEM1002, CHEM1102, CHEM1108, CHEM1904 <i>Note: Department permission required for enrolment</i>	Semester 2
Year 2			
Year 2 will have the following 48 credit point structure:			
ENVX2001 Applied Statistical Methods	6	P ENVX1001 or BIOM1003 or MATH1011 and MATH1015	Semester 1
GENE2001 Agricultural Genetics 2	6	P At least one of (BIOL1001, BIOL1002, BIOL1101, BIOL1901, BIOL1911)	Semester 1
PLNT2001 Plant Biochemistry and Molecular Biology	6	P 12 Junior credit points from Chemistry and Biology (or with the Dean's permission BIOL1201 and BIOL1202) N PLNT2901, AGCH2004	Semester 1
or			
PLNT2901 Plant Biochem & Molecular Biology (Adv)	6	P Distinction average in 12 Junior credit points from Chemistry and Biology (or with the Dean's permission BIOL1201 and BIOL1202) N PLNT2001, AGCH2004	Semester 1
SOIL2003 Soil Properties and Processes	6		Semester 1

Undergraduate course requirements

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AVBS1002 Concepts of Animal Management	6	P 6 credit points of junior Biology	Semester 2
ENTO2001 Agricultural Entomology	6	P 12 credit points of first year biology	Semester 2
MICR2024 Microbes in the Environment	6	P 12 credit points of first year Biology N MICR2001, MICR2901, MICR2003, MICR2007, MICR2011, MICR2021, MICR2921, MICR2909	Semester 2
PLNT2003 Plant Form and Function	6	A 12 credit points of Junior Biology, or equivalent eg BIOL (1001 or 1101 or 1901 or 1911) and BIOL (1002 or 1902 or 1003 or 1903) N PLNT2903, BIOL2003, BIOL2903, CROP2001	Semester 2
or			
PLNT2903 Plant Form and Function (Advanced)	6	A 12 credit points of Junior Biology, or equivalent eg BIOL (1001 or 1101 or 1901 or 1911) and BIOL (1002 or 1902 or 1003 or 1903) N PLNT2003, BIOL2003, BIOL2903, CROP2001	Semester 2
Year 3*			
Year 3 will have the following structure: a core (24 credit points) of			
AGCH3025 Chemistry and Biochemistry of Foods	6	P AGCH2004 or BCHM2071 or BCHM2971 or BCHM2072 or BCHM2972 or PLNT2001 or PLNT2901 or 6 credit points of Intermediate units in Chemistry	Semester 1
PPAT3003 Plant Disease	6	P MICR2024	Semester 1
AGRO3004 Managing Agro-Ecosystems	6	P AFNR1001, AFNR1002, PLNT2003, SOIL2003 and (BIOM2001 or ENVX2001)	Semester 2
SOIL2004 The Soil Resource	6		Semester 2
And 24 credit points from Table D.			
Table D - Year 3 Electives			
AFNR3001 Agro-ecosystems in Developing Countries	6	<i>Note: Department permission required for enrolment</i>	S1 Intensive
Agricultural Chemistry			
AGCH3032 Land and Water Ecochemistry	6	P AGCH2003 or AGCH2004 or PLNT2001 or CHEM24XX or BCHM2XXX or ENVI2001 N AGCH3030, AGCH3031 <i>Note: Department permission required for enrolment</i>	Semester 2
AGCH3400 Agricultural Plant-Microbe Interactions	6	A General microbiology, chemistry, agricultural chemistry or biochemistry P MICR2024, PLNT2001	Semester 2
Agricultural Economics			
AGEC2102 Agribusiness Marketing	6	P AGECE1006 or AGECE1102 or RSEC1031	Semester 1
AGEC2103 Production Economics	6	P ECON1001 or AGECE1006 or (AGECE1003 and AGECE1004) or RSEC1031 N AGECE2003	Semester 1
AGEC2105 Applied Econometric Modelling 1	6	P ECMT1010 and ECMT1020 N ECMT2110	Semester 1
AGEC3101 Agribusiness Management	6	P AGECE2103 or AGECE2003 or AGECE1006 N AGECE3103 and AGECE3001	Semester 2
AGEC3103 Applied Optimisation	6	P (AGECE2001 or AGECE2101) and (AGECE2003 or AGECE2103) N AGECE3101	Semester 1
AGEC2101 Market and Price Analysis	6	P AGECE1006 or (AGECE1003 and AGECE1004) or AGECE1002 or AGECE1102 or RSEC1031 or AGECE1031 N AGECE2001	Semester 2
AGEC3102 Agricultural and Resource Policy	6	P (AGECE2001 or AGECE2101) and (AGECE2003 or AGECE2103) N AGECE3002	Semester 1
Animal Science			
ANSC3102 Animal Reproduction	6	A ANSC3104	Semester 1
ANSC3103 Animal Structure and Function A	6	A AVBS1002 P 12 credit points of junior Biology	Semester 1
ANSC3101 Animal Nutrition 3	6	A Fundamentals of Biochemistry P ANSC2002 or AVBS1002	Semester 2
ANSC3104 Animal Structure and Function B	6	A AVBS1002 P ANSC3103	Semester 2
Biotechnology			
BIOL3018 Applications of Recombinant DNA Tech	6	P 12 credit points from MBLG (2071/2971), MBLG (2072/2972) and Intermediate Biology units. For BMedSc students: 36 credit points of Intermediate BMED units including BMED 2802. N BIOL3918	Semester 1
or			
BIOL3918 Applications of Recombinant DNA Tech Adv	6	P Distinction average in 12 credit points from MBLG (2071/2971), MBLG (2072/2972) and Intermediate Biology units. For BMedSc students: 36 credit points of Intermediate BMED units including Distinction in BMED2802. N BIOL3018	Semester 1
Environmetrics			
ENVX3001 Environmental GIS	6	A least 48 credit points in second year agriculture/science units.	Semester 2

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
ENVX3002 Statistics in the Natural Sciences	6	P ENVX2001 or BIOM2001 or STAT2012 or STAT2912	Semester 1
Horticulture			
HORT3005 Production Horticulture	6	A AFNR1001, AFNR1002 and HORT2002 P Two of PLNT2001, PLNT2901, PLNT2002, PLNT2902, PLNT2003, PLNT2903	Semester 1
Plant Pathology			
BIOL3017 Fungi in the Environment	6	P 12 credit points of Intermediate Biology or Plant Science, or 6 credit points of Intermediate Biology, or Plant Science, and 6 Intermediate credit points of either Microbiology or Geography. N BIOL3917 <i>Dates: 14-25 February 2011. The completion of 6 credit points of MBLG units is highly recommended.</i>	S1 Intensive
or			
BIOL3917 Fungi in the Environment (Advanced)	6	P Distinction average in 12 credit points of Intermediate Biology and Plant Science, or 6 credit points of Intermediate Biology, or Plant Science, and 6 Intermediate credit points of either Microbiology or Geography. N BIOL3017 <i>The completion of 6 credit points of MBLG units is highly recommended.</i>	S1 Intensive
Plant Science			
PLNT2002 Aust Flora: Ecology and Conservation	6	P 6 credit points of a Junior unit of study N PLNT2902	Semester 1
or			
PLNT2902 Aust Flora: Ecology & Conservation (Adv)	6	A The contents of BIOL(1002 or 1902) is assumed knowledge. Students wishing to enroll in Intermediate Biology (BIOL) and Plant Science (PLNT) units of study using BIOL(1003 or 1903) will need to do some preparatory reading P Distinction average in 6 credit points of Junior units of study N PLNT2002	Semester 1
or			
PLNT3003 Systematics and Evolution of Plants	6	P 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. N PLNT3903	Semester 1
or			
PLNT3903 Systematics and Evolution of Plants Adv	6	P Distinction average in 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. These requirements may be varied and students with lower averages should consult the Unit Executive Officer. N PLNT3003	Semester 1
PLNT3001 Plant, Cell and Environment	6	P 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent N PLNT3901	Semester 2
or			
PLNT3901 Plant, Cell and Environment (Advanced)	6	P 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent with average grade of distinction N PLNT3001 <i>Note: Department permission required for enrolment</i>	Semester 2
or			
PLNT3002 Plant Growth and Development	6	P 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent N PLNT3902, BIOL3021, BIOL3931	Semester 2
or			
PLNT3902 Plant Growth and Development (Advanced)	6	P 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent. These requirements may be varied and students with lower averages should consult the unit Executive Officer. N PLNT3002, BIOL3021, BIOL3931	Semester 2
Year 4*^			
In semester one Year 4 students will complete:			
AFNR4101 Research Project A	12	P 144 credit points of level 1000-3000 units of study	Semester 1
One core unit from Table E			
And one core or elective unit from Table D, E or F.			
In semester two Year 4 students will complete:			
AFNR4001 Professional Development	6	N AGRF4000 <i>Note: Department permission required for enrolment</i>	Semester 2
AFNR4102 Research Project B	12	P AFNR4101	Semester 2
And one core or elective unit from Table D, E or F			
* Maximum of 2 core units in Year 4 depending on specialisation (see Table E)			
^ A student may apply to the degree coordinator for permission to enrol in up to one (6 cp) elective University of Sydney unit of study in year 3 and up to one (6 cp) University of Sydney unit of study in year 4 which is not listed in Tables D or E. The application must (1) be made prior to enrolment in the unit (2) be submitted with a written academic justification for enrolment by the student and (3) be submitted with written approval of the relevant unit of study coordinator.			
Table E - Year 4 Core			
Agricultural Chemistry			

Undergraduate course requirements

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
AGCH4007 Instrumentation in Analytical Chemistry	6	P PLNT2001 or AGCH2003 or AGCH2004 or any Intermediate unit in Chemistry	Semester 1
AGCH3400 Agricultural Plant-Microbe Interactions	6	A General microbiology, chemistry, agricultural chemistry or biochemistry P MICR2024, PLNT2001	Semester 2
Agricultural Economics			
AGEC4103 International Agricultural Trade	6	P (AGEC2001 or AGECE2101) and (AGEC2003 or AGECE2103) N AGECE4003	Semester 1
AGEC4104 Industrial Organization of Agribusiness	6	P (AGEC2001 or AGECE2101) and (AGEC2003 or AGECE2103)	Semester 1
AGEC3102 Agricultural and Resource Policy	6	P (AGEC2001 or AGECE2101) and (AGEC2003 or AGECE2103) N AGECE3002	Semester 1
Agricultural Genetics			
GENE4015 Cytogenetics	6	P BIOM2001, GENE2001	Semester 2
GENE4012 Plant Breeding	6	P GENE2001, GENE4013	Semester 2
Agronomy			
AGRO4003 Crop and Pasture Agronomy	6	P AGRO3004	Semester 1
AGRO4004 Sustainable Farming Systems	6	P AGRO3004	Semester 1
Entomology			
ENTO4004 Insect Taxonomy and Systematics	6	P ENTO2001 or ENTO2002 or BIOL2017 or BIOL2917 (Note: BIOL2017/BIOL2917 are only for the BSc students who elect to take this unit of study)	Semester 1
ENTO4003 Integrated Pest Management	6	P ENTO2001 or ENTO2002 or BIOL2017 or BIOL2917 (Note: BIOL2017/BIOL2917 are only for BSc students who elect to take this UoS)	Semester 2
Environmetrics			
ENVX4001 GIS, Remote Sensing and Land Management	6	A Recommended units include GEOS2111/GEOS2911 (Natural Hazards: a GIS approach), ENVX3001 (Environmental GIS), SOIL3004 (The Soil Resource), GEOS3014/GEOS3914 (GIS in Coastal Management) Note: Department permission required for enrolment Consent of the unit coordinator required.	Semester 2
Farming Systems			
AGEC4104 Industrial Organization of Agribusiness	6	P (AGEC2001 or AGECE2101) and (AGEC2003 or AGECE2103)	Semester 1
AGRO4004 Sustainable Farming Systems	6	P AGRO3004	Semester 1
Food Science			
AGCH3026 Food Biotechnology	6	P AGCH2004 or BCHM2071 or BCHM2971 or BCHM2072 or BCHM2972 or PLNT2001 or PLNT2901 or 6 credit points of Intermediate units in Chemistry C AGCH3025	Semester 1
AGCH4007 Instrumentation in Analytical Chemistry	6	P PLNT2001 or AGCH2003 or AGCH2004 or any Intermediate unit in Chemistry	Semester 1
Horticulture			
HORT4004 Issues in Horticultural Science 4A	6	P HORT3001 or HORT3004	Semester 1
HORT4005 Research and Practice in Hort Science	6	P HORT3005	Semester 2
Livestock Production			
AGRO4003 Crop and Pasture Agronomy	6	P AGRO3004	Semester 1
AGRO4005 Livestock Production Systems	6	A ANSC3101 P AGRO3004 Note: Department permission required for enrolment	Semester 2
Plant Pathology			
PPAT4004 Advanced Mycology and Plant Pathology	6	P PPAT3003	Semester 1
PPAT4005 Soil Biology	6	P MICR2024 or 6cp intermediate microbiology	Semester 1
Soil Science			
SOIL3009 Contemporary Field and Lab Soil Science	6	P SOIL2003	Semester 1
SOIL3010 The Soil at Work	6	P SOIL2003 or SOIL2004	Semester 2
Table F - Year 4 electives (not including year 3 electives and year 4 core)			
Agricultural Genetics			

Unit of study	Credit points	A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition	Session
GENE4013 Molecular Genetics and Breeding	6	P BIOM2001, GENE2001	Semester 1
GENE4014 Population and Quantative Genetics <i>This unit of study is not available in 2011</i>	6	P BIOM2001, GENE2001 C GENE4012	Semester 1
Animal Science			
AVBS4009 Aquaculture	6	P Animal and Veterinary Bioscience years 1-3 OR Bachelor of Science in Agriculture years 1-3	Semester 1
ANSC3107 Animal Genetics 3	6	P GENE2001 or MBLG2072 or MBLG2972	Semester 2
AVBS4002 Dairy Production and Technology	6	A Enrolled students are expected to have some understanding of key components of the dairy production system, including basic knowledge of animal physiology and nutrition. P ANSC3101, (Animal and Veterinary Bioscience years 1-3 OR Bachelor of Science in Agriculture years 1-3)	Semester 2
AVBS4008 Intensive Animal Industries	6	P (Animal and Veterinary Bioscience years 1-3) OR (Bachelor of Science in Agriculture years 1-3)	Semester 2
AVBS4012 Extensive Animal Industries	6	P Animal and Veterinary Bioscience years 1-3 OR Bachelor of Science in Agriculture years 1-3	Semester 1
Land and Water Science			
LWSC3005 Environmental Water Quality	6	P LWSC2002 or GEOG2321 or AGCH2003 or 6 credit points of intermediate Chemistry <i>Note: Department permission required for enrolment</i>	Semester 1
Plant Pathology/Microbiology			
VIRO3001 Virology	6	A MICR (2021 or 2921 or 2022 or 2922) P At least 6 credit points of MBLG units and at least 6 credit points in Intermediate MICR or BCHM or BIOL or IMMU or PCOL or PHSI or PLNT units. For BMedSc students: 42 credit points of Intermediate BMED units including BMED2802. For BScAgr students: PLNT (2001 or 2901) and MICR2024. N VIRO3901 <i>Students are very strongly advised to complete VIRO (3001 or 3901) before enrolling in VIRO3002 Medical and Applied Virology in Session 2.</i>	Semester 1
MICR3022 Microbial Biotechnology <i>This unit of study is not available in 2011</i>	6	P At least 6 credit points of MBLG units and 6 credit points of Intermediate MICR units. For BMedSc students: 42 credit points of Intermediate BMED units including BMED (2802 and 2807). For BScAgr students: PLNT (2001 or 2901) and MICR2024. N MICR3922, MICR3002, MICR3902	Semester 2

Undergraduate units of study

ACCT1001

Accounting IA

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 1x 2hr lecture and 1x 1hr tutorial per week **Prohibitions:** ACCT1003, ACCT1004 **Assumed knowledge:** HSC Mathematics **Assessment:** Tutorial work (10%); Practice Set (10%); Mid-semester examination (20%); Final examination (60%)

Note: Available for only for continuing degree students who commenced their studies prior to 2011

Accounting 1A introduces students to the fundamentals of accounting and the double entry system of financial recording. Students examine the assumptions underlying the preparation of financial statements for external users and gain the skills necessary to prepare, interpret and analyse financial statements. In doing so students develop their ability to understand, discuss, analyse and write about accounting-related topics. This unit is designed as an introduction to accounting. As such, no prior knowledge of accounting is assumed.

ACCT1002

Accounting IB

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 1x2hr lecture and 1x1hr tutorial per week **Prerequisites:** ACCT1001 **Prohibitions:** ACCT1003, ACCT1004 **Assessment:** Homework tasks (10%); Group project (20%); Final examination (70%)

Note: Available for only for continuing degree students who commenced their studies prior to 2011

Accounting is about the recording, classification, reporting and interpretation of information to help make economic decisions. Accounting 1A introduces accounting and the double entry system for financial recording. Accounting 1B develops themes and competencies learnt in Accounting 1A. The primary focus of this unit of study is on conceptual and technical issues relating to management accounting and the information required by internal users to make strategic and operational decisions relating to managing a business. A second theme is the financial accounting information businesses are required to produce to assess a firm's financial state and performance. Students examine how commercial and ethical issues affect business decisions and how there are present and future consequences that will affect different groups of interest.

ACCT1003

Financial Accounting Concepts

Credit points: 6 **Session:** Semester 1 **Classes:** 1x2hr lecture and 1x1hr workshop per week **Prohibitions:** ACCT1001, ACCT1002 **Assessment:** Group assignment (20%); Mid-semester examination (25%); Final examination (55%)

Note: Terminating unit.

ACCT1003 Financial Accounting Concepts provides an introduction to how publicly available financial information is generated and communicated in order to facilitate economic decision-making. The unit is designed for students who are not majoring in accounting. It utilises a transaction-effect approach to the preparation of financial statements and emphasises the effect of choices in accounting methods on the financial statements and, thus, on decision-making.

ACCT1004

Management Accounting Concepts

Credit points: 6 **Session:** Semester 2 **Classes:** 1x 2hr lecture and 1x 1hr tutorial per week **Prohibitions:** ACCT1001, ACCT1002 **Assessment:** Group assignments (30%); Mid-semester examination (20%); Final examination (50%)

Note: Terminating unit.

This unit is designed to explain how managers use accounting information, with an emphasis on identifying relevant accounting

information for decision-making. Topics include: estimating cost functions, relevant costing, cost allocation, budgeting, short and long term decision making and managing within a changing environment.

ACCT1005

Accounting, Business and Society

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 1x 2hr lecture and 1x 1hr tutorial per week **Prohibitions:** ACCT1001, ACCT1002, ACCT1003, ACCT1004 **Assessment:** Tutorial work (15%); Written assessment (15%); Mid-semester examination (20%); Final examination (50%)

This unit canvasses the fundamentals of accounting - the language of business. It is directed to providing a broad understanding of the role of accounting in business and society. It seeks to develop an understanding of the economic-cum-financial and social repercussions of accounting, as well as a brief inculcation of the technical skills in manipulating numerical abstractions. It is accounting in an action setting designed to show that there are many uses of accounting data. Uses by numerous types of investors (individuals, institutional shareholders, creditors), employees, the government and others are considered. Starting from an accountability focus, it moves to a decision making focus - both functions are explained through recourse to the double entry equation, augmented by primarily an output (financial statements) perspective, accounting is demonstrated to be related to many decisions. There are many organisational forms that are considered - sole traders, partnerships, corporations, other types of corporate joint ventures and associations and the unit considers accounting from both the private and public sector perspectives. Accounting is shown to provide necessary information to allow varied interests to make informed decisions. Those decisions can be considered as being both internal and external to the firm. This unit demonstrates how accounting influences the way societal elements interact and government taxes are levied. Some more technical aspects of the elements of accounting are outlined - within the accounting equation, the elements of assets, liabilities, revenues and expenses are examined - within simple, familiar settings. Differing sectors private (listed entities primarily) and public (non-listed entities) are shown to be equally dependent on accounting. As well as the conventional financial reports - balance sheet, profit and loss, cash flow statements - students are exposed to the more recent statements such environmental and corporate social responsibility reports. Accounting issues are also explored within a governance framework.

ACCT1006

Accounting and Financial Management

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 1x 2hr lecture and 1x 1hr tutorial per week **Prerequisites:** ACCT1005 **Prohibitions:** ACCT1001, ACCT1002, ACCT1003, ACCT1004 **Assessment:** Tutorial work (5%); Group assignment (10%); Practice set (10%); Mid-semester exam (20%); Final exam (55%)

Accounting and Financial Management is an introduction to financial reporting, and the gateway unit to further study in accounting and to a major in accounting. This unit builds upon the accounting context, presented in ACCT1005 Accounting, Business and Society, with the aim of developing the technical skills of recording basic business transactions through accounting systems. In addition to this technical focus, specific attention will be given to the way in which the accounting information can be used to undertake financial management and analysis, to give students the ability to produce and interpret financial reports.



AFNR1001**The Rural Environment**

Credit points: 6 **Teacher/Coordinator:** Mr Peter Ampt **Session:** Semester 1 **Classes:** 2x1-hr lectures/week 1x3-hr laboratory practical/week on weeks 1 to 10 1x3-hr field practical 11am-5pm on weeks 11 to 13 **Assessment:** 1x2hr exam (50%), problem-based learning (20%), practical assessment (20%), plant collection (10%) **Practical field work:** Field practical sessions allow 'hands-on' experience with agronomy and animal husbandry

This unit allows students to discuss Australian rural production and the Australian environment, their interrelation, the issues agriculture and the environment face for the future and the context in which this takes place. It is a core unit for students in BScAgr and BAnVetBioSc and is the main introductory unit for further studies in the Faculty. For studies in the area of Agriculture and Natural Resources, it is important to be able to identify and describe common domestic animals, crops and weeds, broad acre production systems, key environmental issues and to be able to discuss their significance. Students completing this unit of study will be able to relate the Australian environment to opportunities and limitations for agronomy, animal husbandry and native animal and plant species, partly through problem based learning (PBL) in relation to a topical rural issue. In addition students will practice the identification of economic plant species and explore the ecology of pests and weeds and related integrated management practices. Through the problem based activities, students will learn valuable research skills and how to critically assess sources of information through library and database research. Through the production of reports and essays, students can demonstrate academic writing and recognise the importance of academic honesty.

Textbooks

Malcolm B, Sale P, Leury B, Barlow S (2009). 'Agriculture in Australia - An Introduction (2 edn).' (Oxford University Press: South Melbourne)
Pearson CJ, Cunningham GM and King DH (1993). 'A Plain English Guide to Agricultural Plants.' (Longman Cheshire: Melbourne)
Pratley JE (Ed) (2003). 'Principles of Field Crop Production. (4 edn)' (Oxford University Press: South Melbourne)

AFNR1002**Climate and the Environment**

Credit points: 6 **Teacher/Coordinator:** Mr Peter Ampt **Session:** Semester 2 **Classes:** 2x1-hr lectures/week, 1x1-hr workshop /week on weeks 1 to 8, 1x3-hr laboratory classes/week 10am-1pm on weeks 6 to 9. **Assessment:** 1x2hr exam (50%), problem-based learning (20%), workshops (10%), laboratories (15%), reflective learning journal (5%).

This unit allows the students to discover how climate influences the biophysical and biotic environment and how this affects rural production, native and domestic animals, crops and pastures, native vegetation and pest populations; it also highlights the importance of physics in solving problems in relation to climate and rural production. It is a core unit for students in BScAgr and BAnVetBioSc, builds on knowledge gained in AFNR1001 and lays the basis for studies in the biophysical area of the Faculty. For studies in the area of Agriculture and Natural Resources, it is important to develop knowledge and quantitative skills in the basic physical principles and the main drivers for climate and climate change in an agricultural context. Students completing this unit of study will be able to reflect on the ecosystem interactions between animals, plants and the biophysical environment. In addition, students will experiment with how changes in climate and spatial climate variability can affect animal and pest populations, vegetation densities and cropping patterns and its relation to management decisions. Using problem based activities, students will learn valuable research skills and to critically assess sources of information through library and database research. Students will demonstrate academic writing by producing reports and essays and recognise the importance of academic honesty.

Textbooks

Malcolm B, Sale P, Leury B, Barlow S (2009). 'Agriculture in Australia - An Introduction (2 Edn).' (Oxford University Press: South Melbourne)
Denny MW (1993) 'Air and Water: the Biology and Physics of Life's Media (Princeton University Press).

AFNR3001**Agro-ecosystems in Developing Countries**

Credit points: 6 **Teacher/Coordinator:** Dr. Paulo Santos **Session:** S1 Intensive **Classes:** 1x18 days fieldtrip before start of semester 1 **Assessment:** Individual report (100%)

Note: Department permission required for enrolment.

This unit provides students with a direct contact with the agricultural reality of a developing country through a fieldtrip. Active learning in the field through contacts with farmers, public servants, cooperatives, private firms and NGOs should then motivate a critical reflection on the constraints to agricultural development in these environments.

The fieldtrip will be organized around central themes (for example, technology adoption, sustainable use of resources, access to credit, land use change) that will be introduced in a short series of seminars (held on main campus ahead of the departure and intended to provide a first introduction to some of the questions that are expected to be addressed in the field) and will constitute the focus of group work once back to main campus.

Although there are no formal prerequisites, the unit is directed to students that have completed most of the second year units in their degrees.

N.B. Department permission required for enrolment. Please note that, in practice, this unit will run during Session 6 and all classes and fieldtrip will be scheduled for the weeks prior to the commencement of Semester 1.

AFNR4001**Professional Development**

Credit points: 6 **Teacher/Coordinator:** Ms LA Henry, Dr D Field **Session:** Semester 2 **Classes:** Workshops over four years **Prohibitions:** AGRF4000 **Assessment:** 1x blog posting (10%), 1x on-line (multi-media) (30%) and 1x portfolio (60%) **Practical field work:** 40 days of professional experience, 1 week long excursion

Note: Department permission required for enrolment.

This unit of study is designed to allow students to critically reflect on the relationship between the rural enterprise and environment and how they can contribute to the future decisions and management affecting the rural community. It is a core unit of study in 4th year for the BAgEc, BScAgr, BLWSc, BResEc, BHortSc which requires students to complete 40 days of professional experience with the expectation that students will examine the nature of facts from their degree in this environment. A minimum of 15 days must be completed on-farm/field. The remaining days may be at the student's discretion. The unit will be counted towards 4th year, but professional experience placements will normally be undertaken throughout the degree. In the early stages of the Professional Development program students participate in Faculty excursions that have been developed so they can experience a range of activities, such as research, extension, on-farm and industry both in the rural and urban environment to complement their learning within their individual degree programs. Building on this various workshops have been developed to assist students to identify a rural environment theme or issue of their interest with the specific emphasis being placed on them reflecting on how their new understandings of their theme of interest affects their personal and professional development. To complete this unit students will present a portfolio of their theme including critical reflection on the pivotal relationships between the academic degree, rural environment, professional experience, and beliefs and values if the rural community. Through developing these pivotal relationships, students will be able to use their new understandings to support and guide the future developments in the rural enterprise and environment. By developing and presenting the portfolio and engaging in other online activities the students will enhance their skills in inquiry, information literacy and communication. In particular the autonomous development of case studies reflecting the contemporary issues in agriculture and their professional placements the students will have to consider their understandings of ethical, social and professional issues and further develop the personal and intellectual autonomy.

Note: Department permission required for enrolment

AFNR4101**Research Project A**

Credit points: 12 **Teacher/Coordinator:** Dr Stephen Cattle **Session:** Semester 1 **Classes:** No formal classes, approx 18h per week **Prerequisites:** 144 credit points of level 1000-3000 units of study **Assessment:** Research proposal, literature review.

This unit aims to develop a student's ability to undertake a major research project in an area of specialization. The unit builds on theoretical and applied knowledge gained across most of the units of study undertaken throughout their degree program. This unit is a corequisite with AFNR4102 and each student will work with an academic supervisor in an area of specialization and develop a well defined research project to be executed. The research project is undertaken to advance the students ability to build well-developed research skills, a strong analytical capacity, and the ability to provide high quality research results demonstrating a sound grasp of the research question. Working with an academic supervisor students will develop their ability to define a research project including the producing of testable hypotheses, identifying existing knowledge from reviewing the literature and the design and execution of a research strategy towards solving the research question. Students will build on their previous research and inquiry skills through sourcing a wide range of knowledge to solve the research problem and enhance their intellectual and personal autonomy by means of the development of experimental programs. Students will improve their written and planning skills by composing a research project proposal and the writing of a comprehensive literature review.

AFNR4102**Research Project B**

Credit points: 12 **Teacher/Coordinator:** Dr Stephen Cattle **Session:** Semester 2 **Classes:** No formal classes, approx 18h per week **Prerequisites:** AFNR4101 **Assessment:** Oral presentation, research paper, poster.

This unit is a continuation of the major research project initiated in AFNR4101 and continues to build on theoretical and applied knowledge gained across most of the units of study undertaken throughout their degree program. Working with their academic supervisor in the area of specialization the student will continue to pursue the defined research project towards presenting final results and conclusions. The research results are presented in a format of a research paper as submitted to a research journal. The research paper and corrected literature review is combined and presented together as a thesis. Students will continue to build their research skills, develop strong analytical capacity, demonstrate a sound grasp of the topic, and an ability to interpret results in a broad framework. Working with an academic supervisor students will develop their ability to produce results of high quality, draw reliable conclusions and identify future areas avenues of research. Students will build on their previous research and inquiry skills through sourcing a wide range of knowledge to solve the research problem and enhance their intellectual and personal autonomy by means of the managing the research program. Students will improve their communication skills through oral presentation of their research findings, the production of a poster detailing their research findings and the writing of a research paper.

AGCH3025**Chemistry and Biochemistry of Foods**

Credit points: 6 **Teacher/Coordinator:** Dr Meredith Wilkes, Prof Les Copeland, Dr Robert Caldwell **Session:** Semester 1 **Classes:** 3x1-hr lectures/week, 1x4-hr practical fortnightly **Prerequisites:** AGCH2004 or BCHM2071 or BCHM2971 or BCHM2072 or BCHM2972 or PLNT2001 or PLNT2901 or 6 credit points of Intermediate units in Chemistry **Assessment:** 1x2hr exam (50%) and lab reports (50%)

This unit of study aims to give students an understanding of the properties of food constituents, and the interactions between these constituents during food processing, storage and digestion. The unit will develop an understanding of the relationship between form and functionality of constituents and the concept of fitness-for-purpose (ie, quality) in converting agricultural products into foods. Students will gain an appreciation of the relationship between chemical composition and properties of macroconstituents (carbohydrates, proteins, lipids)

and microconstituents (vitamins, minerals, flavour and antinutritional chemicals) and their functions in plant and animal based foods. The material presented in lectures and practical classes will enable students to develop research and inquiry skills and an analytical approach in understanding the biochemistry of foods, food processing and storage. On completing this unit, students will be able to describe the chemical and biochemical properties of major food constituents, and demonstrate an understanding of the functionality of these constituents in food processing and nutrition. Students will have gained experience in laboratory techniques used in industry for the analysis of some food products, and information literacy and communication skills from the preparation of practical reports.

Textbooks

Laboratory notes will be available for purchase from the Copy Centre in the first week of semester and lecture notes and readings will be made available through WebCT. There is no recommended textbook.

AGCH3026**Food Biotechnology**

Credit points: 6 **Teacher/Coordinator:** Dr Meredith Wilkes, Prof Les Copeland **Session:** Semester 1 **Classes:** 3x1-hr lectures/week, 1x4-hr practical fortnightly **Prerequisites:** AGCH2004 or BCHM2071 or BCHM2971 or BCHM2072 or BCHM2972 or PLNT2001 or PLNT2901 or 6 credit points of Intermediate units in Chemistry **Corequisites:** AGCH3025 **Assessment:** 1x2hr exam (50%) and lab reports (30%) and 1xoral presentation (20%)

This unit aims to give students an understanding of the chemistry, biochemistry and biotechnology of analytical and diagnostic methods and manufacturing processes used in the conversion of raw products into foods. Knowledge of food constituents gained in AGCH3025 will be applied to develop an understanding of: the use of enzymes in food processing and diagnostic technologies; processing of cereal, legume and oilseed grains, and livestock products, into foods; doughs and baking technologies; the evaluation of foods and food quality. Emphasis is placed on current issues faced by the food industry (including GM technology, organic production, and food safety) through a series of special guest lectures from people connected with the food industry. On completing this unit, students will have gained an enhanced understanding of food production and manufacturing systems, the processing of raw ingredients into food products, and food analysis and evaluation. Students will have gained experience in laboratory techniques used in industry for the analysis of some food products, and information literacy and communication skills from the preparation of a case study and practical reports.

Textbooks

Laboratory notes will be available for purchase from the Copy Centre in the first week of semester and lecture notes and readings will be made available through WebCT. There is no recommended textbook.

AGCH3032**Land and Water Ecochemistry**

Credit points: 6 **Teacher/Coordinator:** Feike Dijkstra **Session:** Semester 2 **Classes:** 5-day field trip in AVCC common break; 20 hr lectures/tutorials, 25 hr laboratory classes and project during semester **Prerequisites:** AGCH2003 or AGCH2004 or PLNT2001 or CHEM24XX or BCHM2XXX or ENVI2001 **Prohibitions:** AGCH3030, AGCH3031 **Assessment:** 1x 2 hr exam (60%), laboratory prac reports (25%) and 1x field trip report and presentation (15%)

Note: Department permission required for enrolment.

This field-oriented unit will develop professional expertise in rural ecochemistry, measuring impacts on sustainability and seeking solutions to chemical problems at the catchment scale. AGCH3032 is an elective unit suitable for the BSc, BScAgr, BLWSc, BHortSc, BResEc and BANVetBioSc degrees, building on intermediate units in chemistry or biochemistry. It will promote knowledge and professional skills related to key chemical processes in ecosystems causing risks to soil and water resources, the quality of agricultural produce and to ecological biodiversity. These will be examined by quantitative risk analysis, targeted monitoring and remediation, seeking innovative solutions (e.g. IPM and genetic modification).

A field trip in the AVCC break and professional report on a chosen topic will investigate relevant case studies at selected centres in eastern Australia doing innovative research on global warming and climate change, soil and water quality and environmental protection.

Lectures will provide knowledge in the environmental C, N and S cycles important for sustaining action in ecosystems, the nature of greenhouse gases and mitigation of their production including C sequestration, risks to biota (soil, water, plants, animals) from acidification and innovative means of remediation, environmental risk from pesticides and other pollutants, monitoring and their remediation. In laboratory exercises, students will gain skills in relevant analyses using GC, LC, mass spectrometry and ELISA. The assessment procedures are designed to provide students with skills in definition of research problems and risk assessment, quality in analyses, risk management and remediation, and effective communication of outputs.

AGCH3400

Agricultural Plant-Microbe Interactions

Credit points: 6 **Teacher/Coordinator:** Dr Rosalind Deaker (unit coordinator) A/Prof Michael Kertesz Dr Tina Bell **Session:** Semester 2 **Classes:** Intensive 3 ½ day workshop before semester begins (3 x 7hr + 1 x 4hr), 2 x 1hr lecture pw, 1 x 3 hr practical pw **Prerequisites:** MICR2024, PLNT2001 **Assumed knowledge:** General microbiology, chemistry, agricultural chemistry or biochemistry **Assessment:** 1 x 2hr theory exam (40%), 1 x laboratory report (35%), 1 x theory of prac exam (20%), 2 x lab quizzes (5%)

Can we effectively harness the potential of plant-growth promoting microorganisms to reduce dependence on chemical inputs and enhance sustainable agricultural crop production? This unit of study is designed to introduce students to important interactions between plants and microorganisms that are fundamental to nutrient cycling, nutrient-use efficiency and sustainability of resources and the environment. Disciplinary areas of study include agricultural chemistry, microbiology, plant physiology and molecular biology and will build on theoretical knowledge gained in MICR2042 and PLNT2001. There is a particular focus on beneficial plant-growth promoting microorganisms that are increasingly exploited as crop inoculants to improve soil health and reduce dependence on chemical fertilizers. This unit explores current research on beneficial plant-microbe interactions and provides a theoretical framework with which to evaluate their positive contribution to plant cultivation systems and the environment. An intensive three and a half day technical workshop in the week before semester commences will allow students to refresh sampling, plant analysis and general microbiology skills. Material obtained during the workshop will be analysed during semester and results will be related to the relative efficacy of experimental treatments. Mechanisms of plant-growth promotion studied will include biological nitrogen fixation, nutrient (P, S, Fe) mobilization, phytohormone production and biocontrol. The unit intends to highlight the necessarily close connection between science and industry in order to realize the full potential of benefits from inoculation. In this regard, issues relating to inoculant production, quality control and application will be explored. Students will interact with inoculant industry personnel and some opportunities for work experience will be available. The unit will provide students with technical skills of value to the microbial inoculant and related industries as well as developing relevant research skills to enable participation in the rapidly evolving program of research on microbial inoculants.

Textbooks

A reading list will be provided consisting of journal articles, book chapters and selected text books.

AGCH4007

Instrumentation in Analytical Chemistry

Credit points: 6 **Teacher/Coordinator:** Dr Robert Caldwell **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 8x3-hr laboratory sessions **Prerequisites:** PLNT2001 or AGCH2003 or AGCH2004 or any Intermediate unit in Chemistry **Assessment:** 1x2-hr exam (30%), laboratory reports (30%), problem assignment (40%)

This unit of study is designed to expose students to the principles and technology associated with modern analytical instrumentation. This unit plays an important role for students undertaking complementary studies in analytical food or environmental chemistry. Students are given the theoretical principles behind the instrumentation and wherever possible given hands-on training in the use of that instrumentation. At the conclusion of this unit, students should be able to develop software analysis protocols for several analytical

instruments, carry out analytical procedures, and perform basic fault-finding diagnostics. Students will be able to confidently assert that they have had experience in certain types of analytical procedures and operations using a range of analytical instrumentation.

AGEC1006

Economic Environment of Agriculture

Credit points: 6 **Teacher/Coordinator:** Ms LA Henry **Session:** Semester 2 **Classes:** 3x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Prohibitions:** AGECE1003 and AGECE1004 **Assumed knowledge:** HSC Mathematics **Assessment:** 1x2hr exam (55%) and 1x50 min mid-semester exam (25%) and workshop papers (20%)

To give students an overview of the structure, viability and importance of the agricultural sector in the Australian economy. It is a core unit of study in the BScAgr, BHortSc and BAnVetBioSc degrees. It is designed to give an understanding of the basic economic principles and how they relate to Australian agriculture. Students will look at basic economic theory and concepts and then apply these concepts to solve simplified versions of real problems faced by the agriculture and resource sectors. Students will look at the relationship between these concepts and the concepts learnt within their science related courses. Students will be able to analyse economic concepts and apply these concepts to real world scenarios. They will be able to synthesise and comprehend the relationship between the economic and science disciplines. The students will gain skills through workshop based tasks, information literacy and communication skills through the presentation of the workshop reports and discussion throughout the workshop.

Textbooks

HE Drummond and JW Goodwin, Agricultural Economics, 3rd edn (Prentice-Hall, 2011)

AGEC1101

Agricultural and Resource Systems

Credit points: 6 **Teacher/Coordinator:** Dr. Greg Hertzler (Coordinator), Mr Vilas Gobin (Teacher) **Session:** Semester 2 **Classes:** 1x1hr lecture plus 1x2hr lecture/week, 1x2hr tutorial/week, commencing week 2 **Prohibitions:** AGECE1001 **Assumed knowledge:** HSC Mathematics or HSC Mathematics Extension 1 **Assessment:** Tutorial Problem Sets (20%), Assignments (30%) and 1x 2hr Final Examination (50%)

An introductory unit of study which serves as a foundation for later units in agricultural economics, and introduces some of the basic economic principles required in the discipline of agricultural and resource economics. Topics covered include the agricultural and resource industries in the Australian and world economies; changing place of agriculture in world economies; place of agriculture in economic development; economic and physical factors determining the location of agricultural and resources industries; the changing structure of the Australian agricultural and resource sectors; the physical and biological environment in which farm firms operate; issues in natural resources.

AGEC1102

Agricultural Economics 1

Credit points: 6 **Teacher/Coordinator:** Dr Paulo Santos **Session:** Semester 1 **Classes:** 3x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Prohibitions:** AGECE1002 **Assumed knowledge:** HSC Mathematics or HSC Mathematics Extension 1 **Assessment:** 1xTutorial questions (30%) 1xOnline module (30%) 1x1 ½ hr mid-exam (20%) 1x2 hr final exam (20%)

The unit uses class experiments and discussion of academic papers to build intuition about the behavioral principles underlying the functioning of markets and their importance. Through the discussion of an online problem, these principles are applied to a policy question in the agricultural sector. Several exercises develop the necessary skills in the use of mathematics.

Textbooks

Partha Dasgupta, Economics. A very short introduction, Oxford University Press; Theodore C. Bergstrom and John H. Miller, Experiments with microeconomic principles: microeconomics (2nd edition), McGrawHill.

N.B. Students are advised not to buy the textbooks before lectures commence in case there are any changes.

AGEC2101**Market and Price Analysis**

Credit points: 6 **Teacher/Coordinator:** Dr. Shyamal Chowdhury **Session:** Semester 2 **Classes:** 1x2-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Prerequisites:** AGECE1006 or (AGECE1003 and AGECE1004) or AGECE1002 or AGECE1102 or RSEC1031 or AGECE1031 **Prohibitions:** AGECE2001 **Assessment:** 1x1hr in-class mid-term exam (20%), 1x3000wd assignment (20%), 1x2hr final exam (60%)

This unit focuses on the nature of agricultural and resource commodity markets, market demand relationships, market supply relationships, price determination under alternative market structures, marketing margin relationships, derived demand for inputs, spatially and temporally related markets, market dynamics, price expectations, commodity futures markets and other pertinent topics. Applied examples from the agricultural and resource industries and the overall economy will be used throughout the semester as illustrations of the principles involved.

N.B. Available to 2nd year students in Faculty of Economics and Business.

Advised prerequisite: AGECE2105 or ECMT2110

AGECE2102**Agribusiness Marketing**

Credit points: 6 **Teacher/Coordinator:** Mrs Elizabeth Nolan **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 1x1-hr tutorial/wk in weeks 6-10 **Prerequisites:** AGECE1006 or AGECE1102 or RSEC1031 **Assessment:** 1x1-hr exam or quizzes (20%), and group presentation (10%), and 1x2000wd case study (20%), and 1x2hr exam (50%)

This unit of study is designed to provide an introductory understanding of agribusiness marketing in a modern context. The unit will provide students in the Sciences degrees with an understanding of how the economic theory taught in first year in AGECE1006 can be treated in an applied context. For BAgEc students, it is an intermediate level unit in the Agribusiness major.

Students will study the theory relating to the firm-level marketing mix and marketing strategy. The emphasis will be on the organisation and trends of agribusiness marketing including value-adding and market power in the supply chain, market efficiency and international marketing by agribusiness firms.

The unit content is analytical, and draws on applied microeconomics to demonstrate how marketing decisions are made along the marketing chain. At the end of this unit students will be able to use marketing theory to analyse the steps in the marketing chain and be aware of the forces for change within that chain.

By completing this unit, students should have improved their ability to master key theories, identify and frame problems, organise knowledge, carry out individual and group research, and synthesise information. They should also have improved their information literacy skills, and communication skills through group presentations and individual research.

Textbooks

To be advised

AGECE2103**Production Economics**

Credit points: 6 **Teacher/Coordinator:** Dr Paulo Santos **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 1x2-hr tutorial/week commencing week 2 **Prerequisites:** ECON1001 or AGECE1006 or (AGECE1003 and AGECE1004) or RESEC1031 **Prohibitions:** AGECE2003 **Assessment:** 1x1hr exam (25%), 1xassignment (15%) and 1x2hr exam (60%)

This unit builds on microeconomic principles studied in first year and applies them to the analysis of firms' decisions. Emphasis is put on the formalization of the firm's problem and in the use of duality. The topics include: production functions (single and multi-output); distance functions and their use in the measurement of productivity; the decomposition of productivity and productivity changes; production under risk; cost and profit functions.

N.B. Available to 2nd year students in the Faculty of Economics and Business

Textbooks

Collection of readings

AGECE2105**Applied Econometric Modelling 1**

Credit points: 6 **Teacher/Coordinator:** Ms Shauna Phillips **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Prerequisites:** ECMT1010 and ECMT1020 **Prohibitions:** ECMT2110 **Assessment:** 1x1hr exam (25%), 1xassignment (15%) and 1x2hr exam (60%)

Applied Econometric Modelling is designed to provide students with a sound understanding of the application of applied econometric methods to the agricultural and resource sectors. Topics covered will include: single and multiple regression, forecasting, dummy variables, violations of OLS assumptions, dynamics, binary choice models, and an introduction to cointegration. Emphasis will be placed on developing the ability to estimate and interpret economic relationships. The computing side of the unit involves the use of the statistical package EViews.

This unit of study is designed to develop student understanding and capability in applied regression analysis.

It is a core unit for students in BAgEc and BResEc, students and a non core unit for BScAgr students.

Students will become familiar with exploring data sets and estimating, interpreting, and assessing regressions that represent economic relationships.

At the end of this unit, students will be able to understand the major concepts and principles of applied regression analysis, estimate simple regressions in EViews and interpret the output, and be able to read, understand, and possibly replicate recent literature in agricultural and resource economics journals that apply econometric methods.

The students will gain research and computing skills.

Textbooks

D.N. Gujarati, Essentials of Econometric, 3rd Ed. (McGraw-Hill Irwin), New York.

AGECE3101**Agribusiness Management**

Credit points: 6 **Teacher/Coordinator:** Ms LA Henry **Session:** Semester 2 **Classes:** 2x1-hr lectures/week, 1x2-hr tutorial/week commencing week 2 **Prerequisites:** AGECE2103 or AGECE2003 or AGECE1006 **Prohibitions:** AGECE3103 and AGECE3001 **Assessment:** 1x2hr exam (50%) and 1x50 min mid-semester exam (15%) and 1 assignment (25%) and workshop reports (10%)

This unit of study is designed to introduce decision making problems encountered by firms and agribusiness firms and general methods of solving microeconomic decision making problems. It is unit of study that builds on knowledge gained in junior units of study in particular AGECE1006, AGECE2103 and AGECE2102. Students will review production economics and activity analysis and show how budgeting methods can be used to relate them. They will extend these budgeting techniques to problems of time and risk, using capital and parametric budgeting. Students will also be introduced to linear programming and show how this tool is a practical method of solving decision making problems. Students will learn to consider methods for solving decision making problems where the outcomes are not known with certainty. The students will gain skills through workshop based tasks, an assignment, information literacy and communication skills through the presentation of the workshop reports and discussion throughout the workshop.

AGECE3102**Agricultural and Resource Policy**

Credit points: 6 **Teacher/Coordinator:** Dr. Paulo Santos **Session:** Semester 1 **Classes:** 1x2-hr lecture + 1x1-hr lectures/week, 1x2-hr tutorial/week commencing week 2 **Prerequisites:** (AGECE2001 or AGECE2101) and (AGECE2003 or AGECE2103) **Prohibitions:** AGECE3002 **Assessment:** 1x2.5hr exam (70%) and 3x1 problem sets (30%)

This unit covers the theoretical framework for economic analysis of policy interventions (welfare economics and public choice theory). Emphasis is put on building the skills needed to analyze the incidence of economic policy and on the design of policies under asymmetric information. An understanding of the institutional structure of

agricultural and resource policy in Australia is promoted through the direct contact with policy makers, public agencies and lobbying groups.

N.B. Available to 3rd year students in the Faculty of Economics and Business

Textbooks

John McMillan, 2002, Reinventing the Bazaar. A natural history of markets. W.W. Norton, and collection of articles.

N.B. Students are advised not to buy the textbooks before lectures commence in case there are any changes.

AGEC3103

Applied Optimisation

Credit points: 6 **Teacher/Coordinator:** A/Prof Ross Drynan **Session:** Semester 1 **Classes:** (2 lec & 2 tut)/wk **Prerequisites:** (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) **Prohibitions:** AGEC3101 **Assessment:** 1x2hr exam (70%) and 2 assignments (better done one 18%, other 12%)

This unit of study deals with constrained optimization problems in which one or more constraints are inequalities. Such problems are explored/solved by "mathematical programming" techniques. The main focus of the unit is on linear programming (LP) problems, i.e. ones in which both the objective and the constraints are linear functions, and its application in agricultural and other planning contexts. Topics include graphical and mathematical representation of LP problems, solution methods, solution information, stability of optimal solutions, primal and dual formulations and parametric programming. After covering the basics of LP, the focus shifts to modelling real world scenarios as optimization problems. Students are streamed: one group deals with specialized LP formulations (e.g. transportation model) and extensions of LP (e.g. integer programming). The other examines dynamic optimization for problems that involve inter-temporal resource allocation. Students develop experience and confidence in the use of spreadsheet-based optimizer routines, and with specialised optimization packages (e.g. LINDO).

AGEC3104

Research Methods

Credit points: 6 **Teacher/Coordinator:** Mrs. Elizabeth Nolan **Session:** Semester 2 **Classes:** 2x1-hr lectures/week & 1x1-hr tutorial/week, commencing week 2 **Prerequisites:** AGEC2105 **Prohibitions:** AGEC3004 **Assessment:** 1x2000wd "Methods" chapter (40%) and 1x3000wd "Results" chapter (40%) and 2xlab reports (2x10%)

This unit deals with the nature of research and inquiry in applied economics. Topics covered will include: alternative philosophical perspectives on inquiry; scientific method; research as an orderly process of enquiry; preparation of research proposals; secondary data sources for agricultural and resource economists; collection of primary data; and methods of analysis of data. Topics are illustrated with examples of research in theoretical economics and empirical research. Students are expected to read widely. Development of practical research skills, including the ability to critically and statistically synthesise and interpret data will be fostered by the completion of applied computer-based workshop exercises. Information literacy skills and the ability to summarise and synthesise information and use it to inform an argument will be improved through the preparation of a literature review and a research proposal.

AGEC4101

Agricultural Marketing Analysis

Credit points: 6 **Teacher/Coordinator:** Mrs Elizabeth Nolan **Session:** Semester 2 **Classes:** 2x1-hr lectures/week, commencing week 1 **Prerequisites:** (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) **Prohibitions:** AGEC4004 **Assessment:** 1x1hr exam (20%), 1x2hr exam (50%), 1x2000wd essay (30%).

Performance of the agricultural and resource marketing systems, marketing margins, transportation, storage, and risk. The structure, conduct and performance of marketing firms, and government and public interest in the food system will also be addressed. Extensive reading will be required.

Textbooks

To be advised

AGEC4102

Agricultural Development Economics

Credit points: 6 **Teacher/Coordinator:** Dr. Shyamal Chowdhury **Session:** Semester 2 **Classes:** 1x2-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Prerequisites:** AGEC2001 or AGEC2101 and AGEC2003 or AGEC2103 **Assessment:** 1x2000 wd problem set (20%), 1x1000 wd review (10%), 1x15min presentation (5%), 1x1page evaluation of a peer (5%), and 1x2hr final exam (60%)

This unit focuses on the microeconomic analysis of development, with a special emphasis on the importance of market failures in financial markets as origin of persistent poverty. The unit also addresses policy interventions to overcome such failures and the challenges in their evaluation. A special emphasis is put in the discussion of the role of agriculture in development, and the evidence supporting its importance in poverty reduction.

Textbooks

Debraj Ray, Development Economics, Princeton University Press.

Abhijit Banerjee, Roland Bénabou and Dilip Mookherjee, Understanding Poverty, Oxford University Press.

World Bank, Agriculture for Development - World Development Report 2008, World Bank and Oxford University Press

N.B. Students are advised not to buy the textbooks before lectures commence in case there are any changes.

AGEC4103

International Agricultural Trade

Credit points: 6 **Teacher/Coordinator:** Ms. Shauna Philips **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Prerequisites:** (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) **Prohibitions:** AGEC4003 **Assessment:** 1x1hr exam (25%), 1xessay (15%) and 1x2hr exam (60%)

In this unit of study the basic economic principles underlying international trade in agricultural and resource commodities and the policies involved will be presented. Issues related to trade and development will also be considered. The main topics covered will include: trends in agricultural and resources trade; economics and politics of protection, economic integration and impacts on international commodity trade; international trade policy making. An understanding of globalisation, including foreign direct investment, will also be required. Extensive reading will be required.

Textbooks

Krugman and Obstfeld. International Economics: Theory and Policy, 8th Ed. (Pearson Addison Wesley), New York.

AGEC4104

Industrial Organization of Agribusiness

Credit points: 6 **Teacher/Coordinator:** Dr. Shyamal Chowdhury **Session:** Semester 1 **Classes:** 1x2-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Prerequisites:** (AGEC2001 or AGEC2101) and (AGEC2003 or AGEC2103) **Assessment:** 1x2000 wd assignment (20%), 1x1000 wd review (10%), 1x15min presentation (5%), 1x1page evaluation of a peer (5%), and 1x2hr final exam (60%)

This unit focuses on applications of economic theory and methods in agribusiness decision making. It provides advanced treatment of the industrial organisation of agribusiness firms. Case studies will be used to examine the economic complexities of global agribusiness systems. Extensive readings make up the central component of the unit.

Textbooks

Collections of readings.

AGEC4107

Special Topics

Credit points: 6 **Teacher/Coordinator:** Dr. Paulo Santos **Session:** Semester 1, Semester 2 **Classes:** Individual research and consultation **Prohibitions:** AGEC4007 **Assessment:** Research paper (100%).

Note: Department permission required for enrolment.

This unit deals with the specialised areas of agricultural and resource economics of particular interest to approved students. The student will read under the guidance of a member of staff and complete designated learning tasks.

Textbooks

Individual reading.

AGEC4108**Quantitative Planning Methods**

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** A/Prof Ross Drynan **Session:** Semester 2 **Classes:** (2 lec & 2 tut/lab session)/wk **Prerequisites:** AGEC3101 or AGEC3103 or AGEC3031 or AGEC3001 **Prohibitions:** AGEC4008 **Assessment:** One end-of-semester exam (2 hours), 2 assignments.

This unit examines the use of mathematical methods and models in planning at both the individual firm level and the sector level. While the principal focus is on formal optimization, simulation and Monte Carlo methods are briefly discussed. Topics include non-linear programming, elements of input-output analysis, computable general equilibrium analysis, dynamic problems and methods (e.g. dynamic programming and optimal control). Sectoral level planning applications considered include transportation and plant location studies; spatial equilibrium; and resource utilization across time. Firm level applications include multi-period planning, queuing problems, inventory analysis, and replacement problems. Extensive use is made of computer-based optimization.

AGEC4109**Agricultural Finance and Risk**

Credit points: 6 **Teacher/Coordinator:** A/Prof Ross Drynan **Session:** Semester 2 **Classes:** (2x1hr lec & 1x2hr tut/lab session)/wk, commencing week 1. **Prerequisites:** {(AGEC3001 or AGEC3101) and (AGEC2003 or AGEC2103)} OR (AGEC1102 and AGEC3103) **Prohibitions:** AGEC4009 **Assessment:** 1x2hr exam (70%) and 2 assignments (better done one 18%, other 12%)

This unit has two related components. One component concerns risk and risk management in agriculture; the other deals with issues of agricultural producer finance. Risk topics include: risk measurement, subjective probability, adjusting beliefs as a result of new information; risk attitudes; decision making under risk; expected utility theory; valuing information; generalizations of expected utility theory; E-V analysis; stochastic dominance; internal measures to cope with risk including diversification and flexibility; insurance, futures, options and other market instruments for managing risk. Finance topics include the implications of capital market imperfections and consequential differences between corporate and small business finance; financial relationships between debt/equity levels and risk, optimal debt levels; cost of capital; short term working capital management; and longer term capital (investment) budgeting. Techniques of valuation of projects in risk-free and risk situations are examined. Financial and risk management practices in Australian agriculture are reviewed.

AGEC4112**Research Project A**

Credit points: 9 **Teacher/Coordinator:** Dr. Paulo Santos **Session:** Semester 1 **Classes:** 2x2-hr lectures/week **Prerequisites:** 2 units out of AGEC3102, AGEC3103, AGEC3104 or AGEC3004 **Corequisites:** AGEC4113 **Prohibitions:** AGEC4012 **Assessment:** Individual report (100%)

Note: Department permission required for enrolment. Note:

In this unit of study, students develop their ability to undertake a research project in economics. The unit builds on theoretical and applied knowledge gained throughout the degree. Each student will develop a well defined research project in close collaboration with an academic supervisor. In addition to improving their research skills through the design and report on a single research study, students will improve their communication skills through oral presentation of their work.

AGEC4113**Research Project B**

Credit points: 9 **Teacher/Coordinator:** Dr Paulo Santos **Session:** Semester 2 **Classes:** 2x2-hr lectures/week **Prerequisites:** 2 units out of AGEC3102, AGEC3103, AGEC3104 or AGEC3004 **Corequisites:** AGEC4112 **Prohibitions:** AGEC4013 **Assessment:** Individual report (100%)

Note: Department permission required for enrolment. Note:

This unit of study is taken in conjunction with the companion unit, AGEC4112 Research Project A. See AGEC4112 for details.

AGEC4121**Research Exercises A**

Credit points: 9 **Teacher/Coordinator:** Dr. Paulo Santos **Session:** Semester 1 **Classes:** 1x2-hr lectures/week **Prerequisites:** 2 units out of AGEC3102, AGEC3103, AGEC 3104 or AGEC3004 **Corequisites:** AGEC4122 **Prohibitions:** AGEC4012, AGEC4112 **Assessment:** Group report (100%)

This unit of study is taken in conjunction with the companion unit, AGEC4122 Research Exercises B. Students develop skills in economic research by participating in the designing, undertaking and reporting on one or more research exercises undertaken under the guidance of a staff member. Students may work individually and/or in groups on a project that is common to the entire class. Students may be required to work on separate aspects of that project or may be required to examine the same aspect using different approaches. Students will be required to prepare individual and/or group written reports and/or oral presentations concerning data acquisition, analysis and interpretation of results.

AGEC4122**Research Exercises B**

Credit points: 9 **Teacher/Coordinator:** Dr Paulo Santos **Session:** Semester 2 **Classes:** 1x2-hr lectures/week **Prerequisites:** 2 units out of AGEC3102, AGEC3103, AGEC 3104, or AGEC3004 **Corequisites:** AGEC4121 **Prohibitions:** AGEC4013, AGEC4113 **Assessment:** Group report (100%)

This unit of study is taken in conjunction with the companion unit, AGEC4121 Research Exercises A. See AGEC4121 for details.

AGRO3004**Managing Agro-Ecosystems**

Credit points: 6 **Teacher/Coordinator:** Dr Carina Moeller, Prof. Jeff Amthor, Dr Brett Whelan, Dr Lachlan Ingram **Session:** Semester 2 **Classes:** 2x1-hr lectures/week except week 5, 1x3-hr tutorial/week except week 5 (commencing week 2), 1x3-hr field practical in week 1, 1x full day field practical in week 5. **Prerequisites:** AFNR1001, AFNR1002, PLNT2003, SOIL2003 and (BIOM2001 or ENVX2001) **Assessment:** 1x2.5hr exam (50%), 5xshort-answer quizzes (5x4%) and 2000wd field report (30%)

The most critical and interesting questions managers of natural resources face deal with the inherent complexity of agricultural systems. Long- and short-term interactions exist between physical (e.g. climate, soil) and biological (crops and other organisms) factors, and the agricultural management, among others. Understanding these interactions and their impacts on production and environmental outcomes in dryland agricultural systems is the overall aim of this unit. AGRO3004 is a core unit for BScAgr students and builds on knowledge and skills gained in the junior units AFNR1001, AFNR1002, AVBS1002, PLNT2003, SOIL2003, and BIOM1003. This unit investigates dryland agro-ecosystems, which can be defined as ecosystems modified for the purpose of producing crops in environments where water limits productivity during part of the year. During the semester, principles of crop and pasture production, integrated pest management, approaches to managing climate variability and precision agriculture are introduced. There will be a focus on understanding effects of climate and weather in dryland systems, especially on understanding crop-water relationships. Attention will be paid to biodiversity and the sustainability of agro-ecosystems. The unit provides an opportunity to develop key graduate attributes for agricultural scientists in information literacy, field experimentation, critical analysis, written expression, and team work.

Textbooks

Pratley J (Ed.) (2003) 'Principles of field crop production (4 edn).' (Oxford University Press: Melbourne, Australia).

AGRO4003**Crop and Pasture Agronomy**

Credit points: 6 **Teacher/Coordinator:** Dr Daniel Tan **Session:** Semester 1 **Classes:** 4x4-h lectures/weeks 1,2,9,10; 2x2h lectures 3,4,7,8, 1x full day field practical in week 11 (subject to weather); Field excursions: week 0 and 6 (subject to weather) **Prerequisites:** AGRO3004 **Assessment:** 1x2h exam (45%) and 2x reports on excursions (2x18.5%) and 2000wd field report (18%)

This unit examines agronomy as the discipline that underpins agricultural production. As a case study, the cotton industry is

examined in detail to understand the end-user and social demands on agricultural production, the technical issues that challenge the farmer and the diversity of other specialist information from relevant disciplines such as entomology, pathology and soil science that must be integrated into the farming system. Likewise the rice and/or pastoral industries provide a contrasting farming system as another case study. The unit includes a one-week excursion to cotton growing areas in northern NSW and Qld, specialist intensive instruction provided by the Cotton CRC and a series of workshops, tutorials that provides analysis and synthesis of the major farming systems in this industry. Pasture production is also considered in the context of farming systems.

AGRO4004 Sustainable Farming Systems

Credit points: 6 **Teacher/Coordinator:** Dr Daniel Tan, Prof Jeff Amthor **Session:** Semester 1 **Classes:** Negotiated practicals and workshops (63h) **Prerequisites:** AGRO3004 **Assessment:** Written report on the field/glasshouse experiment(s) (50%), oral debates/discussions on sustainable systems (25%), essay on sustainable agriculture (25%)

This unit is designed to provide students with training in the professional skills required to practice agronomy. The unit principally builds on theoretical and applied knowledge gained in second year plant physiology (PLNT2003) and third year agronomy (AGRO3004). In this unit students will integrate their knowledge of plant physiology, soil science, experimental design, and biometry to address applied problems in agronomy, namely the issue of sustainability. Students will develop their ability to establish conclusions towards making recommendations for long term sustainability of crop and pasture systems. By implementing and managing a major field and/or glasshouse experiment(s) students will develop their research and inquiry skills. Team work is strongly encouraged in this unit and the integration and reporting of research findings will facilitate critical thinking and development of written communication skills. After completing this unit, students should be able to confidently design and manage a glasshouse/field experiment, and interpret and communicate their findings, by integrating knowledge from across disciplinary boundaries.

AGRO4005 Livestock Production Systems

Credit points: 6 **Teacher/Coordinator:** Dr Lachlan Ingram **Session:** Semester 2 **Classes:** (Intensive lectures/workshop/fieldtrip commencing 2nd week of September for 1 week, plus on-line modules throughout semester) **Prerequisites:** AGRO3004 **Assumed knowledge:** ANSC3101 **Assessment:** One 2hr exam (50%), case study reports based on field trips (40%), participation in debate (10%).

Note: Department permission required for enrolment.

The aim of this unit is to highlight the inter-relationships between disease, vegetation, soil, and livestock production. Livestock production systems builds on knowledge in the AGRO3004, which deals with pasture and cropping systems and expands this into the management of systems involving animals. The unit will cover such aspects as dealing with prevention and regulatory aspects of the disease process, mechanisms to deal with disease, parasitology, managing the health of sheep, beef and dairy cows (throughout all stages of their life cycles), and reproductive disorders. Appropriate management of pasture systems can reduce the prevalence of many of these issues and will be covered in lectures that will relate livestock production to herbage quantity and quality, grazing management, limits to production and how pasture-livestock systems impact on the environment and the extent to which this can be mitigated. While this unit will be taught on-line through the University of New England, there will be a week-long intensive residential school that requires a compulsory attendance during the second week of September. Because not all aspects of the residential school is relevant to Sydney students, a one-day field trip will be held while students are attending the residential school. Lectures will also be undertaken at the University of Sydney. The assessment for this unit of study will be based around an exam (50%), three assignments (40%) and a seminar (10%). Students completing this unit will be able to evaluate how

disease, pastures and livestock management interact to affect livestock production and how management of livestock systems can be a sustainable industry in terms of natural resources. Through group work and independent research on the case studies students will gain valuable research and interpersonal skills. Writing and communication skills are developed through report and exam writing and oral communication through participation in a debate

ANSC3101 Animal Nutrition 3

Credit points: 6 **Teacher/Coordinator:** Dr Alex Chaves **Session:** Semester 2 **Classes:** lectures 3 hrs/wk, laboratories 3 hrs/wk **Prerequisites:** ANSC2002 or AVBS1002 **Assumed knowledge:** Fundamentals of Biochemistry **Assessment:** Assignments, including presence and participation in class (10%), 5 individual quizzes (5x6%), 1 online intrasemester exam (25%), 1 oral or video presentation (20%), and 1 online final exam (15%)

This Unit of Study builds upon principles discussed in AVBS1002 Concepts of Animal Management. The Unit is broadly divided into four sections, namely: estimating the nutritive characteristics of feeds; defining the nutrient requirements of animals; diet formulation; errors in feeding. The focus is on coming to an understanding of the assessment of nutritional adequacy and the avoidance and solving of nutritional problems, with a particular emphasis on animals used in agricultural production systems and wildlife. The principles discussed in this course will be expanded in the following year, in which species-specific systems will be described. The basis of successful feeding management is an understanding of the following: the composition of feeds; the digestibility and efficiency of utilisation of nutrients by the animal; the nutrient requirements of the animal; interactions between nutrients that influence health and production. And following from this, students will have the ability to formulate diets to meet animal requirements for a variety of purposes and under a variety of constraints; identify deficiencies, excesses and imbalances in diets and so avoid a decline in productive efficiency and/or a decline in health.

Textbooks

There is no required text for the course. A number of textbooks are available on reserve at the library. These include:

1. Animal Nutrition by McDonald, P., Edwards, R.A., Greenhalgh, J.F.D. and Morgan, C.A. (2002) 6th ed. Pearson Education Limited, Harlow UK.
2. Feeds and Feeding (5th Edition) (Hardcover) by Tilden Wayne Perry, Arthur E. Cullison, Robert S. Lowrey (Authors). Publisher: Prentice Hall; 5 edition (November 19, 1998).
3. Animal Feeds, Feeding and Nutrition, and Ration Evaluation CD-ROM (Hardcover) by David Tisch (Author). Publisher: Delmar Cengage Learning; 1 edition (October 5, 2005).
4. Animal Nutrition Science (Paperback) by G. Dryden (Author) Publisher: CAB; 1 edition (October 5, 2008).
5. Tables of Composition and Nutritional Value of Feed Materials Pigs, Poultry, Cattle, Sheep, Goats, Rabbits, Horses, Fish By Daniel Sauvant, Jean-Marc Perez, Gilles Tran Publisher: INRA (January, 2004).

National Research Council (NRC) publications describing nutrient requirements of various species may also provide useful information; these publications can all be accessed online and are available on reserve at the library:
Nutrient Requirements of Poultry (NRC, 1994).
Nutrient Requirements of Swine (NRC, 1998).
Nutrient Requirements of Dairy Cattle (NRC, 2001).
Nutrient Requirements of Beef Cattle (NRC, 2000).
Nutrient Requirements of Horses (NRC, 2007).

There will be copies of these texts on reserve and for purchase in the bookstore. Again, it is not essential to buy these text books. All the material required for the course will be presented in lecture and in the lecture notes, but the text may prove useful in understanding the lecture material.

ANSC3102 Animal Reproduction

Credit points: 6 **Teacher/Coordinator:** Dr Chris Grupen **Session:** Semester 1 **Classes:** lectures 2 hrs/week, tutorials 1 hr/week, practicals 3 hrs/week **Assumed knowledge:** ANSC3104 **Assessment:** written and oral assignments (25%), mid-semester written exam (15%), end of semester written exam (60%)

This unit of study provides a comprehensive programme on basic and applied aspects of male and female reproductive biology, with particular emphasis on livestock and domestic animals. The fundamental topics include reproductive cycles, sexual differentiation, gametogenesis, fertilization, embryo development, gestation and parturition. An understanding of the applications of advanced

reproductive technologies is developed through lectures, tutorials and the assignments. In addition, practical instruction is given on semen collection and processing, manipulation of the reproductive cycle, artificial insemination, and pregnancy diagnosis in sheep and pigs. Classes are held at the Camperdown Campus in Sydney and at the Camden Campus Animal Reproduction Unit and Mayfarm piggery.

Textbooks

Hafez, B & Hafez, ESE (eds) 2000, Reproduction in farm animals, Lippincott Williams and Wilkins
Senger, PL 2003, Pathways to pregnancy and parturition, 2nd edn, Current Conceptions Inc

ANSC3103

Animal Structure and Function A

Credit points: 6 **Teacher/Coordinator:** Dr Melanie Collier **Session:** Semester 1 **Classes:** lectures 3hrs/wk, laboratories/tutorials 3hrs/wk (note these will vary depending upon the week) **Prerequisites:** 12 credit points of junior Biology **Assumed knowledge:** AVBS1002 **Assessment:** assignments/presentations (50%) and theory exam (50%)

Animal Structure and Function A will develop an understanding of the role of the body systems in maintaining homeostasis in an animal's internal environment. In ASFA the structure and function of the cardiovascular, respiratory, central nervous and urinary systems of the body are explored in depth particularly with reference to the maintenance of homeostasis and an animal's perception of, and response to, its environment. The developed understanding of the normal functioning of these systems allows identification of the impact on the animal of abnormal function of these systems. A study of the structure and function of muscle will include its role in movement and as meat in a production setting. The overall goals of the Unit are (i) to enable students to develop a rich understanding of the relationships between body systems and structures (to be continued in ASFB). (ii) to develop generic skills particularly in oral presentation, (iii) to develop an appreciation of the links between structure and function and their relevance to animal disease and production that will be further developed in Veterinary Pathogenesis as well as in advanced, applied studies in Behaviour in third year and in 4th year Animal Production.

Textbooks

For the animal structure component of the unit:
Dyce, KM, Sack, WO & Wensing, CJG 2002, Textbook of veterinary anatomy, 3rd edn, W.B.Saunders, Philadelphia

For the physiology component of this unit:
Sherwood, L, Klandorf, H and Yancey, P H (2005) Animal Physiology: From Genes to Organisms, Thomson Brooks Cole, Belmont CA

A handbook containing details of lecture outlines, objectives, reference lists, details of practical classes, staffing as well as other relevant class material will be available for students to purchase

ANSC3104

Animal Structure and Function B

Credit points: 6 **Teacher/Coordinator:** Dr Cathy Herbert **Session:** Semester 2 **Classes:** lectures 3 hrs/wk, laboratories/tutorials 3 hrs/wk, activities will vary on a weekly basis **Prerequisites:** ANSC3103 **Assumed knowledge:** AVBS1002 **Assessment:** anatomy dissection project (20%), topic test (10%), critical review (20%), final exam (50%)

In this Unit students will complete the study of the structure and function of organ systems in animals started in ANSC3103. The role of hormones and the immune systems will be investigated in relation to maintenance of internal homeostasis. An introduction to digestion and male and female reproductive anatomy and physiology will form the basis for further applied studies in these areas in third year Units of Study in Animal Nutrition and Animal Reproduction. There will be development of the generic skills of critically reading and writing.

Textbooks

For Animal Structure:
Dyce, KM, Sack, WO & Wensing, CJG 2002, Textbook of veterinary anatomy, 3rd edn, W.B.Saunders, Philadelphia

For Animal Function:
Sherwood, L, Klandorf, H and Yancey, PH 2005. Animal Physiology. From Genes to Organisms. Thomson Brook Cole

AVBS1002

Concepts of Animal Management

Credit points: 6 **Teacher/Coordinator:** Mrs Irene Van Ekris **Session:** Semester 2 **Classes:** 6 hrs/week (lectures and practicals) **Prerequisites:** 6

credit points of junior Biology **Assessment:** practical class testing (20%), written assignments (15%), written exams (65%) **Practical field work:** There will be several whole day practical classes at the Camden campus

This unit will explore the management of animals in natural and man-made environments. At the end of this unit of study, students will understand: the characteristics of the management systems of the major domestic species used for production in Australia and in a world wide context; the characteristics and principles underpinning sustainable management of native animals in natural and man-made environments; an appreciation of the dependence of living organisms upon their environment; an appreciation of the husbandry practices and innovations that have been adopted by the production industries to retain their competitive advantage; a demonstrated capability in handling and husbandry of the major domestic production animal species, and an appreciation of the application of these skills to non-domestic species; a demonstrated understanding of the importance of high standards of animal welfare practice in the management of animals.

Textbooks

There is no single text that adequately covers the unit content and for this reason no formal text is required. Where appropriate, relevant reference material will be identified for specific areas of the course.

AVBS4002

Dairy Production and Technology

Credit points: 6 **Teacher/Coordinator:** Assoc. Professor Yani Garcia **Session:** Semester 2 **Classes:** lectures 2 hrs/wk, practicals 3 hrs/wk **Prerequisites:** ANSC3101, (Animal and Veterinary Bioscience years 1-3 OR Bachelor of Science in Agriculture years 1-3) **Assumed knowledge:** Enrolled students are expected to have some understanding of key components of the dairy production system, including basic knowledge of animal physiology and nutrition. **Assessment:** Whole farm professional report (40%), Pracs assessments, (20%), 1 hr exam (40%) **Practical field work:** Two or three visits to commercial dairy farms in NSW

This unit will explore the various aspects of dairy farming and the dairy industry from a scientific point of view. The lectures are a mix of the principles on which sound dairy farming is based and practical examples of how this operates in practice. Focus is placed on integrating knowledge to gain understanding on the system of production as a whole.

At the end of this unit of study, students will demonstrate a solid understanding of: the characteristics of the dairy industry in Australia and in a world wide context; the key components of pasture-based dairy systems; principles and practices of pasture and feeding management; the application of new technologies to improve efficiency and productivity (particularly automatic milking).

In addition, students will demonstrate an appreciation of key aspects of reproduction and lactation physiology; the integration of knowledge of genetics and reproduction into the type of herd improvement structure set up in the dairy industry; the application of ruminant physiology knowledge to developing feeding programs for dairy cows; the extension of basic reproductive physiology onto the dairy farm using case studies as examples; the economics of the dairy farm business. Practical classes include milking cows; grazing and feeding management of dairy cows; calf rearing; and several visits to commercial farms ranging from small pasture-based dairy farms to a feed-lot operation milking over 2,000 cows.

Textbooks

There is no single text that adequately covers the course content and for this reason no formal text is required. However, the following books can be used as basic bibliography for consultation during the course:

Milk Production from Pasture (CW Holmes et al 2002)
Feeding the dairy cow (Chamberlain and Wilkinson 1996)

Where appropriate, relevant reference material will be identified for specific areas of the course.

AVBS4008

Intensive Animal Industries

Credit points: 6 **Teacher/Coordinator:** Dr Jeff Downing **Session:** Semester 2 **Classes:** 6 hrs/wk **Prerequisites:** (Animal and Veterinary Bioscience years 1-3) OR (Bachelor of Science in Agriculture years 1-3) **Assessment:** Written exam (50%) (Poultry and Pigs 50:50), in course evaluations and case study - Pigs (25%), Broiler growth study report and in course evaluations - Poultry (25%)

Practical field work: Visits to an intensive pig farm, feed mill and poultry production and processing units when biosecurity restrictions allow.

This unit of study is composed of two parts, a Poultry Production component and a Pig Production component. The course will provide students with a comprehensive overview of the production of eggs and poultry meat and pork. The individual components examine various aspects of the poultry and pig production systems important in maintaining efficiency and profitability. It investigates aspects of breeding, nutrition, housing, growth performance, health, welfare, reproductive capability, waste management, marketing and current industry issues. This unit will expand on some aspects of previous year 3 units of study in animal structure and function, nutrition and reproduction. There is a broiler growth study which comprises a significant part of the practical work in the Poultry component. There is a strong emphasis on assessment being built into the course work as this is considered to be more relevant to learning in the final year. The poultry unit has a newly commissioned pelleting mill and this will provide a wider range of opportunities for students interested in nutrition and feed processing.

Textbooks

There is no single text that adequately covers the Australian pig industry and for this reason no formal text is required. There are many sites (industry, academic institutions and government departments) on the Web which provide excellent information. Links to these will be provided. Where appropriate, relevant reference material will be identified for specific areas of the course. Often poultry specific text books are obsolete very quickly, it would be important to use trade information. The library subscribes to breeder management guides and general poultry production journals as well as specific poultry scientific journals.

AVBS4009 Aquaculture

Credit points: 6 **Teacher/Coordinator:** Dr Joy Becker **Session:** Semester 1 **Classes:** Lectures 2hrs/wk, tutorials 1hr/wk, practicals 3hrs/wk **Prerequisites:** Animal and Veterinary Bioscience years 1-3 OR Bachelor of Science in Agriculture years 1-3 **Assessment:** written and/or oral assignments (35%), written practical report (30%), exam 2 hrs (35%)

The Unit of Study explores in detail aspects of commercial aquaculture, including global trends in aquaculture development. Other topics include water quality, feeding, management, health and disease, genetics and reproduction, environmental impact and economic constraints to production. The unit of study emphasises methods to improve aquacultural productivity. It builds on basic principles of anatomy, physiology, nutrition, genetics and health and disease presented in other units of study in BAnVetBioSc. At the end of this Unit of Study, students will demonstrate an understanding of the principles of: the context of aquaculture in global food production; husbandry, management and welfare of aquaculture species; comparative aspects of husbandry in aquaria, domestic, commercial; health and disease relevant to aquaculture; nutrition of aquaculture species; reproduction and genetics of species in aquaculture; water quality and environmental impact of aquaculture; economics and marketing of aquaculture products.

AVBS4012 Extensive Animal Industries

Credit points: 6 **Teacher/Coordinator:** Dr Russell Bush **Session:** Semester 1 **Classes:** lectures 3hrs/wk, practicals 3hrs/wk **Prerequisites:** Animal and Veterinary Bioscience years 1-3 OR Bachelor of Science in Agriculture years 1-3 **Assessment:** case study (10%), practical report (20%), meat grading (10%), excursion report (20%) and written exam (40%) **Practical field work:** 5 day study tour to the Riverina

This unit introduces the concepts of sheep (wool and meat) and beef cattle production in the Australian environment within the context of world food and fibre consumption and production. The key products as well as domestic and export markets for these are presented. The course provides an historical perspective of the basis for each of these industries and describes each of the production systems designed to meet the demand for these products.

Production in both the tropical and temperate regions of Australia will be covered and include the key elements of extensive grazing and intensive feedlot systems. Major issues will include breeds and breeding systems, basic nutrition and production practices and animal

welfare issues as they affect the quality and quantity of product marketed.

The concepts of first stage processing of both meat and fibre products in abattoirs and top-making plants respectively will be presented. The major factors that influence the quality of product and therefore grading and market demand will be presented.

Lecture material will be supported with appropriate practical classes and a 5 day study tour to the Riverina to evaluate different commercial production systems.

Textbooks

Anderson RS, Edney ATB 1991 Practical animal handling, Pergamon Press
Battaglia RA 2001, Handbook of livestock management, Prentice Hall
Cottle, DJ 2010, International sheep and wool handbook, Nottingham University Press
Ensminger, ME & Perry RC 1997, Beef cattle science, Interstate Publishers
Lawrie, RA 1980, 1981, Developments in meat science, vols 1&2, Applied Science Publishers
Lawrie, RA 1985, 1988, 1991, Developments in meat science, vols 3-5, Elsevier Applied Science
Massy, C 1990 The Australian merino, Viking O'Neil
Temple, G 2000, Beef cattle handling and facilities design, Grandin Livestock Systems, Fort Collins, Colo

BIOL1001 Concepts in Biology

Credit points: 6 **Session:** Semester 1, Summer Main **Classes:** 3x1 hr lectures/fortnight and 1x4 hr practical/fortnight. **Prohibitions:** BIOL1911 **Assumed knowledge:** None. However, semester 1 students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). **Assessment:** 1x2 hr exam, assignments, quizzes (100%)

Note: It is recommended that BIOL (1001 or 1911) be taken concurrently with either BIOL1003 or BIOL1903. Students who have completed HSC Biology and scored 80+ should enrol in BIOL1911. Students who lack 80+ in HSC Biology but have a UAI of at least 93 may enrol in BIOL1911 with permission from the UEO. The completion of MBLG 1001 is highly recommended.

Concepts in Biology is an introduction to the major themes of modern biology. The unit emphasizes how biologists carry out scientific investigations, from the cellular/molecular level to the level of ecosystems. Topics covered in lectures and practicals include: introductory cell biology, with particular emphasis on how cells obtain and use energy; the diversity and biology of microorganisms; an introduction to molecular biology through the role of DNA in protein synthesis, including current developments in DNA technology; genetics or organisms; theories of evolution and phylogenetic analysis, and how they are used to interpret the origins of the diversity of modern organisms; and interactions between organisms in biological communities, with emphasis on Australian ecology.

Textbooks

Knox R B et al. Biology, An Australian Focus. 4th ed. McGraw-Hill. 2010

BIOL1002 Living Systems

Credit points: 6 **Session:** Semester 2 **Classes:** 3x1 hr lectures/week, 1x2.5 hr practical/week. **Prohibitions:** BIOL1902 **Assumed knowledge:** HSC 2-unit Biology. Students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). **Assessment:** 1x2 hr exam, assignments, quizzes (100%)

Note: It is recommended that BIOL (1001 or 1911) be taken before this unit of study. This unit of study, together with BIOL (1001 or 1911) provides entry to all Intermediate units of study in biology in the School of Biological Sciences.

Living Systems deals with the biology of organisms, from bacteria to large plants and animals, and emphasises the ways in which they can live in a range of habitats. The importance of energy in living systems, and how elements are used and recycled in biological communities, are described. The unit of study includes lectures and laboratory classes on the physiology of nutrition and growth, basic physiological processes of animals and plants, the ways in which organisms control and integrate their activities, and their reproduction. Finally applications of knowledge of genetics and ecology to practical problems in agriculture and conservation are introduced.

Textbooks

Knox R B et al. Biology, An Australian Focus. 4th ed. McGraw-Hill. 2010.

BIOL1902**Living Systems (Advanced)**

Credit points: 6 **Session:** Semester 2 **Classes:** 3x1 hr lectures/week, 1x2.5 hr practical/week. **Prerequisites:** UAI (or ATAR equivalent) of at least 93 and HSC Biology result in the 90+, or Distinction or better in a University level Biology unit, or by invitation. **Prohibitions:** BIOL1002 **Assessment:** 1x2 hr exam, assignments, quizzes, independent project (100%)

Note: Department permission required for enrolment.

This unit of study shares lectures and practical classes with BIOL1002 but also includes more demanding alternative components of Living Systems.

Textbooks

As for BIOL1002.

BIOL1911**Concepts in Biology (Advanced)**

Credit points: 6 **Session:** Semester 1 **Classes:** 3x1 hr lectures/fortnight and 1x4 hr practical/fortnight. **Prerequisites:** 80+ in HSC 2-unit Biology (or equivalent) or Distinction or better in a University level Biology unit, or by invitation. **Prohibitions:** BIOL 1001 **Assessment:** 1x2 hr exam, assignments, quizzes (100%)

Note: Department permission required for enrolment. Note: It is recommended that BIOL (1001 or 1911) be taken concurrently with all other Junior units of study in Biology. The completion of MBLG1001 is highly recommended.

Concepts in Biology (Advanced) builds on the main themes introduced in HSC Biology, with emphasis on current research in biology. Topics covered in lectures and practicals include: cell biology, with particular emphasis on how cells obtain and use energy; the diversity and biology of microorganisms; current developments in molecular biology, including recombinant DNA technology and the human genome project; inheritance, genetics and the origins of diversity of modern organisms; and interactions between organisms in biological communities, with emphasis on Australian ecology. Research-based lectures will expand on the general lecture topics and include current investigations of such diverse topic areas as cancer therapies, metabolic malfunction, anarchy in beehives, evolutionary studies of snake reproductive strategies, plant phylogeny and global environmental change.

Textbooks

As for BIOL1001.

BIOL3009**Terrestrial Field Ecology**

Credit points: 6 **Teacher/Coordinator:** Dr G Wardle **Session:** S2 Intensive **Classes:** Note: 1x6 day field trip held in the pre-semester break and 4x4 hr practical classes during weeks 1-4 in Semester 2. **Prerequisites:** 12 credit points of Intermediate Biology or ANSC2004 and BIOM2001. **Prohibitions:** BIOL3909 **Assumed knowledge:** BIOL (3006 or 3906). Prior completion of one of these units is very strongly recommended. **Assessment:** Discussions and quiz (10%), research project proposal and brief presentation (10%), sampling project report (20%), specimen collection (10%), research project report (50%).

Note: One 6 day field trip held in the pre-semester break (17 - 22 July 2011), and 4x4 hr practical classes during weeks 1-4 in Semester 2.

This field course provides practical experience in terrestrial ecology suited to a broad range of careers in ecology, environmental consulting and wildlife management. Students learn a broad range of ecological sampling techniques and develop a detailed understanding of the logical requirements necessary for manipulative ecological field experiments. The field work incorporates survey techniques for plants, small mammals and invertebrates and thus provides a good background for ecological consulting work. Students attend a week-long field course and participate in a large-scale research project as well as conducting their own research project. Invited experts contribute to the lectures and discussions on issues relating to the ecology, conservation and management of Australia's terrestrial flora and fauna.

BIOL3017**Fungi in the Environment**

Credit points: 6 **Teacher/Coordinator:** A/Prof P McGee **Session:** S1 Intensive **Classes:** 40 hours of practicals in a two week intensive program held immediately prior to semester one (laboratory component each morning from 14-25 February 2011), plus the equivalent of 30 hours self-guided study during

the semester. **Prerequisites:** 12 credit points of Intermediate Biology or Plant Science, or 6 credit points of Intermediate Biology, or Plant Science, and 6 Intermediate credit points of either Microbiology or Geography. **Prohibitions:** BIOL3917 **Assessment:** Selected from 1x2 hr take home exam, laboratory component and written assignments (100%)

Note: Dates: 14-25 February 2011. The completion of 6 credit points of MBLG units is highly recommended.

The unit is designed to develop understanding of fungal ecology in relation to environmental and rehabilitation biology, biological control of pests and pathogens, and soil microbiology. Emphasis will be placed on the function of fungi, and the benefit provided by fungi in symbiotic interactions with plants, including mycorrhizal fungi and shoot-borne endophytes. Physiological and ecological implications of the interactions will also be considered. Each student will design and implement a research project. Analytical thinking and research-led activity will be encouraged. Using broad scientific approaches, each student will gain the capacity to work cooperatively to find and analyse information from primary sources, develop approaches to test their understanding, and to present their work in a scientifically acceptable manner. Students will develop a deeper understanding of one area of fungal biology through independent study. Part of the learning material will be available on the internet.

BIOL3018**Applications of Recombinant DNA Tech**

Credit points: 6 **Teacher/Coordinator:** Dr B Lyon **Session:** Semester 1 **Classes:** 2x1 hr lectures/week, 1x4 hr practical/week. **Prerequisites:** 12 credit points from MBLG (2071/2971), MBLG (2072/2972) and Intermediate Biology units. For BMedSc students: 36 credit points of Intermediate BMED units including BMED 2802. **Prohibitions:** BIOL3918 **Assessment:** 1x2 hr exam, practical reports, assignment/seminar (100%)

A unit of study with lectures, practicals and tutorials on the application of recombinant DNA technology and the genetic manipulation of prokaryotic and eukaryotic organisms. Lectures cover the applications of molecular genetics in biotechnology and consider the impact and implications of genetic engineering. Topics include the cloning and expression of foreign genes in bacteria, yeast, animal and plant cells, novel human and animal therapeutics and vaccines including human gene therapy, new diagnostic techniques for human and veterinary disease, the transformation of animal and plant cells, the genetic engineering of animals and plants, and the environmental release of genetically-modified (transgenic) organisms. Practical work may include nucleic acid isolation and manipulation, gene cloning and PCR amplification, DNA sequencing and computer analysis of gene sequences, immunological detection of proteins, and the genetic transformation and assay of plants.

BIOL3917**Fungi in the Environment (Advanced)**

Credit points: 6 **Teacher/Coordinator:** A/Prof P McGee **Session:** S1 Intensive **Classes:** See BIOL3017. **Prerequisites:** Distinction average in 12 credit points of Intermediate Biology and Plant Science, or 6 credit points of Intermediate Biology, or Plant Science, and 6 Intermediate credit points of either Microbiology or Geography. **Prohibitions:** BIOL3017 **Assessment:** Selected from 1x2 hr take home exam, laboratory and written assignments (100%)

Note: The completion of 6 credit points of MBLG units is highly recommended.

Qualified students will be encouraged to develop a research project under supervision. The content and nature of the research will be agreed on with the executive officer.

BIOL3918**Applications of Recombinant DNA Tech Adv**

Credit points: 6 **Teacher/Coordinator:** Dr B Lyon **Session:** Semester 1 **Classes:** See BIOL3018. **Prerequisites:** Distinction average in 12 credit points from MBLG (2071/2971), MBLG (2072/2972) and Intermediate Biology units. For BMedSc students: 36 credit points of Intermediate BMED units including Distinction in BMED2802. **Prohibitions:** BIOL3018 **Assessment:** 1x2 hr exam, assignment/seminar (100%)

Qualified students will participate in alternative components of BIOL3018 Applications of Recombinant DNA Technology. The content and nature of these components may vary from year to year.

CHEM1001**Fundamentals of Chemistry 1A**

Credit points: 6 **Session:** Semester 1 **Classes:** Three 1 hour lectures and one 1 hour tutorial per week; one 3 hour practical per week for 10 weeks. **Prohibitions:** CHEM1101, CHEM1901, CHEM1109, CHEM1903 **Assumed knowledge:** There is no assumed knowledge of chemistry for this unit of study, but students who have not undertaken an HSC chemistry course are strongly advised to complete a chemistry bridging course before lectures commence. **Assessment:** Theory examination (60%), laboratory exercises and continuous assessment quizzes (40%) **Practical field work:** A series of 10 three-hour laboratory sessions, one per week for 10 weeks of the semester.

The aim of the unit of study is to provide those students whose chemical background is weak (or non-existent) with a good grounding in fundamental chemical principles together with an overview of the relevance of chemistry. There is no prerequisite or assumed knowledge for entry to this unit of study. Lectures: A series of 39 lectures, three per week throughout the semester.

Textbooks

A booklist is available from the First Year Chemistry website. <http://sydney.edu.au/science/chemistry/firstyear>

CHEM1002**Fundamentals of Chemistry 1B**

Credit points: 6 **Session:** Semester 2 **Classes:** Three 1 hour lectures and one 1 hour tutorial per week; one 3 hour practical per week for 10 weeks. **Prerequisites:** CHEM (1001 or 1101) or equivalent **Prohibitions:** CHEM1102, CHEM1108, CHEM1902, CHEM1904 **Assessment:** Theory examination (70%), laboratory exercises and continuous assessment quizzes (30%) **Practical field work:** A series of 10 three-hour laboratory sessions, one per week for 10 weeks of the semester.

CHEM1002 builds on CHEM1001 to provide a sound coverage of inorganic and organic chemistry. Lectures: A series of 39 lectures, three per week throughout the semester.

Textbooks

A booklist is available from the First Year Chemistry website. <http://sydney.edu.au/science/chemistry/firstyear>

CHEM1101**Chemistry 1A**

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Classes:** Three 1 hour lectures and one 1 hour tutorial per week; one 3 hour practical per week for 10 weeks. **Corequisites:** Recommended concurrent units of study: 6 credit points of Junior Mathematics **Prohibitions:** CHEM1001, CHEM1109, CHEM1901, CHEM1903 **Assumed knowledge:** HSC Chemistry and Mathematics **Assessment:** Theory examination (70%), laboratory exercises and continuous assessment quizzes (30%) **Practical field work:** A series of 10 three-hour laboratory sessions, one per week for 10 weeks of the semester.

Chemistry 1A is built on a satisfactory prior knowledge of the HSC Chemistry course. Chemistry 1A covers chemical theory and physical chemistry. Lectures: A series of 39 lectures, three per week throughout the semester.

Textbooks

A booklist is available from the First Year Chemistry website. <http://sydney.edu.au/science/chemistry/firstyear>

CHEM1102**Chemistry 1B**

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Classes:** One 3 hour lecture and 1 hour tutorial per week; one 3 hour practical per week for 10 weeks. **Prerequisites:** CHEM (1101 or 1901) or a Distinction in CHEM1001 or equivalent **Corequisites:** Recommended concurrent units of study: 6 credit points of Junior Mathematics **Prohibitions:** CHEM1002, CHEM1108, CHEM1902, CHEM1904 **Assessment:** Theory examination (70%), laboratory exercises and continuous assessment quizzes (30%)

Chemistry 1B is built on a satisfactory prior knowledge of Chemistry 1A and covers inorganic and organic chemistry. Successful completion of Chemistry 1B is an acceptable prerequisite for entry into Intermediate Chemistry units of study. Lectures: A series of 39 lectures, three per week throughout the semester.

Textbooks

A booklist is available from the First Year Chemistry website. <http://sydney.edu.au/science/chemistry/firstyear>

CHEM1901**Chemistry 1A (Advanced)**

Credit points: 6 **Session:** Semester 1 **Classes:** Three 1-hour lectures and one 1-hour tutorial per week; one 3-hour practical per week for 10 weeks. **Prerequisites:** ATAR of at least 95.4 and HSC Chemistry result in band 5 or 6, or by invitation. **Corequisites:** Recommended concurrent unit of study: 6 credit points of Junior Mathematics **Prohibitions:** CHEM1001, CHEM1101, CHEM1109, CHEM1903 **Assessment:** Theory examination (70%), laboratory exercises and continuous assessment quizzes (30%) **Practical field work:** A series of 10 three-hour laboratory sessions, one per week for 10 weeks of the semester.

Note: Department permission required for enrolment.

Chemistry 1A (Advanced) is available to students with a very good HSC performance as well as a very good school record in chemistry or science. Students in this category are expected to do Chemistry 1A (Advanced) rather than Chemistry 1A.

The theory and practical work syllabuses for Chemistry 1A and Chemistry 1A (Advanced) are similar, though the level of treatment in the latter unit of study is more advanced, presupposing a very good grounding in the subject at secondary level. Chemistry 1A (Advanced) covers chemical theory and physical chemistry. Lectures: A series of about 39 lectures, three per week throughout the semester.

Textbooks

A booklist is available from the First Year Chemistry website. <http://sydney.edu.au/science/chemistry/firstyear>

CHEM1902**Chemistry 1B (Advanced)**

Credit points: 6 **Session:** Semester 2 **Classes:** Three 1-hour lectures and one 1-hour tutorial per week; one 3-hour practical per week for 10 weeks. **Prerequisites:** CHEM (1901 or 1903) or Distinction in CHEM1101 or equivalent **Corequisites:** Recommended concurrent unit of study: 6 credit points of Junior Mathematics **Prohibitions:** CHEM1002, CHEM1102, CHEM1108, CHEM1904 **Assessment:** Theory examination (70%), laboratory exercises and continuous assessment quizzes (30%)

Note: Department permission required for enrolment.

Chemistry 1B (Advanced) is built on a satisfactory prior knowledge of Chemistry 1A (Advanced) and covers inorganic and organic chemistry. Successful completion of Chemistry 1B (Advanced) is an acceptable prerequisite for entry into Intermediate Chemistry units of study. Lectures: A series of about 39 lectures, three per week throughout the semester.

Textbooks

A booklist is available from the First Year Chemistry website. <http://sydney.edu.au/science/chemistry/firstyear>

CLAW1001**Foundations of Business Law**

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Early **Classes:** 2hrs of lectures and 1x 1hr tutorial per week **Assessment:** Mid-Semester exam (20%), Case Analysis Assignment (20%), Final exam (60%)

The entire fabric of commerce is woven from a complex legal regime, judicial and statutory, which regulates all commercial activity. Every decision in business, and every transaction and relationship, is made in the context of this legal regime. The aim of Foundations of Business Law is to introduce the students to the legal framework and regulatory systems which underlie all business activity and to expose them to the legal implications of commercial conduct. This unit of study introduces the Australian legal system and key areas of substantive business law including contracts, torts (in particular negligence and privacy), property and securities, white collar crime, intellectual property, competition and consumer law (in particular advertising, product liability and unfair contracts), business structures and operations, misleading and unconscionable conduct and dispute resolution.

ECMT1010**Business and Economic Statistics A**

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** two 1-hour lectures and one 2-hour workshop per week **Prohibitions:** ECMT1011, ECMT1012, ECMT1013, MATH1015, MATH1005, MATH1905, STAT1021, ECOF1010 **Assessment:** Homework (15%); Quizzes (30%); Assignment (15%); Final exam (40%)

This unit provides an introduction to basic statistics and its applications in economics and business disciplines. Topics include: methods for data management; analysis and interpretation of data; probability; the normal distribution; an introduction to sampling theory and hypothesis testing; and the concepts of regression analysis. A key component is the provision of instruction and experience in the use of computers and statistical software as an aid in the analysis of data. Students are expected to use data resources on the World Wide Web, retrieve data and analyse this data using Excel.

ECMT1020

Business and Economic Statistics B

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** two 1-hour lectures and one 2-hour workshop per week **Prerequisites:** ECMT1010 or ECOF1010 **Prohibitions:** ECMT1021, ECMT1022, ECMT1023 **Assessment:** Three quizzes (25%); Workshop questions/homework (10%); Assignment (15%); Final exam (50%)

Note: Other than in exceptional circumstances, it is strongly recommended that students do not undertake Business and Economic Statistics B before attempting Business and Economic Statistics A.

This unit broadens the knowledge gained in the unit, ECMT1010 Business and Economic Statistics A by introducing further tools (and their applications) for use in economics, finance, marketing and accounting. This unit features practical applications. Possible topics include: further aspects of hypothesis testing including goodness-of-fit models; regression analysis including a brief introduction to logit models, time series and its applications to economics and finance; input-output analysis; index numbers and mathematics of finance. The material is further complemented by mathematical topics including matrices and partial differentiation. In addition, students are expected to use data resources on the World Wide Web, retrieve data and analyse this data using Excel.

ECMT2110

Regression Modelling

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 2x 1hr lectures and 1x 1hr tutorial per week **Prerequisites:** ECMT1010 or ECOF1010 **Prohibitions:** ECMT2010 **Assessment:** Group project (20%); 3 Assignments (15%); Mid-Semester exam (25%); Final exam (40%)

Students undertaking this unit have some background in basic statistics including an introduction to regression analysis. Using this knowledge as a base, an extensive discussion of basic regression theory and some of its extensions is provided. The unit covers how linear regression models can be applied to data to estimate relationships, to forecast, and to test hypotheses that arise in economics and business. Guidelines for using econometric techniques effectively are discussed and students are introduced to the process of model building. It is essential that the discussion of regression modelling be complemented with practice in analysing data. An important task is the computing component using econometric software.

ECON1001

Introductory Microeconomics

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Classes:** 1 x 2hr lecture and 1x 1hr tutorial per week **Assumed knowledge:** Mathematics **Assessment:** Online quizzes (10%), mid semester test (30%), essay (10%), final exam (50%)

Introductory Microeconomics addresses the economic decisions of individual firms and households and how these interact in markets. It is a compulsory core unit for the Bachelor of Economics and Bachelor of Commerce and an alternative core unit for the Bachelor of Economic and Social Science. Economic issues are pervasive in contemporary Australian society. Introductory Microeconomics introduces students to the language and analytical framework adopted in Economics for the examination of social phenomena and public policy issues. Whatever one's career intentions, coming to grips with economic ideas is essential for understanding society, business and government. Students are given a comprehensive introduction to these ideas and are prepared for the advanced study of microeconomics in subsequent years.

ECON1002

Introductory Macroeconomics

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Classes:** 1 x 2hr lecture and 1x 1hr tutorial per week **Assumed knowledge:** Mathematics **Assessment:** Tutorial participation (5%), 5x online quizzes (10%), mid semester exam (25%), essay (10%), final exam (50%)

Introductory Macroeconomics addresses the analysis of the level of employment and economic activity in the economy as a whole. It is a compulsory core unit for the Bachelor of Economics and an alternative core unit for the Bachelor of Economic and Social Sciences. Introductory Macroeconomics examines the main factors that determine the overall levels of production and employment in the economy, including the influence of government policy and international trade. This analysis enables an exploration of money, interest rates and financial markets, and a deeper examination of inflation, unemployment and economic policy.

ECOS2001

Intermediate Microeconomics

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Classes:** 1 x 2hr lecture and 1x 1hr tutorial per week **Prerequisites:** ECON1001 **Corequisites:** ECMT1010 **Prohibitions:** ECON2001, ECOS2901, ECON2901 **Assessment:** Tutorials (10%), 2x in-class tests (40%), Final Exam (50%)

Note: Certain combinations of Maths/Stats may substitute for Econometrics. Consult the Chair of the Discipline of Economics.

The aim of Intermediate Microeconomics is the development of theoretical and applied skills in economics. It covers applications and extensions of the theory of consumer choice, firm behaviour and market structure. Emphasis is given to the economics of information and choice under uncertainty; industry structures other than monopoly and perfect competition; markets for factors of production; general equilibrium and economic efficiency; market failure and the role of government. This unit provides a basis for the more specialised options that comprise third year economics.

ECOS2002

Intermediate Macroeconomics

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Classes:** 1 x 2hr lecture and 1x 1hr tutorial per week **Prerequisites:** ECON1002 **Corequisites:** ECMT1020 **Prohibitions:** ECON2002, ECOS2902, ECON2902 **Assessment:** Mid Semester exam (30%), Final exam (50%), Assignments (20%)

Note: Certain combinations of Maths/Stats may substitute for Econometrics. Consult the Chair of the Discipline of Economics.

This unit of study develops models of the goods, money and labour markets, examines issues in macroeconomic policy. Macroeconomic relationships, covering consumption, investment, money and employment, are explored in detail. Macro-dynamic relationships, especially those linking inflation and unemployment, are also considered. Exchange rates and open economy macroeconomics are also addressed. In the last part of the unit, topics include the determinants and theories of economic growth, productivity and technology, the dynamics of the business cycle, counter-cyclical policy and the relationship between micro and macro policy in the context of recent Australian experience.

ECOS2901

Intermediate Microeconomics Honours

Credit points: 6 **Session:** Semester 1 **Classes:** 1 x 2hr lecture and 1x 1hr tutorial per week. **Prerequisites:** ECON1001 and ECON1002 with a Credit average or better in the two units of study combined **Corequisites:** ECOS2903 or MATH2070 and ECMT1010 **Prohibitions:** ECON2901, ECOS2001, ECON2001 **Assessment:** 2 x mid semester exams (50%), Final Exam (50%)

Note: Department permission required for enrolment.

This unit is comprised of lectures based upon the curriculum for ECOS2001 Intermediate Microeconomics, supported by a seminar for one hour a week. The content of lectures reflect a more analytical and critical treatment of the topics than ECOS2001. The topics, which build on the theory of consumer and firm behaviour and market structure, include game theory, oligopoly, general equilibrium and

welfare, externalities and public goods and the economics of information.

ECOS2902

Intermediate Macroeconomics Honours

Credit points: 6 **Session:** Semester 2 **Classes:** 1 x 2hr lecture and 1x 1hr tutorial per week **Prerequisites:** ECON1001 and ECON1002 with a Credit average or better in the two units of study combined **Corequisites:** ECMT1020 **Prohibitions:** ECON2902, ECOS2002, ECON2002 **Assessment:** Essay (20%), mid semester exam (30%), Final Exam (50%)

Note: Department permission required for enrolment.

This unit is comprised of lectures based upon the curriculum for ECOS2002 Intermediate Macroeconomics, supported by a seminar for one hour a week. The content of lectures reflects a more intensive treatment of the topics than ECOS2002. Topics covered include: models of the goods, money and labour markets; macro-economic relationships such as consumption, investment, demand for money and labour demand and supply; macro-dynamic relationships, especially those linking inflation and unemployment; exchange rates and open economy macroeconomics; theories of economic growth; productivity and technological change; the dynamics of the business cycle; and the relationship between micro- and macro-economic policy.

ENSY1001

Australian Environments and Climate

Credit points: 6 **Teacher/Coordinator:** Professor Mark Adams **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 1x compulsory weekend excursion week 10 **Assessment:** 1x2hr exam (40%) 2x quizzes (2x5%) 2x assignments (2x15%) 1x assignment (20%)

The objective of this unit is to introduce the big questions relating to the origins and current state of the planet: climate change, environment, landscape formation, and the growth of the human population. During the semester you will be introduced to knowledge, theories and debates about how the world's physical and human systems operate. The first module investigates the system of global environmental change, specifically addressing climate variability and human impacts on the natural environment. The second module presents Earth as an evolving and dynamic planet, investigating how changes take place, the rate at which they occur and how they have the potential to dramatically affect the way we live. Finally, the third module, focuses on human-induced challenges to Earth's future. This part of the unit critically analyses the relationships between people and their environments, with central consideration to debates on global food security, climate change and agriculture.

Textbooks

McKnight, T., Hess, D.H. (2002) Physical geography: a landscape appreciation. Seventh Edition. Prentice Hall.

ENSY1002

Ecological Sustainability

Credit points: 6 **Teacher/Coordinator:** Professor Mark Adams **Session:** Semester 2 **Classes:** 2x1-hr lectures/week, 1x compulsory 4-day excursion Sat-Tue week 9/10 **Assessment:** 5 x essays (5x16%) 1 x Field trip report (20%)

Ecological sustainability lies at the heart of all discussions about sustainability in general. Unless the earth's natural systems continue to function, economic, social and many other systems will fail. This unit of study provides students with critical knowledge and understanding of the biological, chemical and physical principles that govern the key processes that define ecological sustainability. Beginning with an exploration of the meaning of sustainability and how scientific methodology is applied to its study, students will progressively engage with more complex and challenging content. By the end of the unit, students will have explored all the major elements of ecological sustainability and be able to apply their understanding to articulate critical questions that need to be asked when presented with simplistic approaches or ideas. Practical classes will focus on building skills in a few key areas and developing a greater depth of knowledge in others. Two field trips associated with the practical classes will give the students direct experience of and exposure to the science of ecological sustainability. Students will work in small

groups during practical sessions, including field trips, and will be encouraged to participate in tutorial-style discussions.

Textbooks

A Critique for Ecology R.H. Peters, 1991, Cambridge University Press
Biogeochemistry : An Analysis of Global Change W.H. Schlesinger 1997, Academic Press

ENSY2001

Systems Complexity and Dynamics

Credit points: 6 **Teacher/Coordinator:** Prof. John W. Crawford, Prof. Jeff Amthor **Session:** Semester 1 **Classes:** 2x 1hr lectures, 1x3hr prac per wk, commencing week 1 **Prerequisites:** BIOM1003 or ENVX1001 **Assessment:** 1x2 hour exam (60%), 1x 3000 word reflective essay relating to practical work (40%)

This unit of study is designed to equip students with the conceptual and modeling tools to understand the nature of complexity in natural and managed systems, together with a realization of the fundamental similarities that exist between systems and across scales and the consequences that these have for the system dynamics.

It is a core unit for students in the Environmental Systems Degree and builds on Units relating to living systems and biometry by providing students with an understanding the importance of systems approaches and the ability to abstract and model complex environmental systems.

The lectures will present the students with a quantitative knowledge of the structure and dynamics of biological systems, from cells to landscape, and the role and limitations of modeling in supporting intuition to understand the link between system structure and dynamics. The practical classes will be designed to let students explore the concept of modeling without the need to learn sophisticated computer programming or complicated mathematics, and will be based on problems related to those covered in the lectures.

At the end of this unit the students will have an understanding of the process of abstraction and synthesis that is involved in systems modeling and how this can guide intuition in novel application domains by combining concepts to understand complex environmental systems. They will be able to evaluate the validity of models and appropriately interpret the predictions they make. They will understand the modeling process, its value and limitations without the need for detailed knowledge of the enabling technologies such as computer programs and mathematics.

The students will gain skills in abstraction and quantification of complex environmental systems through the use of worked examples and through the use of different modeling tools in the lab. They will gain experience of interdisciplinary team working, build research skills and communication skills through formal presentation, and will gain confidence in dealing with complex everyday problems.

ENTO2001

Agricultural Entomology

Credit points: 6 **Teacher/Coordinator:** Dr Sarah Mansfield **Session:** Semester 2 **Classes:** (2x1hour lecture, 1x3hour practical, 1x1hour insect collection)/week, commencing week 1. **Prerequisites:** 12 credit points of first year biology **Assessment:** 1 x 2hr exam (50%), lab quizzes and manual (20%), 1 x insect collection (30%).

This unit is an introduction to insects, the most abundant group of organisms. The course begins with insect external and internal anatomy, feeding modes, life cycles and behaviour. Real world examples are used to demonstrate the ecological roles insects play in natural and agricultural ecosystems (e.g. pollinators, herbivores, predators, parasitoids, disease vectors). This knowledge is then linked to aspects of applied entomology: insecticides, biological control, habitat manipulation, integrated pest management, medical entomology and insect conservation. Practical sessions focus on insect morphology and taxonomy, so that students learn to identify common insect orders and families. Students must make a representative insect collection. This course forms the basis of students' entomological knowledge for BScAgr and BHortSc degrees and lays the foundation for future study in entomology.

Textbooks

Required: Zborowski, P. & Storey, R. 1995. A field guide to insects in Australia. Reed New Holland, Sydney. 207 pp.

Recommended: Gullan, P.J. & Cranston, P.S. 2005. *The Insects: an outline of entomology*. 3rd edition, Blackwell Publishing, Malden, MA. 505 pp.

ENTO4003

Integrated Pest Management

Credit points: 6 **Teacher/Coordinator:** Dr Sarah Mansfield **Session:** Semester 2 **Classes:** 1x2hr lecture, 1x3hr practical/week, commencing week 1. **Prerequisites:** ENTO2001 or ENTO2002 or BIOL2017 or BIOL2917 (Note: BIOL2017/BIOL2917 are only for BSc students who elect to take this UoS) **Assessment:** 1x2hr exam (40%), 1x case study (20%), 1x group assignment (20%), 1x insect collection (20%).

The focus of this unit is the development and adoption of integrated pest management (IPM) within Australian agriculture. It builds on the knowledge gained in second year entomology (BScAgr and BHortSc) and is a core unit for the entomology specialty (BScAgr). Applied entomology deals with the control of insect pests and the use of beneficial insects. The biology of major pest (herbivores and disease vectors) and beneficial (predators, parasitoids, pollinators) insect groups is covered in depth. Students will compare the advantages and disadvantages of different pest control strategies and evaluate the importance of insect ecology, control methods and socio-economic factors to successful adoption of integrated pest management. Field trips will demonstrate the practical application of IPM concepts presented in lectures. Research, inquiry and information literacy skills will be improved through critical review of current literature and compilation of a case study. Students will practice their communication skills and develop personal and intellectual autonomy through a group project, in-class discussion and a self-directed insect collection.

Textbooks

Required: Bailey, PT (Ed.) 2007. *Pests of field crops and pastures*. CSIRO Publishing, Collingwood, Vic. 520 pp.
Recommended: Llewellyn, R. (Ed.) 2002. *The Good Bug Book*. 2nd edition, Australasian Biological Control, Richmond, NSW. 110 pp.
Pedigo, LP and Rice, ME. 2009. *Entomology and Pest Management*, 6th edn. Pearson Prentice Hall, 784 pp.

ENTO4004

Insect Taxonomy and Systematics

Credit points: 6 **Teacher/Coordinator:** Dr Sarah Mansfield **Session:** Semester 1 **Classes:** (1 x 2hr lecture, 1 x 3hr practical)/week, commencing week 1. **Prerequisites:** ENTO2001 or ENTO2002 or BIOL2017 or BIOL2917 (Note: BIOL2017/BIOL2917 are only for the BSc students who elect to take this unit of study) **Assessment:** 1 x 2hr exam (40%), 1x museum project (25%), 1 x insect collection (25%), 1 x class participation (10%).

Knowledge of the evolutionary relationships between insect groups contributes to our understanding of insect biology and correct taxonomic identification of insects is essential for all areas of entomological research, including pest management. This unit builds on the knowledge gained in second year entomology (BScAgr and BHortSc) and is a core unit for the entomology specialty (BScAgr). Key concepts that underpin the study of insect systematics, biogeography and phylogeny are described using examples from the evolutionary development of insects. The role of morphological, genetic and molecular studies in the classification of insects is examined. Students will demonstrate their knowledge of insect taxonomy through individual projects and assess the impact of evolutionary relationships among insect groups on modern agriculture. Research, inquiry and information literacy skills will be improved through a museum project and a self-directed insect collection. Students will practice their communication skills and develop personal and intellectual autonomy through in-class discussion of current literature.

Textbooks

Upton MS and Mantle BL, 2010. *Methods for collecting, preserving and studying insects and other terrestrial arthropods*, 5th edition. The Australian Entomological Society, Miscellaneous Publication No. 3.
Recommended: Naumann, I 1993. *CSIRO Handbook of Australian Insect Names*. 6th edition, CSIRO Entomology, Melbourne, VIC. 200 pp.
Triplehorn, CA & Johnson, NF 2005. *Borror and DeLong's introduction to the study of insects*. 7th edition, Thomson Brooks/Cole, Belmont, CA, 864 pp.

ENVI2112

Atmospheric Processes and Climate

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** Edwina Tanner **Session:** Semester 2 **Classes:** Three 1 hour lectures and one 2 hour practical per week. **Prerequisites:** 24 credit points of Junior Science units, including 12 credit points of Junior Chemistry or Physics **Prohibitions:** ENVI2002 **Assessment:** Assignments, tutorial papers, exam

This unit of study investigates the physical and chemical characteristics of our atmosphere, as well as the natural processes that occur within it and how these contribute to the climate we live in. Topics such as atmospheric structure, photochemical processes, and weather will be examined. The effects of ocean circulation are investigated, particularly examining the ocean's importance as a source/sink for atmospheric constituents and as a heat regulator. The impact of glaciation is also examined, including sources, quantity, magnitude of threat, and the potential impact to our climate, are then explored. Finally, the unit examines issues surrounding climate change and the modelling of these changes.

ENVI3111

Environmental Law and Ethics

Credit points: 6 **Teacher/Coordinator:** Ms Leta Webb **Session:** Semester 1 **Classes:** Two 2 hour lectures per week. **Prerequisites:** 12 credit points of Intermediate Science or Agriculture units. **Prohibitions:** ENVI3001, ENVI3003 **Assumed knowledge:** Intermediate Environmental Science. **Assessment:** Essays, tutorial papers (100%)

This unit of study covers topics in environmental law and ethics. The environmental law component provides an overview of laws in Australia pertaining to environmental matters and looks at a number of environmental issues at the various levels of analysis, policy making, implementation of policy, enforcement, and dispute resolution. It also provides a broad background to the political and economical issues as they relate to the legal issues involved. It also examines international environmental law, particularly examining how these influence and affect our local policies. The ethics component helps students develop thoughtful and informed positions on issues in environmental ethics using arguments derived from traditional ethics as well as environmentally specific theories. Ethical conflicts are often inevitable and difficult to resolve but using the resources of philosophical ethics and regular reference to case studies, students can learn to recognize the values and considerations at stake in such conflicts, acknowledge differing viewpoints and defend their own well considered positions.

ENVI3112

Environmental Assessment

Credit points: 6 **Teacher/Coordinator:** Dr John Dee **Session:** Semester 2 **Classes:** Two 2 hour lectures per week. **Prerequisites:** 12 credit points of Intermediate Science or Agriculture units. **Prohibitions:** ENVI3002, ENVI3004 **Assumed knowledge:** Intermediate Environmental Science. **Assessment:** Essays, tutorial papers, report (100%)

This unit of study is composed of two components: environmental impact assessment and risk assessment. The former is generally concerned with issues related to environmental impact assessment and builds toward the process of producing an EIS/EIA. More specifically it seeks to establish a critical understanding of the theory and practice of environmental impact studies/statements (EIS) and environmental impact assessment processes (EIA) from both the positive (scientific) and normative (value) perspectives. Emphasis is placed on gaining skills in writing and producing an assessment report, which contains logically ordered and tightly structured argumentation that can stand rigorous scrutiny by political processes, the judiciary, the public and the media. The risk assessment component considers a more chemical approach to the assessment of risk and issues of safety with respect to chemicals, ecotoxicology and the environment. It draws on current environmental management practice to investigate what constitutes risk and to demonstrate how risk may be managed.

ENVX1001

Introductory Statistical Methods

Credit points: 6 **Teacher/Coordinator:** Dr Thomas Bishop **Session:** Semester 1 **Classes:** 2x1 hr lectures/wk, 1x1 hr tutorial/wk, 1x2 hr computer practical/wk **Assumed knowledge:** 70 or more in HSC Mathematics **Assessment:** Practical exercises (30%), Practical Exam (20%), Theory Exam (50%)

This is a core first year unit for the BEnvSys, BScAgr and BAnVetBioSc degrees. It provides the foundation quantitative skills that are needed in other units in the degrees and for further study in applied statistics. In the first half of the unit the emphasis is on statistics, topics covered include: describing biological data and variability, sampling and estimation, framing biological hypotheses; estimating a single treatment mean via a confidence interval and testing for a particular mean via a z-test or t-test; estimating or testing the difference between two treatment means. In the second half of the unit the focus is on single variable calculus, the topics being differentiation and integration, with an emphasis on linear and non-linear functions that can be used for modelling biological and environmental data. In the practicals the emphasis is on applying theory to analysing real datasets using the spreadsheet package Excel and the statistical package Genstat.

Textbooks

No textbooks are recommended but useful reference books are:
 -Mead R, Curnow RN, Hasted AM (2002) 'Statistical methods in agriculture and experimental biology.' (Chapman & Hall: Boca Raton).
 -Quinn GP, Keough MJ (2002) 'Experimental design and data analysis for biologists.' (Cambridge University Press: Cambridge, UK).

ENVX2001

Applied Statistical Methods

Credit points: 6 **Teacher/Coordinator:** Dr Thomas Bishop **Session:** Semester 1 **Classes:** 2x1 hr lectures/wk, 1x1 hr tutorial/wk, 1x2 hr computer practical/wk **Prerequisites:** ENVX1001 or BIOM1003 or MATH1011 and MATH1015 **Assessment:** Practical exercises (30%), Practical Exam (20%), Theory Exam (50%).

This unit of study is a core 2nd year unit for students in the BEnvSys, BScAgr and BAnVetBioSc degrees. It consists of three parts. In the first part students will investigate how to use an ANOVA to analyse experiments with more than 2 treatment levels, multiple factors and different blocking designs. In the second part an introduction to a branch of mathematics called linear algebra is given with an emphasis on the applications to statistics and modelling. In the final part students will learn to model relationships between response and predictor variables using regression. During the practicals two software packages; Genstat and Excel, will be used to analyse real datasets. At the end of this unit, students will have learnt how to analyse data using ANOVA and regression, the basic methods needed for their future studies and careers. The students will gain research and inquiry skills through completion of weekly computer assignments. Information literacy and communication skills will be developed through weekly computer work.

Textbooks

No textbooks are recommended but useful reference books are:
 -Mead R, Curnow RN, Hasted AM (2002) 'Statistical methods in agriculture and experimental biology.' (Chapman & Hall: Boca Raton).
 -Quinn GP, Keough MJ (2002) 'Experimental design and data analysis for biologists.' (Cambridge University Press: Cambridge, UK).

ENVX3001

Environmental GIS

Credit points: 6 **Teacher/Coordinator:** A/Prof Inakwu Odeh **Session:** Semester 2 **Classes:** Three-day field trip, (2 lec & 2 prac/wk). **Assumed knowledge:** least 48 credit points in second year agriculture/science units. **Assessment:** One 15 min presentation (10%), 3500w prac report (35%), 1500w report on trip excur (15%), 2 hr exam (40%)

This unit is designed to impart knowledge and skills in spatial analysis and geographical information science (GISc) for decision-making in an environmental context. The lecture material will present several themes: principles of GISc, geospatial data sources and acquisition methods, processing of geospatial data and spatial statistics. Practical exercises will focus on learning geographical information systems (GIS) and how to apply them to land resource assessment, including digital terrain modelling, land-cover assessment, sub-catchment modelling, ecological applications, and soil quality assessment for decisions regarding sustainable land use and management. A 3 day field excursion during the mid-semester break will involve a day of GPS fieldwork at Arthursleigh University farm and two days in Canberra visiting various government agencies which research and maintain GIS coverages for Australia. By the end of this UoS, students should be able to: differentiate between spatial data and spatial

information; source geospatial data from government and private agencies; apply conceptual models of spatial phenomena for practical decision-making in an environmental context; apply critical analysis of situations to apply the concepts of spatial analysis to solving environmental and land resource problems; communicate effectively results of GIS investigations through various means- oral, written and essay formats; and use a major GIS software package such as ArcGIS.

Textbooks

Burrough, P.A. and McDonnell, R.A. 1998. Principles of Geographic Information Systems. Oxford University Press: Oxford.
 Clarke, K. C. 2003. Getting Started With Geographic Information Systems. 4th Edition. Prentice Hall: Upper Saddle River, New Jersey.

ENVX3002

Statistics in the Natural Sciences

Credit points: 6 **Teacher/Coordinator:** Dr Thomas Bishop **Session:** Semester 1 **Classes:** 1x2 hr workshop/wk, 1x3 hr computer practical/wk **Prerequisites:** ENVX2001 or BIOM2001 or STAT2012 or STAT2912 **Assessment:** Major Project (20%) Practical exercises (30%), Exam (50%).

This unit of study is designed to introduce students to the analysis of data they may face in their future careers, in particular data that are not well behaved, they may be non-normal, there may be missing observations or they may be correlated in space and time. In the first part, students will learn how to analyse and design experiments based on the general linear model. In the second part, they will learn about the generalisation of the general linear model to accommodate non-normal data and data that is correlated in time. A major project will focus on the analysis of a dataset from an existing research project. At the end of this unit, students will have learnt a range of advanced statistical methods and be equipped to apply this knowledge to analyse data that they may encounter in their future studies and careers. The students will gain research and inquiry skills through completion of a major project. Information literacy and communication skills will be developed through weekly computer work.

Textbooks

No textbooks are recommended but useful reference books are:
 -Mead R, Curnow RN, Hasted AM (2002) 'Statistical methods in agriculture and experimental biology.' (Chapman & Hall: Boca Raton).
 -Quinn GP, Keough MJ (2002) 'Experimental design and data analysis for biologists.' (Cambridge University Press: Cambridge, UK).

ENVX4001

GIS, Remote Sensing and Land Management

Credit points: 6 **Teacher/Coordinator:** A/Prof Inakwu Odeh **Session:** Semester 2 **Classes:** 3x1-hr lectures/week weeks 1-6, 1x1 project weeks 7-11, 1x1-½ hour presentation scheduled for weeks 12 and 13, 1x3-hr practical weeks 1-6 **Assumed knowledge:** Recommended units include GEOS2111/GEOS2911 (Natural Hazards: a GIS approach), ENVX3001 (Environmental GIS), SOIL3004 (The Soil Resource), GEOS3014/GEOS3914 (GIS in Coastal Management) **Assessment:** 1x 20 min presentation (10%), laboratory work reports (30%), Group assignment (10%), 1x 3000w project report (50%)

Note: Department permission required for enrolment. Note: Consent of the unit coordinator required.

This unit of study is aimed at advanced techniques in Remote Sensing (RS), linked with Geographical Information Systems (GIS), as applied to land management problems. The unit consists of three separate but overlapping parts: 1) a short theoretical part which focuses on the concepts of RS; 2) a practical part which aims at developing hands-on skills in using RS and GIS tools, and 3) an application-focused module in which students will learn the skills of how to design a land management project and actualise it using integrated GIS and RS techniques. At the completion of this unit students will have grasp the theories and concepts of GIS and acquired research skills in the application of advanced remote sensing and GIS algorithms to provide evidence-based solutions to natural resource management and environmental problems. Communication skills and critical thinking for solving land resources problems are encouraged through class discussions, group work and tutorial presentations.

Textbooks

van Dijk, A. and Bos, M.G. 2001. GIS and remote sensing techniques in land- and water-management. Kluwer Academic Publisher, Dordrecht.
 Skidmore, A. 2002. Environmental modelling with GIS and remote sensing. Taylor & Francis, London.

Jesen J. R. 2007. Remote sensing of the environment: an earth resource perspective. 2nd ed. Pearson Prentice Hall Upper Saddle, New Jersey.

GENE2001

Agricultural Genetics 2

Credit points: 6 **Teacher/Coordinator:** Professor Peter Sharp **Session:** Semester 1 **Classes:** (3 lec, 3 prac/problem set)/wk **Prerequisites:** At least one of (BIOL1001, BIOL1002, BIOL1101, BIOL1901, BIOL1911) **Assessment:** 1x2.5hr exam (60%) and 1x assignment of problem-type questions (20%) 4x on-line quizzes (4x5%)

This lecture and practical unit of study provides an introduction to the genetics and breeding of plants and animals. It provides an understanding for parallel and following courses. Lectures cover the basics of gene transmission and interaction, cytogenetics, molecular genetics, population and quantitative genetics, as well as the more applied aspects of plant and animal breeding and biotechnology. Practicals emphasise, with agricultural examples, the procedures of genetic and cytogenetic analysis, and the use of computers in simulation procedures in population genetics, quantitative inheritance and selection programs, and provide exposure to current plant and animal breeding and biotechnology.

GENE4012

Plant Breeding

Credit points: 6 **Teacher/Coordinator:** Professor Richard Trethowan **Session:** Semester 2 **Classes:** 20lectures plus group presentations plus 10hrs practicals/demonstrations (26 July - 30 August) **Prerequisites:** GENE2001, GENE4013 **Assessment:** 1x2hr exam (75%) and 1xgroup project (25%)

Lectures and practical work are devoted to the theory, philosophy and practice of plant breeding. The unit addresses screening techniques, conservation of genetic variability, breeding for disease resistance and integration of molecular technology in applied plant breeding, with examples from both field and horticultural crops. The unit is taught in the context [of] climate change, food security and the evolving global intellectual property environment.

GENE4013

Molecular Genetics and Breeding

Credit points: 6 **Teacher/Coordinator:** Professor Peter Sharp **Session:** Semester 1 **Classes:** (3 lec, 2 seminars/workshops, 1 lab)/wk **Prerequisites:** BIOM2001, GENE2001 **Assessment:** 1x2hr exam(50%), 2x 1500word assignments(35%), 1xpractical report(10%), 1xpresentation(5%)

Lectures and laboratory work covering the structure and function of plant genomes and genes, the technology and results of DNA transformation and the analysis of plant traits by molecular techniques including by genetic mapping using molecular and other genetic markers.

GENE4014

Population and Quantative Genetics

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** Prof Chris Moran **Session:** Semester 1 **Classes:** (3 lec, 2 labs)/wk **Prerequisites:** BIOM2001, GENE2001 **Corequisites:** GENE4012 **Assessment:** 2hr exam, assignments, practical reports, presentation.

Lectures and practical periods dealing with population genetic, quantitative inheritance and animal breeding given by the Faculty of Veterinary Science.

GENE4015

Cytogenetics

Credit points: 6 **Teacher/Coordinator:** Professor Peter Sharp; animal component coordinator, Dr Jaime Gongora **Session:** Semester 2 **Classes:** Equivalent of 2 lecture/tutorials & 3 practicals/week **Prerequisites:** BIOM2001, GENE2001 **Assessment:** 1x1500wd Essay (25%), 1x750wd Practical report (10%) and 1x1000wd Fact Sheet (15%) 1x1200wd Laboratory report (20%), 1x2000wd Assignment (30%)

This is a final year elective in the two degrees, BScAgr, and BAnVetBiosci. Approximately a half of the face-to-face contact hours will be given as an intensive, and this section of the unit will be held during the mid-year break before semester 2. Lecture and practical work in cytogenetics, especially of plant and animal species of applied

interest in plant agriculture, animal agriculture and other applied interest in animal genetics, such as companion, native and endangered species. The lecture component covers the molecular nature of chromosomes and their transmission, variation in chromosome behaviour, both normal and disease related. In addition, the uses of chromosome engineering to produce variation in plants and animals will also be covered. The practical component covers the technologies used to study chromosomes or both plants and animals, both mitotic and meiotic chromosomes, and molecular techniques such as in situ hybridisation, gene activity and chromosomal protein localisation. On completion, students will be able to apply cytogenetic knowledge and technologies to species of eukaryotes of economic significance, and know how cytogenetic processes have affected the development of these species.

GEOG2321

Fluvial and Groundwater Geomorphology

Credit points: 6 **Teacher/Coordinator:** Dr Alison Gates, Dr Willem Vervoot **Session:** Semester 2 **Classes:** Two 1 hour lectures and one 2 hour practical per week. **Prerequisites:** 24 credit points of Junior units of study including 6 credit points of Junior Geoscience. Students in the BEnvSys should have ENSY1001, 12 credit points of Chemistry, 6 credit points of Biology, BIOM1003 or ENVX2001 **Prohibitions:** GEOG2002, GEOG2302, GEOG2303, MARS2002, MARS2006 **Assessment:** One 2 hr exam, two quizzes, one field report, practical exercises (100%)

This unit of study provides an introduction to the fundamentals of fluvial geomorphology (the study of surface water as an agent of landscape change) and groundwater hydrology. The fluvial geomorphology section of the unit will describe the movement of water in stream channels and investigate the landscape change associated with that movement. Topics to be covered will include open channel flow hydraulics, sediment transport processes and stream channel morphology. Practical work will focus on the collection and analysis of field data. The quantity and quality of the groundwater resources are closely linked to geology and fluvial geomorphology. The groundwater section of this unit is based around four common groundwater issues: contamination, extraction, dryland salinity and groundwater-surface water interaction. In the practical component, common groundwater computer models such as FLOWTUBE and MODFLOW will be used to further explore these problems.

Textbooks

Recommended Textbooks: Fetter, CW. Applied Hydrogeology. Prentice-Hall. 2001.

Knighton, D. Fluvial Forms and Processes. Hodder-Arnold. 1998.

GEOS1001

Earth, Environment and Society

Credit points: 6 **Teacher/Coordinator:** Dr Tom Hubble, Dr Jody Webster, A/Prof Bill Pritchard **Session:** Semester 1 **Classes:** Two 1 hour lectures and one 2 hour practical per week. **Prohibitions:** GEOS1901, GEOG1001, GEOG1002, GEOL1001, GEOL1002, GEOL1902 **Assessment:** One 2 hour exam, 2000 word essay, field and prac reports (100%)

This is the gateway unit of study for Human Geography, Physical Geography and Geology. Its objective is to introduce the big questions relating to the origins and current state of the planet: climate change, environment, landscape formation, and the growth of the human population. During the semester you will be introduced to knowledge, theories and debates about how the world's physical and human systems operate. The first module investigates the system of global environmental change, specifically addressing climate variability and human impacts on the natural environment. The second module presents Earth as an evolving and dynamic planet, investigating how changes take place, the rate at which they occur and how they have the potential to dramatically affect the way we live. Finally, the third module, focuses on human-induced challenges to Earth's future. This part of the unit critically analyses the relationships between people and their environments, with central consideration to debates on population change and resource use.

GEOS1002**Introductory Geography**

Credit points: 6 **Teacher/Coordinator:** Dr Kurt Iveson **Session:** Semester 2 **Classes:** Two 1 hour lectures and one 2 hour practical per week. **Prohibitions:** GEOS1902, GEOG1001, GEOG1002 **Assessment:** One 2 hour exam, one 1000 word essay, two online quizzes, one practical report (100%)

This Unit of Study provides an introductory geographical analysis of the ways in which people and physical processes/features are produced, behave and interact. The Unit focuses on the physical and human processes that generate spatial variation and difference, as well as tracing the interactions between these processes. It includes an investigation of Earth's surface features, exploring the distribution of select landforms across Earth and interpreting their evolutionary histories. Several landscapes will be examined, such as those formed by rivers, wind, and glaciers. But physical landscapes evolve under the influence of and affect human operations. Therefore, the Unit of Study will also consider the political, economic, cultural and urban geographies that shape contemporary global society. Each of these themes will be discussed with reference to key examples (such as Hurricane Katrina, the Kashmir Earthquake, the conflict in Darfur, and sea-level rise in the Pacific), in order to consider the ways in which the various processes (both physical and human) interact. The Unit of Study will also include a short field trip to localities surrounding the university to observe processes of spatial change and conflict. The Unit of Study is designed to attract and interest students who wish to pursue geography as a major within their undergraduate degree, but also has relevance to students who wish to consider the way geographers understand the contemporary world.

GEOS1003**Introduction to Geology**

Credit points: 6 **Teacher/Coordinator:** Dr Tom Hubble, Prof Geoff Clarke **Session:** Semester 2, Summer Late **Classes:** Three 1 hour lectures and one 1 hour practical per week. **Prohibitions:** GEOS1903, GEOL1002, GEOL1902, GEOL1501 **Assessment:** One 2 hour exam, practical reports, field report (100%)

The aim of this unit of study is to examine the chemical and physical processes involved in mineral formation, the interior of the Earth, surface features, sedimentary environments, volcanoes, and metamorphism. Lectures and laboratory sessions on mountain building processes and the formation of mineral deposits will lead to an understanding of the forces controlling the geology of our planet. Processes such as weathering, erosion and nature of sedimentary environments are related to the origin of the Australian landscape. In addition to laboratory classes there is a one-day excursion to the western Blue Mountains and Lithgow to examine geological objects in their setting.

Textbooks

The recommended text is Stephen Marshak, *Earth: Portrait of a Planet*. W. W. Norton & Company (2007) - Paperback - 832 pages - ISBN 039393036X

GEOS2113**Making the Australian Landscape**

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** Dr S.J. Gale **Session:** Semester 1 **Classes:** Two or three 1-hour lectures and one or two 1-hour practicals per week. **Prerequisites:** 24 credit points of Junior units of study, including GEOS1002 or GEOS1003 or GEOS1902 or GEOS1903 or GEOG1001 or ENVI1002 or GEOL1001 or GEOL1002 or GEOL1902 **Prohibitions:** GEOS2913 **Assessment:** One 2 hour examination, practical reports.

The shifts in the nature of the Earth's environment over time and the resultant changes in process regimes have had dramatic impacts on the way the Australian physical landscape has evolved. We consider here the effects of these changes on the broad pattern of the landscape, focusing particularly on slopes and soils. We follow this by investigating the environmental changes that have taken place since the end of the last glacial, the time when the continent's climates and environments first took on a recognisably modern form. We deal specifically with the impact of human activity on the Australian biophysical environment, emphasising both pre-European impacts and those changes that have taken place since European contact.

GEOS3018**Rivers: Science, Policy and Management**

Credit points: 6 **Teacher/Coordinator:** Prof Philip Hirsch, Dr Tom Hubble **Session:** Semester 1 **Classes:** one 2 hour lecture and one 2 hour tutorial per week, fieldwork **Prerequisites:** 24 credit points of Intermediate units of study including 6 credit points of Intermediate Geoscience (GEOG or GEOS) units of study **Prohibitions:** GEOS3918 **Assessment:** One 2 hour exam, one 1500 word essay, one group project (100%)

This unit of study aims to decipher the multi-faceted nature of river management by examining how rivers function, from both natural science and social science perspectives. The physical condition of rivers is assessed by considering issues such as catchment hydrology, water quality, the structure and role of riparian vegetation and the functioning of aquatic ecosystems. This information is then combined to examine the science underpinning river rehabilitation projects and environmental assessment of river basin development. The ability to rehabilitate rivers and their management for social and economic goals is also controlled by a range of social and political factors. Therefore, water resource policies and institutions, both within Australia and globally, are also examined in terms of their influences on fluvial systems.

GOVT1101**Australian Politics**

Credit points: 6 **Teacher/Coordinator:** Dr Anika Gauja **Session:** Semester 1 **Classes:** 1x2hr lecture/week, 1x1hr tutorial/week commencing week 2 **Assessment:** 1x2000wd essay (40%), 1x1000wd critical research exercise (10%), 1x 2hr exam (40%) and tutorial participation (10%)

This unit introduces students to debates about the nature and limits of Australian democracy, to the major institutions of Australian politics, and to the distribution of power in Australian society. Major institutions and forces such as parliament, executive government, the federal system, political parties and the media are examined as arenas of power, conflict and consensus. Who rules? How? Which groups are excluded?

Textbooks

Texts to be advised.

GOVT1104**Power in Society**

Credit points: 6 **Teacher/Coordinator:** Dr Anna Boucher **Session:** Semester 2 **Classes:** 1x2hr lecture/week, 1x1hr tutorial/week commencing week 2 **Assessment:** 1x750wd reading assignment (20%), 1x2000wd essay (30%), 1x2hr exam (40%) and tutorial participation (10%)

This unit provides an introduction to the study of politics through a focus on the key organising principle of political science: power. Different ways in which power is theorised and structured are considered, not with the intention of presenting a universal theory or theories, but rather to find some connections and extensions amongst a wide variety of experiences of political power. In particular this unit considers the way power operates in Australian society in relation to political decision making. The unit draws on case studies in order to combine the study of key political ideas and concepts with practical examples from our daily lives (e.g. diet, transport, drugs, clothing, etc.).

GOVT1105**Geopolitics**

Credit points: 6 **Teacher/Coordinator:** Dr Diarmuid Maguire (S1), Prof Graeme Gill (S2) **Session:** Semester 1, Semester 2 **Classes:** 1x2hr lecture/week, 1x1hr tutorial/week commencing week 2 **Assessment:** 1x1500wd essay (30%), 1x1hr mid-term exam (20%), 1x2hr final exam (40%) and tutorial participation (10%)

This unit will examine how the contemporary international political order has emerged by focusing upon the interplay of diplomatic and strategic issues in the post-war world. It will begin with an analysis of the Cold War and its origins, tracing the development of Soviet-American rivalry, its manifestations in Europe, Asia, Africa and Latin America, and the different ways in which that rivalry was played out. The collapse of the Soviet Union as both a superpower and a state and the disappearance of the communist bloc will be analysed, before surveying the post-Cold War international scene. Among the

issues reviewed in the post-Cold War era will be the question of US hegemony and unilateralism vs. multilateralism, nuclear proliferation, the continuing tension between the first and the third worlds, questions of civilisational conflict, non-state actors and terrorism, democratisation, and regional conflict.

GOVT1202

World Politics

Credit points: 6 **Teacher/Coordinator:** Dr Gil Merom (S1), Dr Susan Park (S2) **Session:** Semester 1, Semester 2 **Classes:** 1x2hr lecture/week, 1x1hr tutorial/week commencing week 2 **Assessment:** 1x500wd essay (10%), 1x2300wd essay (35%), 1x2hr in-class test (40%) and tutorial participation (15%)

This unit introduces the core content of the field of international relations. The first part of the unit presents the realist, liberal, Marxist and constructivist paradigms of international relations. The second part of the unit discusses the key actors and processes political scientists define in the field, including the state, decision makers, bureaucratic organisations, and classes. The final part of the unit focuses on international security, international political economy, and global problems.

HORT3005

Production Horticulture

Credit points: 6 **Teacher/Coordinator:** Dr Jenny Jobling **Session:** Semester 1 **Classes:** (2x1hr lec; 1x3hr prac/workshop)/wk **Prerequisites:** Two of PLNT2001, PLNT2901, PLNT2002, PLNT2902, PLNT2003, PLNT2903 **Assumed knowledge:** AFNR1001, AFNR1002 and HORT2002 **Assessment:** One 3 hr exam (55%), three assignments (45%).

This unit of study covers topics on the production of perennial fruit crops, wine grapes, the sustainable production of vegetables and it also covers the key aspects of the postharvest handling and quality assurance of fresh produce. At the end of this unit students are expected to have a detailed understanding of these areas of horticulture and be able to discuss related literature and the physiological principles underlying the commercial success of these horticultural enterprises. Students will also gain research and enquiry skills through research based practical sessions and assignments.

Textbooks

Recommended reading:

Louis Glowinski (2008) The complete book of fruit growing in Australian. Lothian Books
Westwood, M.N. (1993) Temperate-zone pomology. Timber Press Inc.
Jackson, J.E (2003) Biology of apples and pears. Cambridge University Press
Gopinadhan Paliyath et al. (Ed.) (2008) Postharvest biology and technology of fruits, vegetables, and flowers. Oxford : Wiley-Blackwell
Decoteau, D/. R (2000). Vegetable Crops. Upper Saddle River, NJ: Prentice Hall

HORT4004

Issues in Horticultural Science 4A

Credit points: 6 **Teacher/Coordinator:** Dr Brian Jones **Session:** Semester 1 **Classes:** 1x4hr workshop/site visit per week **Prerequisites:** HORT3001 or HORT3004 **Assessment:** 1x2hr Exam (40%), weekly reports (40%), Field work (20%).

This unit links a range of horticultural science topics with commercial applications. One element is designed around a "supply chain" framework, applied to multiple "real world" case studies. It will develop skills in data analysis and interpretation, problem identification and problem solving. Students will understand how multiple issues must be integrated in order to provide fresh solutions to technical or commercial challenges and opportunities. A second element exposes students to the research work at the Royal Botanic Gardens at Mt Annan. This illustrates the importance of horticultural science to conservation issues. It also covers opportunities and barriers regarding the commercial use of native flora.

HORT4005

Research and Practice in Hort Science

Credit points: 6 **Teacher/Coordinator:** Dr Brian Jones **Session:** Semester 2 **Classes:** 1x2h tut/wk; one 1-week excursion **Prerequisites:** HORT3005 **Assessment:** Tutorial papers (30%); project proposal (10%); project report (50%); peer review (10%).

Upon completion of this unit, students will have participated in a major excursion and a series of discussion workshops based on prescribed readings that will broaden their appreciation of current research themes in horticultural science, industry issues, stimulate critical thinking, enhance professional research skills and give an insight into the career opportunities for horticultural scientists. Attendance at seminars, written reports and presentations made during these workshops will improve student skills in critical analysis and communication.

INFS1000

Digital Business Innovation

Credit points: 6 **Session:** Semester 1, Semester 2, Summer Main **Classes:** 1x 2hr lecture and 1x 1hr lab workshop per week **Prohibitions:** ISYS1003, INFO1000, INFO1003 **Assessment:** Groupwork (10%); Group project (25%); Mid-semester test (25%); Final exam (40%)

The Digital Age, with its focus on information as a key business resource, has changed the way Business Information Systems (BIS) are viewed in organisations. They are now seen as enablers of innovation where people supported by powerful technology are considered to be their most important component. This is because creativity, innovation and critical thinking cannot be outsourced or easily acquired by competitors.

This unit is designed to develop your understanding of how businesses operate and shows how information systems support all aspects of business operations and management through integration of people, business processes and systems. You will be provided with an introduction to the state-of-the art theories, frameworks and models to assist in understanding the nature and contribution of BIS in a range of organisational contexts including private, public and not for profit as well as virtual communities and social networks. With its emphasis on business rather than IT, this unit is suitable for all business and non business majors and does not require prior IT-related experience. If you want to learn how to use technology to become a more innovative and creative business professional and a global technology-savvy citizen this unit is for you!

LWSC2002

Introductory Hydrology

Credit points: 6 **Teacher/Coordinator:** Dr Willem Vervoort **Session:** Semester 2 **Classes:** Lec 2hr/wk; practical: 3hr/wk (for 8 weeks); field work: 25hr/wk (for 1 wk only) **Assumed knowledge:** AFNR1001, AFNR1002, ENSY1001 and (BIOM1003 or ENVX1001) **Assessment:** One 2 hr exam (50%), laboratory and practical reports (20%), field trip report (30%). **Practical field work:** 1 week field trip

This unit introduces students to hydrology and water management in the context of Australian integrated catchment management. It particularly focuses on the water balances, rainfall runoff modeling, analysis and prediction of streamflow and environmental flows, water quality and sustainable practices in water management. Through theoretical work and case studies, the students will engage with problems related water quantity and quality in Australia and the world. The unit builds on knowledge gained in AFNR1001, AFNR1002, and SOIL2001 and establishes the foundation for later units in the hydrology and water area. The unit provides one of the essential building blocks for a career related to water management and hydrology. The unit consists of two parts; the first part will involve a series of lectures, tutorials, practical exercises and case studies. The second part of the unit consists of field excursions to parts of NSW. During the field excursions, students will engage with current water problems and engage in basic hydrometric and water quality data collection. The data will be used later to analyse catchment condition and water supply issues.

After completion of this unit, you should be able to:

Explain the different processes in the hydrological cycle

Measure and interpret hydrometric and basic water quality data

Elucidate the processes involved in generation of streamflow from rainfall.

Distinguish the link between water quantity and water quality and its implications for water management.

Demonstrate a deeper understanding of the unique nature of Australian Hydrology

Master the ability to critically debate problems facing sustainable water resource management policy and practice in Australia using course material, scientific literature, policy and popular media

Textbooks

Al Bakri D 2002. Geoscience and sustainable catchment and resource management: The Ben Chifley Catchment case study, *Environmental Geology*, 42, 588-596.

Al Bakri D 2001. Towards developing a geoscientific approach to sustainable agricultural and rural development, *Journal of Environmental Geology*, 40 (4-5), 543-556.

Heathcote IW 1998. *Integrated watershed management, principles and practices*, John Wiley and Sons, New York.

LWSC3005

Environmental Water Quality

Credit points: 6 **Teacher/Coordinator:** Dr Feike Dijkstra **Session:** Semester 1 **Classes:** 2 lec/wk; 3hr lab for 7 weeks; 25hr fieldwork (in 1 wk only) **Prerequisites:** LWSC2002 or GEOG2321 or AGCH2003 or 6 credit points of intermediate Chemistry **Assessment:** One 2 hr exam (40%), laboratory and practical reports (35%), field trip professional report (25%).

Note: Department permission required for enrolment.

The unit of study will provide students with an in-depth understanding of the main water quality problems in Australia, related limnological issues and the underlying causes and processes. The unit builds on knowledge gained in LWSC2002, AGCH2003 and GEOG2321. The study program commences with a field trip module to the productive Macquarie and Namoi Valleys, where irrigated agriculture has been developed. Environmental impacts of agricultural enterprises such as irrigation farming and human settlements on water environments will be assessed. Field observations on pH, nutrient level, salt content, pesticide contamination, and microbial content in aquatic environments will be made with samples returned for more detailed laboratory analysis at the University. The unit will also investigate sources and dynamic of pollutants in receiving water, sediment-nutrient interaction and pollution control strategies. The unit will cover aspects of freshwater ecology with particular emphasis on wetlands ecosystem, riparian vegetation, phytoplankton communities and cyanobacteria.

Textbooks

Wetzel R G 2001. *Limnology: Lake and reservoir ecosystems*, 3rd edn, Academic Press London.

LWSC3007

Advanced Hydrology and Modelling

Credit points: 6 **Teacher/Coordinator:** Dr. Willem Vervoort **Session:** Semester 1 **Classes:** 2 hr lectures/ week, 1 hr on-line and 2 hr practical/week **Prerequisites:** LWSC2002 **Assessment:** Practical reports (50%), take-home exam (50%)

This unit of study is designed to allow students to examine advanced hydrological modeling and sampling designs focusing on catchment level responses and uncertainty.

This unit builds on the theoretical knowledge gained in LWSC2002 and possibly GEOG2321. Students will learn how to develop their own simulation model of catchment hydrological processes in R and review the possibilities and impossibilities of using simulation models for catchment management. Students will further investigate optimal sampling techniques for water quality data based on understanding the variability in hydrological responses. At the end of this unit, students will be able to build their own catchment model and calibrate this model, articulate advantages and disadvantages of using simulation models for catchment management, justify the choice of a simulation model for a particular catchment management problem, identify issues in relation to uncertainty in water quality and quantity, develop an optimal water quality sampling scheme. The students will gain research and inquiry skills through research based group projects, information literacy and communication skills through on-line discussion postings, laboratory reports and a presentation and personal and intellectual autonomy through working in groups.

Textbooks

Beven, K.J. *Rainfall-Runoff modeling, The Primer*, John Wiley and Sons, Chichester, 2001

MATH1001

Differential Calculus

Credit points: 3 **Session:** Semester 1, Summer Main **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prohibitions:** MATH1011, MATH1901, MATH1906, MATH1111 **Assumed knowledge:** HSC Mathematics Extension 1 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

MATH1001 is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering.

This unit of study looks at complex numbers, functions of a single variable, limits and continuity, vector functions and functions of two variables. Differential calculus is extended to functions of two variables. Taylor's theorem as a higher order mean value theorem.

Textbooks

As set out in the Junior Mathematics Handbook.

MATH1002

Linear Algebra

Credit points: 3 **Session:** Semester 1, Summer Main **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prohibitions:** MATH1902, MATH1012, MATH1014 **Assumed knowledge:** HSC Mathematics Extension 1 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

MATH1002 is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering.

This unit of study introduces vectors and vector algebra, linear algebra including solutions of linear systems, matrices, determinants, eigenvalues and eigenvectors.

Textbooks

As set out in the Junior Mathematics Handbook

MATH1003

Integral Calculus and Modelling

Credit points: 3 **Session:** Semester 2, Summer Main **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prohibitions:** MATH1013, MATH1903, MATH1907 **Assumed knowledge:** HSC Mathematics Extension 2 or MATH1001 or MATH1011 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

MATH1003 is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering. This unit of study first develops the idea of the definite integral from Riemann sums, leading to the Fundamental Theorem of Calculus. Various techniques of integration are considered, such as integration by parts. The second part is an introduction to the use of first and second order differential equations to model a variety of scientific phenomena.

Textbooks

As set out in the Junior Mathematics Handbook

MATH1005

Statistics

Credit points: 3 **Session:** Semester 2, Summer Main **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prohibitions:** MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010 **Assumed knowledge:** HSC Mathematics **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

MATH1005 is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering.

This unit offers a comprehensive introduction to data analysis, probability, sampling, and inference including t-tests, confidence intervals and chi-squared goodness of fit tests.

Textbooks

As set out in the Junior Mathematics Handbook

MATH1013**Mathematical Modelling**

Credit points: 3 **Session:** Semester 2, Summer Main **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prohibitions:** MATH1003, MATH1903, MATH1907 **Assumed knowledge:** HSC Mathematics or MATH1111 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

MATH1013 is designed for science students who do not intend to undertake higher year mathematics and statistics.

In this unit of study students learn how to construct, interpret and solve simple differential equations and recurrence relations. Specific techniques include separation of variables, partial fractions and first and second order linear equations with constant coefficients. Students are also shown how to iteratively improve approximate numerical solutions to equations.

Textbooks

As set out in the Junior Mathematics Handbook

MATH1901**Differential Calculus (Advanced)**

Credit points: 3 **Session:** Semester 1 **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prerequisites:** HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. **Prohibitions:** MATH1111, MATH1011, MATH1001, MATH1906 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

This unit is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering. It parallels the normal unit MATH1001 but goes more deeply into the subject matter and requires more mathematical sophistication.

Textbooks

As set out in the Junior Mathematics Handbook

MATH1902**Linear Algebra (Advanced)**

Credit points: 3 **Session:** Semester 1 **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prerequisites:** HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. **Prohibitions:** MATH1002, MATH1012, MATH1014 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

This unit is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering. It parallels the normal unit MATH1002 but goes more deeply into the subject matter and requires more mathematical sophistication.

Textbooks

As set out in the Junior Mathematics Handbook

MATH1903**Integral Calculus and Modelling Advanced**

Credit points: 3 **Session:** Semester 2 **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prerequisites:** HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. **Prohibitions:** MATH1003, MATH1013, MATH1907 **Assumed knowledge:** HSC Mathematics Extension 2 or Credit or better in MATH1001 or MATH1901 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

MATH1903 is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering.

This unit of study parallels the normal unit MATH1003 but goes more deeply into the subject matter and requires more mathematical sophistication.

Textbooks

As set out in the Junior Mathematics Handbook

MATH1905**Statistics (Advanced)**

Credit points: 3 **Session:** Semester 2 **Classes:** Two 1 hour lectures and one 1 hour tutorial per week. **Prerequisites:** HSC Mathematics Extension 2. This requirement may be varied. Students with an interest in mathematics, but without HSC mathematics Extension 2, should consult the unit of study coordinator. **Prohibitions:** MATH1015, MATH1005, STAT1021, STAT1022, ECMT1010 **Assessment:** One 1.5 hour examination, assignments and quizzes (100%)

This unit is designed to provide a thorough preparation for further study in mathematics and statistics. It is a core unit of study providing three of the twelve credit points required by the Faculty of Science as well as a Junior level requirement in the Faculty of Engineering. This Advanced level unit of study parallels the normal unit MATH1005 but goes more deeply into the subject matter and requires more mathematical sophistication.

Textbooks

As set out in the Junior Mathematics Handbook

MICR2024**Microbes in the Environment**

Credit points: 6 **Teacher/Coordinator:** A/Prof Michael Kertesz **Session:** Semester 2 **Classes:** (2 lec, 3h prac)/wk **Prerequisites:** 12 credit points of first year Biology **Prohibitions:** MICR2001, MICR2901, MICR2003, MICR2007, MICR2011, MICR2021, MICR2921, MICR2909 **Assessment:** 1 x 2hr exam (60%), 4 x quizzes (total 15%), lab skills assessment (5%) and 1 x lab project report (20%)

This unit introduces the diversity of microbes found in soil, water, air, plants and animal environments. Through an examination of their physiology and genetics it explores their interactions with plants, animals and each other, and their roles as decomposers and recyclers in the environment. The soil is a rich microbial environment, and the concept of soil health and its relationship to plant growth is discussed. Practical classes introduce techniques and skills in isolating, quantifying and culturing microbes, designing and interpreting experiments to study microbial growth, and in preparing and presenting data.

Textbooks

Willey et al. 2007. Prescott/Harley/Klein's Microbiology 8th ed. McGraw-Hill

MICR3022**Microbial Biotechnology**

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** Dr Nick Coleman **Session:** Semester 2 **Classes:** Two 1-hour lectures per week and seven 4 hour practicals. **Prerequisites:** At least 6 credit points of MBLG units and 6 credit points of Intermediate MICR units. For BMedSc students: 42 credit points of Intermediate BMED units including BMED (2802 and 2807). For BScAgr students: PLNT (2001 or 2901) and MICR2024. **Prohibitions:** MICR3922, MICR3002, MICR3902 **Assessment:** One 2-hour theory exam, practical reports, lab book and skills assessment.

Microbes are central to biotechnology as chemical factories, as sources of enzymes and as cloning hosts. The lecture and prac courses in MICR3022/3922 aim to teach basic principles and methods in microbiology in the context of applications in biotechnology - including industrial, medical and environmental biotech. A special focus will be on the importance of microbial diversity as a source of enzyme diversity for biotechnology. The course revolves around three themes, summarized as metabolites, enzymes, and communities. Topic areas to be covered in lectures include production of small molecules (alcohols and antibiotics), production of macromolecules (protein expression, recombinant DNA), and management of microbial proteins in plants and animals (principles, methods, risks), and management of microbial communities (gut microbes, wastewater treatment, bioprospecting). Techniques covered in lectures include fermentation, mutation, making and screening clone libraries, directed evolution, heterologous expression, metabolic engineering, environmental metagenomics, microarrays, and high throughput screening. In one practical project students will purify DNA polymerase from recombinant E.coli cells and test the enzyme for its ability to catalyze polymerase chain reaction (PCR). In the second practical project students will isolate hydrocarbon-oxidizing bacteria from soil and assess their ability to produce a useful metabolite (the blue dye indigo).

MKTG1001**Marketing Principles**

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 1x 2hr lecture and 1x 1hr tutorial per week **Prohibitions:** MKTG2001 **Assessment:** Group case study (20%), Mid-semester exam (20%), Group presentation (20%), Tutorial participation (10%), Research component (2%), Final exam (28%)

This unit examines the relationships among marketing organisations and final consumers in terms of production-distribution channels or value chains. It focuses on consumer responses to various marketing decisions (product mixes, price levels, distribution channels, promotions, etc.) made by private and public organisations to create, develop, defend, and sometimes eliminate, product markets. Emphasis is placed on identifying new ways of satisfying the needs and wants, and creating value for consumers. While this unit is heavily based on theory, practical application of the concepts to "real world" situations is also essential. Specific topics of study include: market segmentation strategies; market planning; product decisions; new product development; branding strategies; channels of distribution; promotion and advertising; pricing strategies; and customer database management.

MKTG1002**Marketing Research 1**

This unit of study is not available in 2011

Credit points: 6 **Session:** Semester 2 **Classes:** 1 lecture and 1 tutorial per week **Prerequisites:** MKTG1001 (or MKTG2001) **Prohibitions:** MKTG2003 **Assessment:** Group project; Tutorial participation portfolio; Individual critique; Exams (mid-semester and final)

Fundamental to marketing is a requirement to understand who your customers are and what they want. Marketing research is the essential activity of discovering information and presenting it in a useful format to marketing decision makers. This unit introduces the skills and knowledge necessary to allow students to accurately formulate research questions and then discover answers ensuring that these are accurate, reliable and timely. Particular focus is given to different approaches to and aspects of data collection, including: qualitative research; secondary data collection; questionnaire design; sampling; experimental design; validity and basic data analysis.

PLNT2001**Plant Biochemistry and Molecular Biology**

Credit points: 6 **Teacher/Coordinator:** Dr Meredith Wilkes Prof Les Copeland **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2, 1x3-hr practical weekly **Prerequisites:** 12 Junior credit points from Chemistry and Biology (or with the Dean's permission BIOL1201 and BIOL1202) **Prohibitions:** PLNT2901, AGCH2004 **Assessment:** 1x1hr exam (15%) and 1x1.5hr exam (45%) and lab reports (40%)

This unit of study is designed to develop an understanding of the molecular principles that underlie the structure and function of plants and how these principles relate to the use of plants by humans as a source of food and fibre. The unit is a core unit for BScAgr students and an elective for BSc and other degree programs. It recognizes the specialized nature of plant biochemistry and molecular biology and is a platform for students who wish to gain a sound knowledge of plant growth and development.

This unit covers the biochemistry of the main carbohydrate, lipid, protein and nucleic acid constituents of plants, metabolic pathways that regulate plant growth and development, the mobilization and deposition of storage reserves, storage and expression of genetic information and plant responses to environmental influences. The role of molecular biology in the manipulation of plant growth and development will also be explored.

At the completion of this unit students will be able to demonstrate theoretical knowledge of the biochemical structure and function of plants and how molecular biology can enhance our use of plants as food and fibres. Students will also be able to demonstrate abilities in the practice of laboratory methods used to analyse plants and the effective communication of experimental findings. Students enrolled in this unit will gain research and enquiry skills through attendance at lectures and participation in laboratory classes and tutorials, information literacy and communication skills through the synthesis

of information used to prepare practical reports, social and professional understanding by participation in groupwork and assessments that seek to understand the role of agriculture in the broader community.

Textbooks

No recommended text. A study guide/laboratory manual will be available for purchase from the Copy Centre during the first week of semester. Lecture notes and readings will be available through WebCT.

PLNT2002**Aust Flora: Ecology and Conservation**

Credit points: 6 **Teacher/Coordinator:** Dr Glenda Wardle, Dr Murray Henwood. **Session:** Semester 1 **Classes:** (2 hrs lec & 3 hrs prac)/wk, audiovisual. **Prerequisites:** 6 credit points of a Junior unit of study **Prohibitions:** PLNT2902 **Assessment:** One 2-hr exam (40%), laboratory reports (20%) herbarium (20%), one 2-hr practical exam (20%).

This unit provides a broad understanding of the evolution, classification and diversity of terrestrial plants, and the principles of plant ecology in an Australian context. The major types of Australian vegetation are discussed across a range of temporal and spatial scales, and their current distribution related to their environment and origins. Selected contemporary issues in plant conservation from Australian natural and managed systems are explored. There is a strong emphasis on practical skills such as phylogenetic inference, plant identification and the collection and analysis of ecological data. The practical component of the unit of study uses examples taken from the Australian flora (including plants of horticultural significance) and major crop plants. Important elements of this unit are half-day field trips to the Royal National Park, and the construction of student herbaria. The practical sessions and interactions with staff encourage students to develop their own learning style and enhance a strong sense of self-reliance. Critical thinking, effective communication and other vocational and generic skills are emphasized. The content is well suited to students with interests in botany, plant science and ecology, and is often combined with units of study offered through the School of Biological Sciences and the Faculty of Agriculture, Food and Natural Resources. This unit of study also complements a wide range of units of study from: science (e.g. plant science, earth and environmental science, animal science, bioinformatics, molecular and cell biology, genetics and biotechnology); agriculture (e.g. horticulture, land and water science, and natural resources); and broader disciplines (e.g. education, arts, and environmental law).

Textbooks

A Laboratory Manual for the unit will be available for purchase from the Copy Centre during the first week of Semester.

PLNT2003**Plant Form and Function**

Credit points: 6 **Teacher/Coordinator:** A/Prof Robyn Overall, Dr Lindsay Campbell **Session:** Semester 2 **Classes:** 24 lectures; 10 tutorials; 8 x 2 hr and 2x3hr labs; 2x6 hr field trips **Prohibitions:** PLNT2903, BIOL2003, BIOL2903, CROP2001 **Assumed knowledge:** 12 credit points of Junior Biology, or equivalent eg BIOL (1001 or 1101 or 1901 or 1911) and BIOL (1002 or 1902 or 1003 or 1903) **Assessment:** One 2hr theory exam (40%), prac exam (20%), anatomy project (10%), quizzes (5%), physiology report (10%), field report (15%).

This unit of study investigates the structure of cells, tissues and organs of flowering plants and relates them to function. Topics include; how photosynthesis, translocation, water transport and nutrition relate to the structures that carry out these processes. Most of the information on plant structure will be provided in self-instructional audio-visual sessions augmented by small group discussions. This is integrated with experiments carried out in the laboratory or on field excursions to investigate the physiological aspects of plant structures. There is a focus on recent advances in plant molecular biology where they have been critical in enhancing our understanding of the form and function of plants. The physiological and anatomical responses of plants to extreme environments such as drought and salinity will also be addressed. Attention will be paid to the anatomy and physiology of crop, horticultural and Australian native plants. This unit of study complements Plant Biochemistry and Molecular Biology, Australian Flora: ecology and conservation and Cell Biology and leads onto senior units of study in plant sciences, including Plant Growth and

Development. It is essential for those seeking a career in plant molecular biology.

Textbooks

Taiz L, Zeiger E (2006) *Plant Physiology* 4th ed. Sunderland, Mass Sinauer
Recommended reading:
Atwell B, Kriedemann P, Turnbull C (1999) *Plants in Action*. Macmillan, South Yarra. (A new edition is currently being written)
Buchanan BB, Gruissem W, Jones RL (2000) *Biochemistry and Molecular Biology of Plants*, ASPP, Rockvill, Maryland
A Study Guide for the unit will be available for purchase from the Copy Centre during the first week of semester.

PLNT2901

Plant Biochem & Molecular Biology (Adv)

Credit points: 6 **Teacher/Coordinator:** Dr Meredith Wilkes Prof Les Copeland
Session: Semester 1 **Classes:** 2x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2, 1x3-hr practical weekly **Prerequisites:** Distinction average in 12 Junior credit points from Chemistry and Biology (or with the Dean's permission BIOL1201 and BIOL1202) **Prohibitions:** PLNT2001, AGCH2004 **Assessment:** 1x1hr exam (15%) and 1x1.5hr exam (45%) and project report (40%)

This unit of study is designed to develop an understanding of the molecular principles that underlie the structure and function of plants and how these principles relate to the use of plants by humans as a source of food and fibre.

This unit is offered at an advanced level and is available to students in BScAgr, BSc and other degree programs. This unit recognizes the specialized nature of plant biochemistry and is of interest to students who wish to gain a more advanced knowledge of plant growth and development.

This unit covers the biochemistry of the main carbohydrate, lipid, protein and nucleic acid constituents of plants, metabolic pathways that regulate plant growth and development, the mobilization and deposition of storage reserves, storage and expression of genetic information and plant responses to environmental influences. The role of molecular biology in the manipulation of plant growth and development will also be explored.

At the completion of this unit students will be able to demonstrate theoretical knowledge of the biochemical structure and function of plants and how molecular biology can enhance our use of plants as food and fibres. Students will also be able to demonstrate abilities in the practice of laboratory methods used to analyse plants and the effective communication of experimental findings by completing a short research project.

Students enrolled in this unit will gain research and enquiry skills through attendance at lectures and tutorials and by completing a small research project and information literacy and communication skills through the synthesis of information used to prepare a report on the findings of the research project.

Textbooks

No recommended text. A study guide/laboratory manual will be available for purchase from the Copy Centre during the first week of semester. Lecture notes and readings will be available through WebCT.

PLNT2902

Aust Flora: Ecology & Conservation (Adv)

Credit points: 6 **Teacher/Coordinator:** Dr Glenda Wardle, Dr Murray Henwood
Session: Semester 1 **Classes:** (2 lec & 3 prac)/wk, audiovisual **Prerequisites:** Distinction average in 6 credit points of Junior units of study **Prohibitions:** PLNT2002 **Assumed knowledge:** The contents of BIOL(1002 or 1902) is assumed knowledge. Students wishing to enroll in Intermediate Biology (BIOL) and Plant Science (PLNT) units of study using BIOL(1003 or 1903) will need to do some preparatory reading **Assessment:** One 2-hr exam (40%), laboratory reports (20%) research project (20%), one 2-hr practical exam (20%).

Qualified students will participate in alternative components of PLNT2002. The content and nature of these components may vary from year to year. See prerequisites for Senior units of study in Biology.

Textbooks

A Laboratory Manual for the unit will be available for purchase from the Copy Centre during the first week of Semester.

PLNT2903

Plant Form and Function (Advanced)

Credit points: 6 **Teacher/Coordinator:** A/Prof Robyn Overall, Dr Lindsay Campbell **Session:** Semester 2 **Classes:** 24 lectures; 10 tutorials; 8 x 2 hr and 2x3hr labs; 2x6 hr field trips **Prohibitions:** PLNT2003, BIOL2003, BIOL2903, CROP2001 **Assumed knowledge:** 12 credit points of Junior Biology, or equivalent eg BIOL (1001 or 1101 or 1901 or 1911) and BIOL (1002 or 1902 or 1003 or 1903) **Assessment:** One 2hr theory exam (40%), prac exam (20%), research project oral and written presentation (25%), field report (15%).

The content will be based on PLNT2003 but qualified students will participate in alternative components at a more advanced level. The content and nature of these components may vary from year to year.

Textbooks

Taiz L, Zeiger E (2006) *Plant Physiology* 4th ed. Sunderland, Mass Sinauer
Recommended reading:
Atwell B, Kriedemann P, Turnbull C (1999) *Plants in Action*. Macmillan, South Yarra.
Buchanan BB, Gruissem W, Jones RL (2000) *Biochemistry and Molecular Biology of Plants*, ASPP, Rockvill, Maryland
A Study Guide for the unit will be available for purchase from the Copy Centre during the first week of semester.

PLNT3001

Plant, Cell and Environment

Credit points: 6 **Teacher/Coordinator:** Dr Charles Warren and Dr Brian Jones
Session: Semester 2 **Classes:** Workshops and discussions 2 hr/wk; laboratories: alternate weeks 30 hr total (6 pracs; 5 hr each) **Prerequisites:** 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent **Prohibitions:** PLNT3901 **Assessment:** One 2hr exam (30%), 2 reports (30%), two essays (30%) one group presentation (10%).

This unit of study of comprises lectures/workshops and practical sessions that will explore how plants and ecosystems function. Classes will examine the central role of plants in the function of terrestrial ecosystems (e.g. global and ecosystem cycles of carbon and nutrients). Plants shape how ecosystems function, and at the same time the environment affects how plants function. Hence, we will also examine the mechanisms plants employ to adapt and acclimate to their (often stressful) environment. Adaptation and acclimation of plants to their environment will be examined at molecular through to whole plant scales. You will need to draw on knowledge from intermediate units of study and explore the published literature to successfully integrate information from areas unfamiliar to yourself. The purpose of this Unit of Study is to develop an understanding of current directions in Plant Science at an advanced level. When you have successfully completed this unit of study, you should be able to: be familiar with modern approaches of physiology, biophysics and molecular biology in the study of plant function; understand how domains of knowledge interact to describe plant function; understand how plants function in stressful environments; carryout a small research project; draft a manuscript for publication in a peer-reviewed journal.

Textbooks

Students will be drawing on the current research literature for content. A Study Guide for the unit will be available for purchase during the first week of semester from the Copy Centre at a cost to be advised.

PLNT3002

Plant Growth and Development

Credit points: 6 **Teacher/Coordinator:** Dr Jan Marc (Executive Officer), Prof Robyn Overall, Prof David Guest, Dr Brian Jones **Session:** Semester 2 **Classes:** 2-3 lec per wk, one 4 hr practical (6 weeks only), one 3 hr presentation of research project in week 13 **Prerequisites:** 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent **Prohibitions:** PLNT3902, BIOL3021, BIOL3931 **Assessment:** One 2 hr exam (60%), project presentation and report (20%), laboratory quizzes, report and book (20%).

This unit explores the mechanisms underlying plant growth and development from seed to maturity. It covers the process of building the plant body from embryogenesis, development and operation of meristems, polarity, patterning, controls of flowering and fruit development to programmed cell death and senescence. It includes the role of signals such as plant hormones in coordinating plant growth and development and the molecular and cellular mechanisms

underlying plant responses to environmental signals such as gravity and light. There is a focus on recent plant molecular biology that has been critical in enhancing our current understanding of plant growth and development. The unit uses examples from crop, horticultural and native plants as well as the model plant *Arabidopsis*. Lectures are augmented by experimental work, including and independent research project. The laboratory work will include plant tissue culture, protoplast production and modern cell biological techniques used to study plant development. This unit of study complements other senior units of study in the Plant Science Major and is essential for those seeking a career in plant molecular biology.

Textbooks

Taiz L, Zeiger E (2006) *Plant Physiology* 4th ed. Sinauer Associates, Sunderland, Massachusetts

Recommended reading:

Atwell B, Kriedemann P, Turnbull C (1999) *Plants in Action*. Macmillan, South Yarra.

Buchanan BB, Grissem W, Jones RL (2000) *Biochemistry and Molecular Biology of Plants*, ASPP, Rockville, Maryland

A Study Guide for the unit will be available for purchase from the Copy Centre during the first week of semester.

PLNT3003

Systematics and Evolution of Plants

Credit points: 6 **Teacher/Coordinator:** A/Prof Murray Henwood **Session:** Semester 1 **Classes:** 2x1hr lectures/week, 1x3 hr practical/week, 2-day field-trip during semester. **Prerequisites:** 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. **Prohibitions:** PLNT3903 **Assessment:** 1x2 hr take-home exam (45%), oral presentation (5%), nomenclature exercise (15%), research project (35%).

This unit of study introduces students to the practical aspects of Plant Systematics and Evolution. Students will gain a working knowledge of the general techniques and approaches used in Plant Systematics (including an understanding of plant taxonomy, phylogenetics and evolutionary processes). A range of data sources (nucleotide sequences and morphology) will be used to address questions concerning the evolution, classification and historical biogeography of various plant groups. A two-day field trip will provide tuition in plant identification and an opportunity to acquire skills in field-botany. This unit of study is recommended for students with an interest in the areas of: botany, plant science, horticulture, fungal biology (including plant pathology), environmental science, bioinformatics and ecology. It is often combined with units of study offered through the School of Biological Sciences and the Faculty of Agriculture, Food and Natural Resources.

Textbooks

Jud, WS, Campbell, CS, Kellog, EA, Stevens, PF and Donohuge, MJ. 2002. *Plant Systematics: A Phylogenetic Approach*.

PLNT3901

Plant, Cell and Environment (Advanced)

Credit points: 6 **Teacher/Coordinator:** Dr Charles Warren and Dr Brian Jones **Session:** Semester 2 **Classes:** Workshops and discussions 2 hr/wk; laboratories: alternate weeks 30 hr total (6 pracs; 5 hr each) **Prerequisites:** 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent with average grade of distinction **Prohibitions:** PLNT3001 **Assessment:** One 2hr exam (30%), 2 two essays (30%), one advance student project report (30%), one individual oral presentation (10%).

Note: Department permission required for enrolment.

This unit of study of comprises lectures/workshops and practical sessions that will explore how plants and ecosystems function. Classes will examine the central role of plants in the function of terrestrial ecosystems (e.g. global and ecosystem cycles of carbon and nutrients). Plants shape how ecosystems function, and at the same time the environment affects how plants function. Hence, we will also examine the mechanisms plants employ to adapt and acclimate to their (often stressful) environment. Adaptation and acclimation of plants to their environment will be examined at molecular through to whole plant scales. You will need to draw on knowledge from intermediate units of study and explore the published literature to successfully integrate information from areas unfamiliar to yourself. The purpose of this Unit of Study is to develop an understanding of current directions in Plant Science at an advanced level. When you

have successfully completed this unit of study, you should be able to: be familiar with modern approaches of physiology, biophysics and molecular biology in the study of plant function; understand how domains of knowledge interact to describe plant function; understand how plants function in stressful environments; carryout a small research project; draft a manuscript for publication in a peer-reviewed journal.

Textbooks

Students will be drawing on the current research literature for content.

A Study Guide for the unit will be available for purchase during the first week of semester from the Copy Centre at a cost to be advised.

PLNT3902

Plant Growth and Development (Advanced)

Credit points: 6 **Teacher/Coordinator:** Dr Jan Marc (Executive Officer), Prof Robyn Overall, Prof David Guest, Dr Brian Jones **Session:** Semester 2 **Classes:** 2-3 lec per wk, one 4 hr practical (6 weeks only), one 3 hr presentation of research project in week 13 **Prerequisites:** 12 credit points of intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT2001, PLNT2901, PLNT2003, PLNT2903, BIOL2016, BIOL2916, BIOL2003, BIOL2903, BIOL2006, BIOL2906, CROP2001, AGCH2002 or equivalent. These requirements may be varied and students with lower averages should consult the unit Executive Officer. **Prohibitions:** PLNT3002, BIOL3021, BIOL3931 **Assessment:** One 2 hr exam (60%), project presentation and report (20%), laboratory quizzes and book (20%).

Qualified students will participate in alternative components of PLNT3002 Plant Growth and Development, representing 30% of the total assessment, as follows: the students will be exempt from one standard laboratory report and the standard independent group project. Instead, the students will conduct an advanced independent individual practical or theoretical research project under the supervision of a member of the academic staff. The program includes a formal presentation of the results of the project in verbal and written reports.

Textbooks

Taiz L, Zeiger E (2006) *Plant Physiology* 4th ed. Sinauer Associates, Sunderland, Massachusetts

Recommended reading:

Atwell B, Kriedemann P, Turnbull C (1999) *Plants in Action*. Macmillan, South Yarra.

Buchanan BB, Grissem W, Jones RL (2000) *Biochemistry and Molecular Biology of Plants*, ASPP, Rockville, Maryland

A Study Guide for the unit will be available for purchase from the Copy Centre during the first week of semester.

PLNT3903

Systematics and Evolution of Plants Adv

Credit points: 6 **Teacher/Coordinator:** A/Prof Murray Henwood **Session:** Semester 1 **Classes:** See PLNT3003 **Prerequisites:** Distinction average in 6 credit points of any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. These requirements may be varied and students with lower averages should consult the Unit Executive Officer. **Prohibitions:** PLNT3003 **Assessment:** 1x2 hr take-home exam (45%), oral presentation (5%), nomenclature exercise (15%), research project (35%).

Qualified students will participate in alternative components of PLNT3003 Systematics and Evolution of Plants. The content and nature of these components may vary from year to year.

Textbooks

Same as PLNT3003.

PPAT3003

Plant Disease

Credit points: 6 **Teacher/Coordinator:** Prof David Guest **Session:** Semester 1 **Classes:** (2 lec, 3h prac)/wk **Prerequisites:** MICR2024 **Assessment:** One 2h end of semester exam (60%), one prac exam (25%), six take-home quizzes (15%).

This unit introduces plant disease and the pathogens that limit agricultural and horticultural production. The unit is core to the BScAgr and BHortSc degrees and is available as an elective to BLWS and BSc students. It builds on the material introduced in MICR2024. The lecture component of the unit discusses the aetiology of plant disease and symptom development; diagnosis of plant disease; the biology, epidemiology and management of fungi and other microbes that cause plant disease; breeding for disease resistance; plant-parasite relationships; and disease resistance in plants. The practical component introduces techniques used in handling and identifying

fungi and in studying plant disease, and develops skills in experimental design, execution and interpretation of experimental data. At the completion of this unit, students will be able to exercise problem-solving skills (developed through practical experiments and lecture discussions), think critically, and organise knowledge (from consideration of the lecture material and preparation of practical reports), expand from theoretical principles to practical explanations (through observing and reporting on practical work), use certain computer software for analysing data and reporting on laboratory projects. Students learn to work in a research team, plan effective work schedules (to meet deadlines for submission of assessable work), use statistical analysis in research, keep appropriate records of laboratory research, work safely in a research laboratory and operate a range of scientific equipment. Students will gain research and inquiry skills through research based group projects, information literacy and communication skills through assessment tasks and personal and intellectual autonomy through working in groups.

Textbooks

Schumann GL & Darcy CJ 2006. Essential Plant Pathology. APS Press, St Paul, Minn., USA.

PPAT4004

Advanced Mycology and Plant Pathology

Credit points: 6 **Teacher/Coordinator:** Prof David Guest **Session:** Semester 1 **Classes:** (2 tut, 3 hrs prac)/wk **Prerequisites:** PPAT3003 **Assessment:** Two hour end of semester exam (70%), 1500-word review paper (30%).

This unit investigates evolution, systematics, taxonomy and biology of fungi and their role as plant pathogens; plant disease epidemiology and understanding fungal populations; infection processes and plant defence. The unit is an elective for BScAgr, BHortSc and BSc students. It builds on the material introduced in PPAT3003 and BIOL3017. Undertaking this unit will develop skills in isolating and identifying plant pathogenic fungi, diagnosing plant diseases, designing, conducting and analysing experiments. At the completion of this unit, students will be able to exercise problem-solving skills (developed through practical experiments, projects and tutorial discussions), think critically, and organise knowledge (from consideration of the lecture material and preparation of project reports), and expand from theoretical principles to practical explanations (through observing and reporting on project work). Students will consolidate their teamworking skills, develop self-directed study skills and plan effective work schedules, use statistical analysis in research, keep appropriate records of laboratory research, work safely in a research laboratory and operate a range of scientific equipment. Students will gain research and inquiry skills through individual and group research projects, information literacy and communication skills through assessment tasks and personal and intellectual autonomy through working in groups.

Textbooks

Agrios GN. 2005. Plant Pathology 5th ed. Academic Press
Plant pathogens and plant diseases / edited by J.F. Brown and H.J. Ogle; endorsed by the Australasian Plant Pathology Society Inc. Armidale, N.S.W.: Rockvale Publications for the Division of Botany, School of Rural Science and Natural Resources, University of New England, 1997.
Carlile MJ. The Fungi 2nd ed. Academic Press
Kendrick B. 2001. The Fifth Kingdom 3rd ed. Mycologue Press, Ontario. www.mycolog.com

PPAT4005

Soil Biology

Credit points: 6 **Teacher/Coordinator:** Prof David Guest **Session:** Semester 1 **Classes:** (2 tut, 3 hrs prac)/wk **Prerequisites:** MICR2024 or 6cp intermediate microbiology **Assessment:** Tutorial papers (30%), project proposal (10%), project report (50%), peer review (10%).

This unit investigates the diversity of organisms living in the soil, their biology, interactions and ecology, and their roles in maintaining and improving soil function. The unit is an elective for BScAgr, BHortSc and BSc students. It builds on the material introduced in MICR2024, PPAT3003 and BIOL3017. Undertaking this unit will develop skills in monitoring soil microbes, designing, conducting and analysing experiments. At the completion of this unit, students will be able to exercise problem-solving skills (developed through practical experiments, projects and tutorial discussions), think critically, and

organise knowledge (from consideration of the lecture material and preparation of project reports), and expand from theoretical principles to practical explanations (through observing and reporting on project work). Students will consolidate their teamworking skills, develop self-directed study skills and plan effective work schedules, use statistical analysis in research, keep appropriate records of laboratory research, work safely in a research laboratory and operate a range of scientific equipment. Students will gain research and inquiry skills through group research projects, information literacy and communication skills through assessment tasks and personal and intellectual autonomy through working in groups.

Textbooks

Sylvia et al. 2005. Principles and Applications of Soil Microbiology 2nd ed. Pearson.
Schjonning PJ. 2001. Managing Soil Quality. CAB International.

PSYC1001

Psychology 1001

Credit points: 6 **Session:** Semester 1, Summer Main **Classes:** Three 1 hour lectures and one 1 hour tutorial per week, plus 1 hour per week of additional web-based (self-paced) material related to the tutorial. **Assessment:** One 2.5hr exam, one 1000w essay, multiple tutorial tests, experimental participation (100%)

Psychology 1001 is a general introduction to the main topics and methods of psychology, and is the basis for advanced work as well as being of use to those not proceeding with the subject. Psychology 1001 covers the following areas: science and statistics in psychology; behavioural neuroscience; applied psychology; social psychology; personality theory; human development.

This unit is also offered in the Sydney Summer School. For more information consult the website:

http://sydney.edu.au/summer_school/

Textbooks

Psychology 1001 manual,
Weiten, W. Psychology. Themes and variations. 8th Ed. Belmont, CA: Thomson Wadsworth. 2010

PSYC1002

Psychology 1002

Credit points: 6 **Session:** Semester 2, Summer Main **Classes:** Three 1 hour lectures and one 1 hour tutorial per week, plus 1 hour per week of additional web-based (self-paced) material related to the tutorial. **Assessment:** One 2.5 hour exam, one 1250 word research report, multiple tutorial tests, experimental participation (100%)

Psychology 1002 is a further general introduction to the main topics and methods of psychology, and it is the basis for advanced work as well as being of use to those not proceeding with the subject. Psychology 1002 covers the following areas: human mental abilities; learning, motivation and emotion; visual perception; cognitive processes; abnormal psychology.

This unit is also offered in the Sydney Summer School. For more information consult the web site:

http://sydney.edu.au/summer_school/

Textbooks

Psychology 1002 manual
Weiten, W. Psychology. Themes and variations. 8th Ed. Belmont, CA: Thomson Wadsworth. 2010

RSEC1031

Resource Economics 1

Credit points: 6 **Teacher/Coordinator:** Dr Michael Harris **Session:** Semester 2 **Classes:** 3x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2. **Prohibitions:** AGEC1031 **Assessment:** 1x1-hr mid-semester exam (30%), Tutorial work (10%), 1x24-hr take-home exam (30%), 1x1.5-hr hour final exam (30%)

This unit provides a comprehensive introduction to resource and environmental economics, and how particular concepts in economics are used to provide insights into efficient and sustainable natural resource management. Some descriptive content regarding Australia's natural resource assets and industries is included, but the primary focus is analytical. Emphasis is placed on the importance of property rights structures, cost-effective regulations and dynamic considerations

in managing natural resource stocks and environmental assets. Some material on economic valuation of environmental assets and benefit-cost analysis is included.

RSEC4131

Benefit-Cost Analysis

Credit points: 6 **Teacher/Coordinator:** Dr Michael Harris **Session:** Semester 1 **Classes:** 1x2 hr lecture/wk commencing week 1 & 1x1 hr tut/wk, commencing week 2. **Prerequisites:** (ECON2001 or ECOS2001) and (AGEC2103 or AGECE2003) **Prohibitions:** AGECE4037 **Assessment:** 1x written essay (20%), 1x, mid semester exam (20%), 1x final exam (60%).

This unit provides a detailed treatment of benefit-cost analysis and its use in public sector decision making and project evaluation. The underpinning concepts in welfare economics are analysed in detail, such as economic efficiency, criteria for assessing social welfare improvements, and economic surplus measures. Procedures of undertaking a benefit-cost analysis are presented, and tools of non-market valuation for environmental assets are covered in detail. These techniques include both stated and revealed preference techniques, including contingent valuation, choice modeling, hedonic pricing and travel cost methods.

RSEC4132

Environmental Economics

Credit points: 6 **Teacher/Coordinator:** Dr Tihomir Ancev **Session:** Semester 1 **Classes:** 2x1-hr lectures/week commencing week 1, 1x1-hr tutorial/week commencing week 2 **Prerequisites:** ECON2001 or ECOS2001 or AGECE2103 or AGECE2003 **Prohibitions:** ECON3013, AGECE4035 **Assumed knowledge:** (ECON2001 or ECOS2001), (ECON2002 or ECOS2002), AGECE3001, AGECE2101, AGECE2105 **Assessment:** 1x report and presentation from the practical experience in environmental economics (20%), 1x1hr mid-term exam (30%), and 1x2hr final exam (50%)

The unit provides theoretical and empirical background on the economics of minerals exploration, extraction and marketing and on the economics of energy generation, distribution and use. The economics of minerals and energy commodity markets will be discussed and analysed. The interactions of mineral extraction and energy generation activities with other natural resources and the environment will be of particular interest (e.g. mine site remediation, land use conflicts). Sustainability and prospects for long term efficient use of these resources, as well as the development and use of alternative technologies will also be discussed. In addition, institutional and policy issues (e.g. regulatory reform), will be analysed. The unit will discuss the main aspects of the markets for minerals and energy, market structure, business environment and price movements. The unit will also provide an introductory discussion on the markets for derivatives (options, futures, forward, swaps) on minerals and energy commodities.

Textbooks

Perman, R., Y. Ma, J. McGilvray and M. Common. Natural Resource and Environmental Economics. Pearson, 3rd Ed. 2003
Charles D. Kolstad., Environmental Economics., Oxford University Press, 2000
Tom Tietenberg., Environmental and Natural Resource Economics., 6th Edition, Addison-Wesley, 2003.
Grafton, Adamowics, Dupont, Nelson, Hill and Renzetti. The Economics of the Environment and Natural Resources. Blackwell Publishing, 2004
N.B. Students are advised not to buy the textbook before lectures commence in case there are any changes.

RSEC4133

Economics of Mineral & Energy Industries

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** Dr Tihomir Ancev **Session:** Semester 2 **Classes:** (2 lec & 1 tut)/wk **Prerequisites:** (ECON2001 or ECOS2001) and (AGECE2103 or AGECE2003) **Prohibitions:** ECON3013 **Assumed knowledge:** (ECON2002 or ECOS2002), AGECE3001, AGECE2101, AGECE2105 **Assessment:** One 1hr mid-term exam, written report on field trip activities, one 2 hr end of semester exam.

The unit provides theoretical and empirical background on the economics of minerals exploration, extraction and marketing and on the economics of energy generation, distribution and use. The economics of minerals and energy commodity markets will be discussed and analysed. The interactions of mineral extraction and energy generation activities with other natural resources and the

environment will be of particular interest (e.g. mine site remediation, land use conflicts). Sustainability and prospects for long term efficient use of these resources, as well as the development and use of alternative technologies will also be discussed. In addition, institutional and policy issues (e.g. regulatory reform), will be analysed. The unit will discuss the main aspects of the markets for minerals and energy, market structure, business environment and price movements. The unit will also provide an introductory discussion on the markets for derivatives (options, futures, forward, swaps) on minerals and energy commodities.

NB: Only available to 4th year students in the FAFNR. Available to 3rd year students in the FEB. Available to students that have completed RSEC1031 or ENVI3013/ GEOS 3513 with permission from the unit coordinator

Textbooks

Brennan, T.J., Palmer, L.K. and Martinez, A.S., Alternating Currents: Electricity Markets and Public Policy, Resources for the Future Press, Washington D.C., 2002.
Tilton, J.E., On Borrowed Time? Assessing the Threat of Mineral Depletion, Resources for the Future Press, Washington D.C., 2003.
Perman, R., Y. Ma, J. McGilvray and M. Common. Natural Resource and Environmental Economics. Pearson, 3rd Ed. 2003.
Tom Tietenberg, Environmental and Natural Resource Economics, 6th Edition, Addison-Wesley, 2003.
Ferdinand E. Banks, Energy Economics: A Modern Introduction, Kluwer Academic Publishers, 2000.
Stephen E. Kesler, Mineral Resources, Economics and the Environment, Maxwell Macmillan International, 1994.
N.B. Students are advised not to buy the textbook before lectures commence in case there are any changes.

RSEC4134

Economics of Water & Bio-resources

Credit points: 6 **Teacher/Coordinator:** Dr Tihomir Ancev **Session:** Semester 2 **Classes:** 2x1-hr lectures/week commencing week 1, 1x1-hr tutorial/week commencing week 2 **Prerequisites:** (ECON2001 or ECOS2001) and (AGECE2103 or AGECE2003) **Prohibitions:** ECON3013 **Assumed knowledge:** (ECON2002 or ECOS2002), AGECE3001, AGECE2101, AGECE2105 **Assessment:** 1x essay (35%), 1x1hr mid-term exam (25%); 1x2hr final exam (40%)

The unit consists of two complementary parts: water economics and economics of biological resources (fisheries, forestry, other wildlife). The main objective of the water economic component is to investigate the economic aspects of water use and water quality. In particular approaches toward efficient use of the water resource over time, optimal allocation of water among competing uses and achievement of the socially optimal level of water quality will be discussed. The demand for water from various sectors will be analysed in both static and dynamic settings. Issues considered include the selection and construction of water storages, aquifer water extraction and alternative water sources. The issues of waste water disposal and water quality, changing water technologies, and water pollution will be also discussed. There will be particular emphasis on the economic mechanisms for managing the water resources including property rights, water allocation and water markets. The key policy instruments (taxes, quotas, standards) in these areas will be analyzed and discussed. The institutional and policy aspects will also be considered through analysis of water policy reform in Australia and elsewhere. The main objective of the economics of biological resources will be to introduce students to the bio-economic modelling of the resources that experience biological growth. This will be prominently exemplified through various aspects of fishery economics. The unit will also discuss the economics of forestry.

Textbooks

Bergstrom, Boule and Poe (Eds.), The Economic Value of Water Quality, Edward Elgar Pub., 2001.
Easter, Rosegrant and Dinar (Eds.), Markets for Water: Potential and Performance, Kluwer Academic Pub., 1998.
David Smith, Water in Australia, Oxford University Press, 1999.
Perman, R., Y. Ma, J. McGilvray and M. Common. Natural Resource and Environmental Economics. Pearson, 3rd Ed. 2003.
John M. Hartwick and Nancy D. Olewiler, The Economics of Natural Resource Use, 2nd Ed., Addison-Wesley, 1998.
Conrad, J.M. (1999), Resource Economics, Cambridge University Press, Cambridge.
N.B. Students are advised not to buy the textbook before lectures commence in case there are any changes.

RSEC4141**Resource Economics Project A**

Credit points: 9 **Teacher/Coordinator:** Dr Paulo Santos **Session:** Semester 1 **Classes:** 2x2-hr lectures/week **Prerequisites:** AGEC3104 or AGEC3004 or AGEC4041 **Corequisites:** RSEC4142 **Prohibitions:** AGEC4012, AGEC4112 **Assessment:** Individual report (100%)

Note: Department permission required for enrolment.

In this unit of study, students develop skills in economic research by designing, undertaking and reporting on a single research study (thesis). Student undertake research on an approved topic under the supervision of a member of staff and prepare a report of approximately 25,000 words in length.

RSEC4142**Resource Economics Project B**

Credit points: 9 **Teacher/Coordinator:** Dr Paulo Santos **Session:** Semester 2 **Classes:** 2x2-hr lectures/week **Prerequisites:** AGEC3104 or AGEC4112 or AGEC4041 **Corequisites:** RSEC4141 **Prohibitions:** AGEC4013, AGEC4113 **Assessment:** Individual report (100%)

Note: Department permission required for enrolment.

This unit of study is taken in conjunction with the companion unit, RSEC4142 Resource Economics Project A. See RSEC4142 for details.

Textbooks

Not applicable as this is a research unit.

SOIL2003**Soil Properties and Processes**

Credit points: 6 **Teacher/Coordinator:** A/Prof Balwant Singh (Coordinator), Prof Alex McBratney, Dr Stephen Cattle **Session:** Semester 1 **Classes:** 3x1hr lectures and 1x3hr practical/week, commencing week 1, and a compulsory field excursion to be held on the Thursday and Friday in the week preceding the first semester. **Assessment:** Soil description report (10%), Quizzes (or Essay) (15%), Practical exercise book (20%), Practical exam (15%) and Written exam (40%).

This unit of study is designed to introduce students to the fundamental concepts within pedology, soil physics and soil chemistry. These concepts are part of the grounding principles that underpin crop and animal production, nutrient and water cycling, and environmental sustainability taught by other units of study in the Faculty. Students will participate in a two-day field excursion in the first week of semester to examine some common soils of the Sydney Basin, they will also learn to describe soil, and measure soil chemical and physical properties in the field. Referring to common soil profiles of the Sydney Basin, students will concentrate on factors affecting soil formation, the rudiments of soil description, and analysis of soil properties that are used in soil classification. Students will also develop knowledge of the physics of water and gas movement, soil strength, soil chemical properties, inorganic and organic components, nutrient cycles and soil acidity in an agricultural context. At the end of this unit students will become familiar with the factors that determine a soil's composition and behaviour, and will have an understanding of the most important soil physical and chemical properties. Students will develop communication skills through essay, report and practical exercises. The final report and laboratory exercise questions are designed to develop team work and collaborative efforts.

Textbooks

Campbell, K.O. & Bowyer, J.W. (eds) (1988). *The Scientific Basis of Modern Agriculture*. Sydney University Press.
White, R.E. (2006). *Principles and Practice of Soil Science: the Soil as a Natural Resource*. 4th ed., Blackwell Science, Oxford.
Charman, P.E.V. & Murphy, B.W. (2000). *Soils: Their properties and management*. 2nd ed. Oxford University Press, Melbourne.

SOIL2004**The Soil Resource**

Credit points: 6 **Teacher/Coordinator:** Dr Stephen Cattle (Coordinator), Prof Alex McBratney, A/Prof Balwant Singh **Session:** Semester 2 **Classes:** (2x1 hr lec, 1x2hr pracs)/wk, 24 hr (5 days) field work out of semester time **Assessment:** Fieldtrip participation (5%), soil survey mapping report (30%), laboratory report and poster presentation (25%), three group tutorials (20%), viva voce exam (20%)

This unit will familiarize students with the description and mapping of soil types in the Australian landscape, with common analytical methods

for soil and with the various forms of degradation that may alter the quality and function of soil. It is an applied soil science unit which builds on the fundamental soil science concepts learned in the SOIL2003 unit. The first practical component of the unit, a five-day soil survey, will give students experience in soil description and classification in the field, and soil samples collected during this survey will be subsequently analysed for a variety of attributes by the students in laboratory practicals. In the lecture series, topics including soil type distribution, soil quality, soil function, soil fertility and soil degradation will be discussed and linked to practical sessions. By the end of this unit, students will be able to construct maps of soil properties and soil type distribution, describe primary soil functions, soil attributes and types of soil degradation in an agricultural context, and be able to recognize and communicate the ability of a soil profile to sustain plant growth. Students will gain research and inquiry skills by collecting, analyzing and interpreting soil survey data, and will gain communication skills by having to prepare and present a poster.

Textbooks

Brady NC & Weil RR. (2002) *The Nature and Properties of Soils*. 13th ed. (or any later edition) Prentice Hall, New Jersey.
Isbell RF McDonald WS & Ashton LJ. (1997) *Concepts and Rationale of the Australian Soil Classification*. Australian Collaborative Land Evaluation Program, CSIRO Publishing, Canberra.
White RE (2006) *Principles and Practice of Soil Science: the Soil as a Natural Resource*. 4th ed., Blackwell Science, Oxford.
McKenzie N, Jacquier D, Isbell, R & Brown K. (2004) *Australian Soils and Landscapes: An Illustrated Compendium*. CSIRO publishing, Melbourne.

SOIL3009**Contemporary Field and Lab Soil Science**

Credit points: 6 **Teacher/Coordinator:** Prof Alex McBratney (coordinator), A/Prof Balwant Singh, Dr Stephen Cattle, Dr Budiman Minasny **Session:** Semester 1 **Classes:** (2 lec, 2 prac)/wk, 6-day field excursion **Prerequisites:** SOIL2003 **Assessment:** 1 x viva voce exam (40%), pedology written assessments (15%), soil physics written assessments (15%), soil chemistry written assessments (15%), 1 x group presentation (5%), 1 x synthesis paper (10%)

This is a theoretical and empirical unit providing specialised training in three important areas of contemporary soil science, namely pedology, soil chemistry and soil physics. The key concepts of these sub-disciplines will be outlined and strengthened by hands-on training in essential field and laboratory techniques. All of this is synthesized by placing it in the context of soil distribution and use in North-Western New South Wales. The unit is motivated by the teaching team's research in this locale. It builds on students existing soil science knowledge gained in SOIL2003. After completion of the unit, students should be able to articulate the advantages and disadvantages of current field & laboratory techniques for gathering necessary soil information, and simultaneously recognise key concepts and principles that guide contemporary thought in soil science. Students will be able to synthesise soil information from a multiplicity of sources and have an appreciation of the cutting edge areas of soil research. By investigating the contemporary nature of key concepts, students will develop their skills in research and inquiry. Students will develop their communication skills through report writing and oral presentations and will also articulate an openness to new ways of thinking which augments intellectual autonomy. Teamwork and collaborative efforts are encouraged in this unit.

Textbooks

D. Hillel. 2004. *Introduction to Environmental Soil Physics*. Elsevier Science, San Diego, CA, USA
R. Schaetzl and S. Anderson 2005. *Soils: Genesis and Geomorphology*. Cambridge University Press, New York, NY, USA
D.L. Sparks 2003 *Environmental Soil Chemistry* (2nd edn). Academic Press, San Diego, CA, USA

SOIL3010**The Soil at Work**

Credit points: 6 **Teacher/Coordinator:** Prof Alex McBratney (coordinator) A/Prof Balwant Singh, Dr Stephen Cattle (facilitators) plus research-only academics **Session:** Semester 2 **Classes:** Problem-based unit: each student completes 2 problems; 4 x 3 hr workshops per problem (each student attends 8 workshops in total) **Prerequisites:** SOIL2003 or SOIL2004 **Assessment:** For each of two scenarios: Statement of the problem report (2x12.5%) - shared info, but two team reports; How to tackle problem seminar (2x12.5%) - team

seminars, before fieldwork, analyses done; Results seminar (2x12.5%) - team seminars; Final report (2x12.5%) - individual work.

This is a problem-based applied soil science unit. It is designed to allow students to identify soil-related problems in the real-world and by working in a group and with an end-user to suggest short and long-term solutions to such problems. This is a core unit for students majoring or specializing in soil science and an elective unit for those wishing to gain an understanding of environmental problem-solving. It utilises and reinforces soil-science knowledge gained in SOIL2003 and/or SOIL2004 and problem-solving skills gained during the degree program. This unit will address real-world scenarios which involve soil-related problems such as carbon management, structural decline, acidification, salinisation and contamination. Students will gain some understanding of the concept of sustainability, and will be able to identify the causes of problems by reference to the literature, discussion with landusers and by the design and execution of key experiments and surveys. They will gain a focused knowledge of the key soil drivers to environmental problems and will have some understanding on the constraints surrounding potential solutions. By designing and administering strategies to tackle real-world soil issues students will develop their research and inquiry skills and enhance their intellectual autonomy. By producing reports and seminars that enables understanding by an end-user students will improve the breadth of their communication skills.

Textbooks

I.W.Heathcote 1997. Environmental Problem Solving: A Case Study Approach. McGraw-Hill, New York, NY, USA.

VIRO3001

Virology

Credit points: 6 **Teacher/Coordinator:** Dr Tim Newsome **Session:** Semester 1 **Classes:** Two 1-hour lectures per week, five 2-hour tutorials and six 4-hour practicals per semester. **Prerequisites:** At least 6 credit points of MBLG units and at least 6 credit points in Intermediate MICR or BCHM or BIOL or IMMU or PCOL or PHSI or PLNT units. For BMedSc students: 42 credit points of Intermediate BMED units including BMED2802. For BScAgr students: PLNT (2001 or 2901) and MICR2024. **Prohibitions:** VIRO3901 **Assumed knowledge:** MICR (2021 or 2921 or 2022 or 2922) **Assessment:** One 2-hour exam, practical work, group presentations (100%)

Note: Students are very strongly advised to complete VIRO (3001 or 3901) before enrolling in VIRO3002 Medical and Applied Virology in Session 2.

Viruses are some of the simplest biological machinery known, being completely dependent on hosts for their replication, yet they are also the etiological agents for some of the most important human diseases.

New technologies that have revolutionised the discovery of new viruses are also revealing a hitherto unappreciated abundance and diversity in the ecosphere, and a wider role in human health and disease. Developing new gene technologies have enabled the use of viruses as therapeutic agents, in novel vaccine approaches, gene delivery and in the treatment of cancer. This unit of study is designed to introduce students who have a basic understanding of molecular biology to the rapidly evolving field of virology. Viral infection in plant and animal cells and bacteria is covered by an examination of virus structure, genomes, gene expression and replication. Building upon these foundations, this unit progresses to examine host-virus interactions, pathogenesis, cell injury, the immune response and the prevention and control of infection. The structure and replication of sub-viral agents: viroids and prions, and their role in disease are also covered. The practical component provides hands-on experience in current diagnostic and research techniques such as molecular biology, cell culture, serological techniques, immunofluorescence and immunoblot and is designed to enhance the students' practical skills and complement the lecture series. Tutorials cover a range of topical issues and provide a forum for students to develop their communication skills.

Textbooks

Dimmock, Easton and Leppard. Introduction to Modern Virology. 6th edition. Blackwell.

WORK1003

Foundations of Work and Employment

Credit points: 6 **Session:** Semester 1, Semester 2 **Classes:** 1x 2 hour lecture and 1x 1 hour tutorial hour per week **Assessment:** Participation (10%), short essay (20%), major essay (40%), exam (30%)

Note: This is the compulsory unit of study for the Industrial Relations/Human Resource Management major.

This unit draws on concepts from industrial relations and human resource management to examine the interests and strategies of workers, unions, managers, employers and the state. It explores the relationships between these parties as they seek to manage their environments and workplaces and to exercise control over each other. The unit enables students to understand how and why the organisation, regulation and management of work are changing in Australia and globally. As well as providing an introduction to all aspects of the study of the employment relationship, this is the foundation unit for a major in industrial relations and human resource management.

Undergraduate degree resolutions and policies

Bachelor of Agricultural Economics

Bachelor of Agricultural Economics (Honours)

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

Code	Course title
BH002	Bachelor of Agricultural Economics

2 Attendance pattern

The attendance pattern for this course is full time or part time according to student choice.

3 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

4 Requirements for award

- (1) The units of study that may be taken for the course/s are set out in the table of units of study for Bachelor of Agricultural Economics. The Dean may approve some variation in units of study required for the degree for exceptionally talented students.
- (2) To qualify for the degree of Bachelor of Agricultural Economics a candidate must successfully complete 192 credit points, comprising:
 - (a) 72 credit points of core units of study; and
 - (b) two majors including an Agricultural Economics major and an additional major; and
 - (c) elective credit points.

5 Majors

- (1) A major requires a minimum of 36 credit points above junior level. The majors available are:
 - (a) Accounting
 - (b) Agribusiness
 - (c) Agricultural Economics
 - (d) Agriculture Finance
 - (e) Agricultural Marketing
 - (f) Agricultural Science

- (g) Commercial Law
- (h) Econometrics
- (i) Economics
- (j) Finance
- (k) Geography
- (l) Government and International Relations
- (m) Management
- (n) Marketing
- (o) Psychology

- (2) Core units of study that are common to the requirements of a major may count to that major, however, any unit of study may only count towards one major. Where a unit of study is common to more than one major, the student must nominate, by the end of their final year, the particular major to which the unit is to be allocated.

6 Requirements for the Honours degree

- (1) All candidates for the degree are considered for the award of the degree with honours. Honours is awarded to meritorious candidates.
- (2) To qualify for the award of honours a candidate must have:
 - (a) achieved an average WAM over Years 2/3 of at least 65; and
 - (b) achieved a WAM in Year 4 of at least 65.
- (3) Refer to the resolutions of the faculty of Agriculture, Food and Natural Resources for the calculation of the WAM and the level of the honours award.

7 Award of the degree

- (1) The Bachelor of Agricultural Economics is awarded as either Pass or Honours. The honours degree is awarded in classes ranging from First Class to Second Class according to the conditions specified in the Resolutions of the Faculty of Agriculture, Food and Natural Resources.
- (2) Candidates for the award of the Honours degree who do not meet the requirements, but who have otherwise satisfied the course requirements, will be awarded the pass degree.

8 Transitional provisions

- (1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
- (2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed by 1 January, 2016. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.

Bachelor of Environmental Systems

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes



Code	Course title
BH007	Bachelor of Environmental Systems

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Streams

- (1) The Bachelor of Environmental Systems is available in the following streams:
 - (a) Agricultural Systems; and
 - (b) Natural Terrestrial Systems.
- (2) Completion of one stream is a requirement of the course. Candidates should seek advice from the degree coordinator on which stream to take, prior to selecting second year units of study.

4 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

5 Requirements for award

- (1) The units of study that may be taken for the course are set out in the Bachelor of Environmental Systems table of units of study. The Dean may approve some variation in units of study required for the degree for exceptionally talented students.
- (2) To qualify for the award of the pass degree, a candidate must complete 144 credit points, including:
 - (a) 102 credit points of core units of study
 - (b) 18 credit points of elective second year units and 24 credit points of elective third year units in a single stream.

6 Transitional provisions

- (1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
- (2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed by 1 January, 2016. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.

Bachelor of Resource Economics

Bachelor of Resource Economics (Honours)

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

Code	Course title
BH004	Bachelor of Resource Economics

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

4 Requirements for award

- (1) The units of study that may be taken for the courses are set out in the Table of units of study for the Bachelor of Resource Economics. The Dean may approve some variation in units of study required for the degree for exceptionally talented students.
- (2) To qualify for the degrees of Bachelor of Resource Economics a candidate must successfully complete 192 credit points, comprising of core and elective units as per the table of units of study.

5 Majors

Completion of a major is not a requirement of the course. A major requires the completion of 48 credit points chosen from units of study listed in the table for that major. Units of study counted towards one major may not count toward any other major completed. The majors available are:

- (a) Agricultural Science
- (b) Biology
- (c) Chemistry
- (d) Commercial Law
- (e) Econometrics
- (f) Economics
- (g) Finance
- (h) Geography
- (i) Geology
- (j) Government and International Relations
- (k) Marine Science
- (l) Mathematics
- (m) Soil Science
- (n) Statistics

6 Requirements for the Honours degree

- (1) All candidates are considered for the award of the degree with honours. Honours is awarded to meritorious candidates.
- (2) To qualify for the award of the honours degree a candidate must have:
 - (a) achieved an average WAM over Years 2 and 3 of at least 65; and
 - (b) achieved a WAM in Year 4 of at least 65.
- (3) Refer to the resolutions of the faculty of Agriculture, Food and Natural Resources for the calculation of the WAM and the level of the honours award.

7 Award of the degree

- (1) The Bachelor of Resource Economics is awarded as either Pass or Honours. The honours degree is awarded in classes ranging from First Class to Second Class according to the conditions specified in the Resolutions of the Faculty of Agriculture, Food and Natural Resources.
- (2) Candidates for the award of the Honours degree who do not meet the requirements, but who have otherwise satisfied the course requirements, will be awarded the pass degree.

8 Transitional provisions

- (1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
- (2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed by 1 January, 2016. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.

Bachelor of Science in Agriculture

Bachelor of Science in Agriculture (Honours)

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

Code	Course title
BH000	Bachelor of Science in Agriculture

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not

possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

4 Requirements for award

- (1) The units of study that may be taken for the course are set out in table of units of study for the Bachelor of Science in Agriculture. The Dean may approve some variation in units of study required for the degree for exceptionally talented students.
- (2) To qualify for the award of the pass degree, a candidate must successfully complete 192 credit points, including:
 - (a) 150 credit points of core units of study; and
 - (b) In addition, at least 12, and no more than 18 credit points from units designated as Year 4 specialisation units; and
 - (c) The remaining units from units designated as Year 3 or Year 4 electives.
 - (d) A maximum of 6 credit points in Year 3 and 6 credit points in Year 4 may be taken from units outside of the Table (including from other faculties), to count as either Year 3 or Year 4 electives.

5 Requirements for the Honours degree

- (1) All candidates for the degree are considered for the award of the degree with honours. Honours is awarded to meritorious candidates.
- (2) To qualify for the award of honours a candidate must have:
 - (a) achieved an average WAM over Years 2/3 of at least 65; and
 - (b) achieved a WAM in Year 4 of at least 65.
- (3) Refer to the resolutions of the faculty of Agriculture, Food and Natural Resources for the calculation of the WAM and the level of the honours award.

6 Award of the degree

- (1) The Bachelor of Science in Agriculture is awarded as either Pass or Honours. The honours degree is awarded in classes ranging from First Class to Second Class according to the conditions specified in the Resolutions of the Faculty of Agriculture, Food and Natural Resources.
- (2) Candidates for the award of the Honours degree who do not meet the requirements, but who have otherwise satisfied the course requirements, will be awarded the pass degree.

7 Transitional provisions

- (1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
- (2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed by 1 January, 2016. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.

Postgraduate course requirements

The higher degrees and qualifications in the faculty are:

- Doctor of Agricultural Economics (DAgrEc)
- Doctor of Science in Agriculture (DScAgr)
- Doctor of Philosophy (PhD)
- Master of Agricultural Economics (MAgrEc)
- Master of Science in Agriculture (MScAgr)
- Master of Agriculture (MAgr)
- Graduate Diploma in Agriculture (GradDipAgr)
- Graduate Certificate in Agriculture (GradCertAgr)

The regulations governing the award of these degrees are printed in this handbook. Prospective candidates should consult with the Associate Dean, Postgraduate Studies concerned before submitting an application for admission to candidature.

All candidates would normally begin in Semester 1 (near the end of February). In some cases candidates may be able to commence in Semester 2 (late July). Teaching in postgraduate courses in the faculty develops skills and graduate attributes. A Statement of Generic Graduate Attributes can be found in this handbook at Section 7 (Other faculty information). The following statements summarise part only of the regulations governing the award of these degrees.

Doctor of Agricultural Economics and Doctor of Science in Agriculture

The degrees of Doctor of Agricultural Economics and Doctor of Science in Agriculture shall not be conferred until the candidate is a graduate of eight years' standing from the degree which qualified him or her for candidature. The degree may be awarded for published work which, in the opinion of the examiners, has been generally recognised by scholars in the field concerned as a distinguished contribution to knowledge.

Doctor of Philosophy

The degree of Doctor of Philosophy is a research degree awarded for a thesis considered to be a substantially original contribution to the subject concerned. Some coursework may be required (mainly in the form of seminars) but in no case is it a major component.

Applicants should normally hold a master's degree with research or a bachelor's degree with first or high second class honours of the University of Sydney, or an equivalent qualification from another university or institution.

The degree may be taken on either a full-time or part-time basis. In the case of full-time candidates, the minimum period of candidature is four semesters for candidates holding a master's degree or equivalent, or six semesters in the case of candidates holding a bachelor's degree with first class or second class honours; the maximum period of candidature is normally eight semesters. The first full year of candidature is normally on probation.

Part-time candidature may be approved for applicants who can demonstrate that they are engaged in an occupation or other activity which leaves them substantially free to pursue their candidature for the degree. They should be able to devote at least 20 hours per week to candidature or an equivalent annual period made up in blocks. Normally the minimum period of candidature will be determined on the recommendation of the faculty but usually will not be less than the equivalent of 6 semesters.

Master of Agricultural Economics and Master of Science in Agriculture

Graduates of the University of Sydney who have completed units of study acceptable to the Faculty of Agriculture, Food and Natural Resources or persons who, in the opinion of the faculty, have qualifications equivalent to those required of a graduate of the University of Sydney, may apply for admission as candidates for the degree of master.

Candidates engage in research culminating in a thesis for four to six semesters full-time or pro rata part-time. Some honours graduates (or equivalent) may be eligible for a minimum candidature of two semesters full-time. The first full year of candidature is normally on probation.

Master of Agriculture, Graduate Diploma in Agriculture and Graduate Certificate in Agriculture

Postgraduate studies are available towards a Master of Agriculture, Graduate Diploma in Agriculture and Graduate Certificate in Agriculture.

Admission requirements for the Master of Agriculture, Graduate Diploma in Agriculture and Graduate Certificate in Agriculture are normally a bachelor's degree or an equivalent qualification. In some instances the admission requirements may be met by evidence of general or professional qualifications and appropriate work experience to indicate that the student has the academic preparation and capacity to complete the course in question. With the approval of the Dean, students may be granted admission with advanced standing if they have completed relevant prior learning at an equivalent level elsewhere.

Many units are based on compulsory fieldwork carried out prior to the commencement of semester. All coursework students should be available to participate in fieldwork excursions two weeks prior to the commencement of semester.

Students may transfer between courses and receive credit for any completed units, provided they have not taken out the award from which they are transferring.

The Graduate Certificate, Graduate Diploma and the Master of Agriculture testamur will specify the area of specialisation: Agribusiness, Agricultural Economics, Agricultural Technologies, Natural Resource Management, Resource Economics or Sustainable Agriculture.

Graduate Certificate in Agriculture

Candidates for the Graduate Certificate complete a total of 24 credit points (cp) made up of 12cp from their selected specialisation as specified in TABLE A and the balance from elective units chosen from any other units listed in TABLE D (subject to meeting prior learning requirements and timetabling). Students who have completed relevant prior learning at an equivalent level may be given up to 6cp advanced standing.



Table A

Program	Core units
Agribusiness	At least two of AGECE5401, AGECE5403, AGECE5404
Agricultural Economics	At least two units of study beginning with the prefix AGECE54
Agricultural Technologies	At least two of AFNR5110, AFNR5201, AFNR5210, AFNR5307
Natural Resource Management	At least two of RSEC5431, RSEC5432, AFNR5502, AFNR5510, AFNR5511, AFNR5512, AFNR5701
Resource Economics	At least two of RSEC5431, RSEC5432, RSEC5433
Sustainable Agriculture	At least two of RSEC5431, RSEC5432, AFNR5201, AFNR5210, AFNR5511, AFNR5512, AFNR5701
Turf Management	At least two units of study beginning with the prefix AFNR56. Department permission required.

Graduate Diploma in Agriculture

Candidates for the Graduate Diploma complete a total of 36cp made up of 12cp from their selected specialisation as specified in TABLE B and the balance from elective units chosen from any other units listed in TABLE D (subject to meeting prior learning requirements and timetabling). Students may choose to undertake a research project of 12 cp by enrolling in AFNR5901 and AFNR 5905 and this will be used to determine their specialisation. All research projects will commence in Semester 1 unless exemption is approved by the Dean. Students who have completed relevant prior learning at an equivalent level may be given up to 12cp advanced standing.

Table B

Program	Core units
Agribusiness	At least two of AGECE5401, AGECE5403, AGECE5404
Agricultural Economics	At least two units of study beginning with the prefix AGECE54
Agricultural Technologies	At least two of AFNR5110, AFNR5201, AFNR5210, AFNR5307
Natural Resource Management	At least two of RSEC5431, RSEC5432, AFNR5502, AFNR5510, AFNR5511, AFNR5512, AFNR5701
Resource Economics	At least two of RSEC5431, RSEC5432, RSEC5433
Sustainable Agriculture	At least two of RSEC5431, RSEC5432, AFNR5201, AFNR5210, AFNR5511, AFNR5512, AFNR5701
Turf Management	At least two units of study beginning with the prefix AFNR56. Department permission required.

Master of Agriculture

Candidates for the Master of Agriculture complete a total of 48cp made up of a research project equating to 24cp (see TABLE C) and the balance from elective units of study chosen from TABLE D (subject to meeting prior learning requirements and timetabling). All research projects will commence in Semester 1 unless exemption is approved by the Dean. The choice of research project will be used to determine the specialisation. Students who have completed relevant prior learning at an equivalent level may be given up to 12cp advanced standing.

Table C

Code	Unit	SEM
AFNR5901	Research Review	1
AFNR5904	Research Proposal and Approach	1
AFNR5905	Research Paper	2

Code	Unit	SEM
AFNR5906	Research Communication	2

Table D

Code	Unit	Sem
AFNR5107	Analytical Chemistry A	1
AFNR5110	Crop Improvement	2
AFNR5201	Crop Agronomy	1
AFNR5210	Sustainable Horticultural Cropping Systems	1
AFNR5307	Crop Protection	1
AFNR5510	The Soil at Work	2
AFNR5511	Soil Processes, Assessment and Management	1
AFNR5512	Water Management and Variable Climate	2
AFNR5502	Remote Sensing, GIS and Land Management	2
AFNR5701	Plants and the Environment	1
AFNR5901	Research Review	1
AFNR5904	Research Proposal and Approach	1
AFNR5905	Research Paper	2
AFNR5906	Research Communication	2
AGECE5401	Agricultural Marketing Analysis	1
AGECE5402	Agricultural Development Economics	2
AGECE5403	Agricultural Trade	1
AGECE5404	Agribusiness Analysis	2
AGECE5405	Quantitative Planning Methods	1
AGECE5406	Agricultural Finance and Risk	2
RSEC5431	Benefit Cost Analysis	1
RSEC5432	Environmental Economics	1
RSEC5433	Economics of Mineral & Energy Industries	2
The following units require Department permission:		
AFNR5601	Turf Management	1
AFNR5602	Advanced Turf Management	2
AFNR5603	Turf Species and Varieties	1
AFNR5604	Diagnostic Methods in Turf Management	1
AFNR5605	Applied Plant Ecology	2

Postgraduate units of study

AFNR5107

Analytical Chemistry A

Credit points: 6 **Teacher/Coordinator:** Dr Robert Caldwell (Coordinator)
Session: Semester 1 **Classes:** 22 hrs of lectures and 32 hrs of laboratory during the semester **Assessment:** One 2-hr exam (30%), laboratory reports (30%), major assignment (40%).

Lecture, reading list and laboratory topics will cover the theory and fundamentals of both common and advanced instrumentation used in analytical chemistry. Topics will cover ion selective electrode technology, pH meters, and other electrochemical devices; centrifuge and ultracentrifuge instrumentation, maintenance and applications, instrumentation in atomic and molecular spectrophotometry, gas and liquid chromatography, gel and capillary electrophoresis; automated derivatization methods; mass spectrometry, and immuno-analytical technology.

AFNR5110

Crop Improvement

Credit points: 6 **Teacher/Coordinator:** Professor R Trethowan **Session:** Semester 2 **Classes:** The equivalent of 3 lectures and 3hrs practical work per week **Assessment:** one 2hr exam (50%), essay/assignment (20%), practical reports (20%), presentation (10%)

Lectures, practical work and field trip(s) covering advanced aspects of the theory, philosophy and practice of plant breeding. Included are extended discussions of screening techniques (in the field, glasshouse and laboratory), conservation and exploitation of diversity, disease resistance, tissue culture, plant cytogenetics of relevance to pre-breeding and breeding. Also considered are the role of biotechnology processes and products in plant breeding; genetic engineering and the use of molecular marker technologies. This course will use examples from the full range of crops; broad-acre cereals and legumes, pastures, turf and horticultural crops, both perennial and annual. The main base of the course may vary between the ATP and Camden campuses. Field trips (mainly to the IA Watson Grains Research Centre, Narrabri) will be used especially to examine trial procedures and field-based operations, and to interact with commercial plant breeding.

AFNR5201

Crop Agronomy

Credit points: 6 **Teacher/Coordinator:** Dr Lindsay Campbell Visiting lecturers, Dr. Natasha Teakle, Dr. Lachlan Ingram, Dr Carina Moeller **Session:** Semester 1 **Classes:** 4x4-h lectures/weeks 1,2,9,10; 2x2h lectures 3,4,7,8, 1x full day field practical in week 11 (subject to weather); Field excursions: week 0 and 6 (subject to weather) **Assessment:** 1x2h exam (45%) and 2x reports on excursions (2x18.5%) and 2000wd field report (18%)

This unit examines agronomy as the discipline that underpins agricultural production. Two industries are studied to gain appreciation of the main agronomic principles of crop production. Most principles can be applied to dryland crops even though the emphasis in this unit is on irrigated crops. As a case study, the cotton industry is examined in detail to understand the end-user and social demands on agricultural production, the technical issues that challenge the farmer and the diversity of other specialist information from relevant disciplines such as entomology, pathology and soil science that must be integrated into the farming system. Likewise the rice industry provides a contrasting farming system as another case study. The unit includes a one-week excursion to cotton growing areas in northern NSW, specialist intensive instruction provided by the Cotton CRC and a series of workshops) tutorials that provides analysis and synthesis of the major farming systems in this industry.

AFNR5307

Crop Protection

Credit points: 6 **Teacher/Coordinator:** Dr Sarah Mansfield **Session:** Semester 1 **Classes:** 1 x 2 hr lecture, 4 hr independent study/week **Assessment:** case study (60%), seminar (20%), online and in-class discussion (20%)

The focus of this unit is the development and adoption of integrated pest management to control weeds, insects and plant pathogens. The advantages and disadvantages of biological, cultural and chemical control methods are described using examples from agro-ecosystems. Students will develop a comparative case study of IPM for a particular crop that considers all three pest groups and present a seminar about this case study.

Textbooks

Schumann GL & Darcy CJ 2006. Essential Plant Pathology. APS Press, St Paul, Minn., USA.
 Agrios GN. 2005. Plant Pathology 5th ed. Academic PressCarilile MJ. 2001. The Fungi 2nd ed. Academic PressKendrick B. 2001. The Fifth Kingdom 3rd ed. Mycologue Press, Ontario. www.mycolog.com
 Recommended: Pedigo, LP and Rice, ME. 2009. Entomology and Pest Management, 6th edn. Pearson Prentice Hall, 784 pp.

AFNR5210

Sustainable Horticultural Cropping

Credit points: 6 **Teacher/Coordinator:** Dr R. McConchie **Session:** Semester 1 **Classes:** 1hr Lecture/week, 2hr tutorial/excursions for case study, and on-line discussions **Assessment:** On-line discussions (10%), Group presentation (10%), Project report (30%), 2 hr exam (50%)

This unit builds on knowledge gained in undergraduate plant and crop science units to develop an understanding of horticultural cropping systems management. Particular focus will be on intensive production systems and will provide them with a broad overview of current issues affecting the horticultural industries. Emphasis is on minimising the environmental impact of horticultural enterprises and introduces students to current themes and thinking in sustainable practices in horticultural science, such as efficient water management, sustainable use of fertilizers, salinity, integrated pest management and organic practices. Students also select an industry based case study analysis of a horticultural production system, designed to provide them with skills in data analysis and interpretation, problem identification and problem solving.

AFNR5502

Remote Sensing, GIS and Land Management

Credit points: 6 **Teacher/Coordinator:** A/Prof Inakwu Odeh **Session:** Semester 2 **Classes:** 3x1-hr lectures/week weeks 1-6, 1x1 project weeks 7-11, 1x1-½ hour presentation scheduled for week s12 and 13, 1x3-hr practical weeks 1-6 **Assessment:** 1x 20 min presentation (10%), laboratory work reports (30%), Group assignment (10%), 1x3000w project report (50%)

This unit of study is aimed at advanced techniques in Remote Sensing (RS), linked with Geographical Information Systems (GIS), as applied to land management problems. We will review the basic principles of GIS and then focus on advanced RS principles and techniques used for land resource assessment and management. This will be followed by practical training in RS techniques, augmented by land management project development and implementation based on integration of GIS and RS tools. The unit thus consists of three separate but overlapping parts: 1) a short theoretical part which focuses on the concepts of RS; 2) a practical part which aims at developing hands-on skills in using RS tools, and 3) an application-focused module in which students will learn the skills of how to design a land management project and actualise it using integrated GIS and RS techniques.



Syllabus summary: Lectures will cover: Overview of the basic principles of Geographical Information Science (GISc), Advanced principles of remote sensing, Land resource information and data capture using RS, Digital elevation modelling and terrain analysis using remote sensing; Image enhancement and visualization; Image classification and interpretation; RS data interpretation for land resource inventory; RS and GIS for land use and land cover change analysis; Coupling of models of land resource assessment with GIS and RS. Fifty percent of learning time will be devoted to the design and implementation of projects, which can be selected from GIS and RS applications in: agricultural land management, vegetation studies, water and catchment (hydrological) studies; land-cover and land-use change modelling, pesticide and herbicide environmental risk assessment, environmental impact analysis, land degradation modelling including soil salinity, soil erosion, etc.

Textbooks

van Dijk, A. and Bos, M.G. 2001. GIS and remote sensing techniques in land- and water-management. Kluwer Academic Publisher, Dordrecht.
Skidmore, A. 2002. Environmental modelling with GIS and remote sensing. Taylor & Francis, London.
Jesen J. R. 2007. Remote sensing of the environment: an earth resource perspective. 2nd ed. Pearson Prentice Hall Upper Saddle, New Jersey.

AFNR5510

The Soil at Work

Credit points: 6 **Teacher/Coordinator:** Prof Alex McBratney (coordinator), A/Prof Balwant Singh, Dr Stephen Cattle (facilitators), plus research-only academics **Session:** Semester 2 **Classes:** Problem-based unit: each student completes 2 problems; 4 x 3 hr workshops per problem (each student attends 8 workshops in total) **Assessment:** For each of two scenarios: Statement of the problem report (2x12.5%) - shared information, two team reports How to tackle problem seminar (2x12.5%) - team seminars, before fieldwork, analyses done Results seminar (2x12.5%) - team seminars Final report (2x12.5%) - individual work.

This is a problem-based applied soil science unit. It is designed to allow students to identify soil-related problems in the real-world and by working in a group and with an end-user to suggest short and long-term solutions to such problems. It utilises and reinforces soil-science knowledge and problem-solving skills gained during the program. This unit will address real-world scenarios which involve soil-related problems such as carbon management, structural decline, acidification, salinisation and contamination. Students will gain some understanding of the concept of sustainability, and will be able to identify the causes of problems by reference to the literature, discussion with landusers and by the design and execution of key experiments and surveys. They will gain a focused knowledge of the key soil drivers to environmental problems and will have some understanding on the constraints surrounding potential solutions. By designing and administering strategies to tackle real-world soil issues students will develop their research and inquiry skills and enhance their intellectual autonomy. By producing reports and seminars that enables understanding by an end-user students will improve the breadth of their communication skills.

Textbooks

I.W.Heathcote 1997. Environmental Problem Solving: A Case Study Approach. McGraw-Hill, New York, NY, USA.

AFNR5511

Soil Processes, Assessment & Management

Credit points: 6 **Teacher/Coordinator:** Dr Damien Field **Session:** Semester 1 **Classes:** 1 Lec, 2 tutorials/wk, case study & on-line discussions. **Assessment:** Key soil processes essay (20%), On-line discussions (10%), Case study report (50%), Group presentation (20%)

Soils support agricultural and natural ecosystems and regulate environmental interactions between the hydrosphere and atmosphere. It is the quality of our soils that affect productivity, the environment, health and ultimately sustainability. However, challenges such as those presented by lack of plant nutrient supply, soil acidification, physical degradation, soil contamination, and loss of soil biodiversity are problems at a global scale that threaten the sustainability of the environment and society. As well as the threats the importance of maintaining a quality soil that regulates environmental interactions will be explored, such as soil as a sink for carbon affecting climate

interactions or understanding how a rich soil biodiversity can contribute to food production affecting food security. To do this, this unit of study is concerned with exploring the key pedology, soil chemistry, soil physical and soil biological processes that drive these challenges to soil quality. Time will be spent investigating how the quality of the soil can be assessed, using the indicators of the mentioned soil processes, and how the resulting data can be aggregated and communicated in a meaningful way. Working with case studies, the students will identify problems that are assessed using soil quality or function analysis with the aim of identifying management options. The management options will be evaluated to determine their adoptability and implement ability. By investigating the case studies using soil quality or function analysis students will develop their research and enquiry skills. Assessing and developing adoptable management strategies the students will develop their skills in synthesising material from multiple sources and enhance their intellectual autonomy. By producing reports and presenting seminars the students will develop their communication skills.

Textbooks

D. Hillel, 2004. Introduction to Environmental Soil Physics, Elsevier Science, San Diego, CA USA.
R. Schaertel and S Anderson, 2005. Soils. Genesis and Geomorphology, Cmbridge University Press, New York, NY USA.
D. L. Sparks, 2003. Environmental Soil Chemistry (2nd Edition), Academic Press, San Diego, CA USA.
P. Doelman and H. Eijsackers, 2004. Vital Soil. Function, Value and Properties. Developments in Soil Science. Vol 29. Elsevier, Amsterdam Netherlands.
P. Schjonning, S. Elmholt and B. T. Christensen. 2004. Managing Soil Quality. Challenges in Modern Agriculture. CABI Publishing, Cambridge USA.

AFNR5512

Water Management and Variable Climate

Credit points: 6 **Teacher/Coordinator:** Dr. R.W. Vervoort **Session:** Semester 2 **Classes:** 1hr workshop/week, online practical work, project work **Assessment:** Online quizzes (20%), project report (30%), 2 hr exam (50%)

This unit builds on knowledge gained in undergraduate soil science and crop science units to develop an understanding of field level management. Particular focus will be on the effect of climate variability and change on water management decisions at the field and farm scale in relation to farm output and externalities (Salinity, nutrient losses). At the completion of this unit student would be able to: Identify which climate variables will be most affected by climate change and variability; Evaluate which field and farm scale outputs will be most affected by climate change and variability; Develop scenarios based on distributions of climate variability; and Calculate the likely impacts of climate variability and change on crop production and externalities in irrigated systems using Monte Carlo techniques.

The open source software package R (www.r-project.org) will be used for most analysis and other open source software will be used for crop modelling.

Textbooks

Beven, K.J. Rainfall-Runoff modeling, The Primer, John Wiley and Sons, Chichester, 2001 Kumagai. M. and Warwick, W. F. 2003. Freshwater management: Global versus local perspectives, Springer-Verlag, Tokyo.

AFNR5601

Turf Management

Credit points: 6 **Teacher/Coordinator:** Dr Peter Martin **Session:** Semester 1 **Classes:** External studies and residential block **Assessment:** one 3hr examination (50%), two 1,500 word assignments (25%), tutorial papers (5%) and practical reports (20%)

Note: Department permission required for enrolment.

This unit examines the scientific basis of turf management for both warm climate and cool climate grasses. Topics include the history and economic importance of managed grass surfaces; the macro- and micro-environment of turf both above and below ground; the physiology of growth under turf conditions including the effects of water, traffic, mowing, cultivation and nutrition; establishment of turf by seed and vegetative methods; and the objective assessment of turf quality.

Textbooks

Beard, J.B. Turfgrass: Science and Culture (Prentice Hall)
Atwell, B., Kriedemann, P. and Turnbull, C. Plants in Action: adaptation in nature; performance in cultivation (Macmillan Australia)

Glendinning, J (ed.) Australian Soil Fertility Handbook (CSIRO Publications Collingwood).

AFNR5602

Advanced Turf Management

Credit points: 6 **Teacher/Coordinator:** Dr Peter Martin **Session:** Semester 2 **Classes:** External studies and residential block **Assessment:** one 3hr examination (40%), one oral presentation (10%), one 2,000 word assignment (20%), tutorial papers (10%) and practical reports (20%)

Note: Department permission required for enrolment.

Readings, discussions and practical experiments to gain advanced expertise in laboratory and field aspects of selected areas of plant and soil sciences underlying turf management. Topics include germination and establishment, stress physiology, minimization of water use while maintaining acceptable turf quality, use of saline and downgrade waters for turf irrigation, root growth, growth analysis, fertilizer and pesticide management, environmental legislation relevant to turf facilities, turf construction materials and techniques, design of turf facilities, quality assurance in turf construction and maintenance of turf constructions.

Textbooks

Adams, W.A. and Gibbs, R.J. Natural Turf for Sport and Amenity (CAB International, Wallingford).

Atwell, B., Kriedemann, P. and Turnbull, C. Plants in Action: adaptation in nature; performance in cultivation (Macmillan Australia).

AFNR5603

Turf Species and Varieties

Credit points: 6 **Teacher/Coordinator:** Dr Peter Martin **Session:** Semester 1 **Classes:** External studies and residential block **Assessment:** one 3hr examination (50%), one 1,500 word assignment (15%), tutorial papers (5%), practical reports (10%) and plant collection (20%)

Note: Department permission required for enrolment.

This unit has three main aims: (a) to provide an overview of plant variation, ecotypic differentiation and the principles of plant taxonomy, with special reference to grasses, (b) to teach skills in identification of members of the grass family and related families including detailed morphological terminology and the use of conventional and vegetative taxonomic keys, and (c) to provide an introduction to the methods of development of new turf cultivars by breeding and/or selection. Information is also provided on biochemical methods of identifying grass varieties, comparative testing of turf grasses, plant breeders' rights and cultivar registration.

Textbooks

Hubbard, C.E. Grasses, 3rd Edition, (Penguin Books, London)

Wheeler, D.J.B., Jacobs, S.W.L. and Whalley, R.D.B., Grasses of New South Wales, 3rd. Edition, (University of New England Printery, Armidale)

Reference book: Briggs, D. and Walters, S.M. Plant Variation and Evolution, 3rd Edition (Cambridge University Press, Cambridge).

AFNR5604

Diagnostic Methods in Turf Management

Credit points: 6 **Teacher/Coordinator:** Dr Peter Martin **Session:** Semester 1 **Classes:** External studies and residential block **Assessment:** 3hr examination (40%), two 1,000 word assignments (20%), one oral presentation (10%), tutorial papers (10%) and a laboratory book (20%)

Note: Department permission required for enrolment.

Following an overview of the main chemical, physical and biological diagnostic tests used in the formulation of advice by turf consultants and in decision making by turf managers, the course will cover the theory and practice of sampling and of the conduct of tests (including interpretation guidelines) using selected methods in the three areas. Chemical testing will include the more important diagnostic methods for soils, irrigation and effluent waters and tissues; physical testing will cover particle size analysis, bulk density, pore space, moisture characteristic and infiltration rates for gravels, sands and soils used in turf construction; biological testing will cover the techniques used for the identification of the major pests and diseases of turf grasses. The unit includes an extensive laboratory component. Reference will also be made to quality assurance procedures in sampling and

laboratory practice and the importance of statistical procedures in the interpretation of results.

Textbooks

Rayment, G.E. and Higginson, F.R. Australian Laboratory Handbook of Soil and Water Chemical Methods (Inkata Press, Adelaide).

Peverill, K.I. et al., Soil Analysis: an Interpretation Manual (CSIRO publishing, Collingwood)

Smiley, R.W., Dernoeden, P.H. and Clarke, B.B. Compendium of Turfgrass Diseases, 2nd Edition, (APS Press, St Paul).

AFNR5605

Applied Plant Ecology

Credit points: 6 **Teacher/Coordinator:** Dr Peter Martin **Session:** Semester 2 **Classes:** External studies and residential block **Assessment:** one 3hr examination (45%), one 2,000 word assignment (20%), one oral presentation (10%), tutorial papers (10%) and practical reports (15%)

Note: Department permission required for enrolment.

Intended primarily for students in the amenity horticulture field, this unit explores the effects of the management practices used in the industry on the micro- and macro- environments, both biological and physical. Input factors such as water, nutrients, organic amendments and pesticides will be considered in relation to their modes of action and their effects on soil sustainability (including acidification and salinification), macro- and micro-biodiversity, contamination of runoff water and ground water, and safety for staff and members of the community. Issues such as the use of selective versus broad-spectrum pesticides, the development of resistance to pesticides and enhanced bio-degradation of pesticides will be considered from the ecological perspective. Physical management methods such as scarification and coring in turf management and canopy reduction in tree management will be evaluated in terms of the net ecological benefits of the practices. During the semester each student will be required to choose a topic in consultation with the lecturer and subsequently present a seminar to the class in the form of a case study or situation analysis.

Textbooks

Atwell, B., Kriedemann, P. and Turnbull, C. Plants in Action: adaptation in nature, performance in cultivation. (Macmillan, Melbourne) (selected chapters)

Gibson, D.J. Methods in Comparative Plant Population Ecology. (Oxford University Press, Oxford).

Coleman, D.C. and Crossley, D.A. Fundamentals of Soil Ecology (Academic Press, London)

Smith, L.W. Notes on the Ecology of Weed Management (Plant Breeding Institute, Camden).

AFNR5701

Plants and the Environment

Credit points: 6 **Teacher/Coordinator:** Dr Margaret Barbour **Session:** Semester 1 **Classes:** 24 hrs lectures and in-class discussion, 36 hours practical **Assessment:** one 2hr exam (40%), in-class discussion (10%), research manuscript (25%), EITHER research proposal (25%), OR research manuscript (25%)

The focus of this unit is the response of plants to the environment, drawing examples from both managed and natural ecosystems. Students will develop advanced-level understanding of plant-environment interaction at scales from leaves to whole ecosystems through presentation and discussion of current research papers. Practical sessions will provide students with hands-on experience of state-of-the-art measurement techniques. Understanding of basic biophysical processes will be applied to inform discussion about the effects of climate change on terrestrial ecosystem services, including crop productivity.

Textbooks

Copies of research papers for each lecture/discussion will be provided, as will review papers where appropriate.

Recommended (but not required):

Jones HG (1992) Plants and Microclimate 2nd ed. Cambridge University Press, UK

Plants in action : adaptation in nature, performance in cultivation / editors Brian J. Atwell, Paul E. Kriedemann, Collin G.N. Turnbull. South Yarra, [Vic.] : Macmillan Education Australia, 1999

AFNR5901

Research Review

Credit points: 6 **Teacher/Coordinator:** Dr Damien Field **Session:** Semester 1 **Classes:** No scheduled classes **Assessment:** Research review paper (100%)

This aims to develop a student's ability to review the literature with the view of developing a major research project in an area of specialization. The student will work with an academic advisor on a mutually agreed topic for research to be undertaken and the subsequent writing of a literature review. The literature review will advance the student's ability to identify existing knowledge, define research problems, demonstrate a sound grasp for presenting a research question, and begin to define a research strategy. Students will develop their research and inquiry skills through sourcing a wide range of literature and improve their written communication skills.

AFNR5904

Research Proposal and Approach

Credit points: 6 **Teacher/Coordinator:** Dr Damien Field **Session:** Semester 1 **Assessment:** Research Proposal (Written) (60%) and Oral Research Proposal (40%)

This unit of study aims to develop a student's ability to write a detailed research proposal and develop a strategy combined with the appropriate methodology to execute their research. Working with their academic advisor students will prepare a proposal describing; the background and aims, its significance and innovation, the justification of the methodology, the national benefit, and considerations of the required budget and project timeline. This unit will enable students to develop their ability to define a research project to be managed within a suitable research framework. Students will develop their skills in solving research problems and enhance their intellectual and personal autonomy through managing a research program.

AFNR5905

Research Paper

Credit points: 6 **Teacher/Coordinator:** Dr Damien Field **Session:** Semester 2 **Assessment:** Research Paper (100%)

This unit of study builds on the major research project proposed in AFNR5904. Working with their academic advisor students will execute their research strategy that provides data and subsequent data analysis towards solving the research question. The results and analysis will be presented in a format suitable for submission as a research paper to a relevant journal. Students will build their research skills, develop a strong analytical capacity, demonstrate a sound grasp of the topic, and ability to interpret results in a broad framework. Students will demonstrate their ability to draw reliable conclusions and identify future areas of research. Students will continue to develop their skills in solving research problems and enhance their intellectual and personal autonomy by means of managing a research program. Students will improve their communication skills through presentation of the research paper.

AFNR5906

Research Communication

Credit points: 6 **Teacher/Coordinator:** Dr Damien Field **Session:** Semester 2 **Assessment:** Popular Article (20%), Poster (40%) and Research Findings (Oral) (40%)

This unit of study provides the students with the opportunity to present the research findings of their major research project using several communication media appropriate for different audiences, for example, external stakeholders and /or popular media. Using poster and oral presentations students will communicate their research to the academic community in a professional conference environment. Students will also be required to attend the Faculty's seminar program that is relevant to their research topic. Students will build on their skills to use several modes of communication to demonstrate their ability to produce high quality results, draw reliable conclusions and identify future areas of research.

AGEC5401

Agricultural Marketing Analysis

Credit points: 6 **Teacher/Coordinator:** Mrs Elizabeth Nolan **Session:** Semester 2 **Classes:** 2x1-hr lectures/week, commencing week 1 **Assessment:** 1x1hr exam (20%), 1x2hr exam (50%), 1x2000wd essay (30%).

Performance of the agricultural and resource marketing systems, marketing margins, transportation, storage, and risk.. The structure, conduct and performance of marketing firms, and government and public interest in the food system will also be addressed. Extensive reading will be required.

Textbooks

To be advised

AGEC5402

Agricultural Development Economics

Credit points: 6 **Teacher/Coordinator:** Dr. Shyamal Chowdhury **Session:** Semester 2 **Classes:** 1x2-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Assessment:** 1x2000 wd problem set (20%), 1x1000 wd review (10%), 1x15min presentation (5%), 1x1page evaluation of a peer (5%), and 1x2hr final exam (60%)

This unit focuses on the microeconomic analysis of development, with a special emphasis on the importance of market failures in financial markets as origin of persistent poverty. The unit also addresses policy interventions to overcome such failures and the challenges in their evaluation. A special emphasis is put in the discussion of the role of agriculture in development, and the evidence supporting its importance in poverty reduction.

Textbooks

Debraj Ray, Development Economics, Princeton University Press.
Abhijit Banerjee, Roland Bénabou and Dilip Mookherjee, Understanding Poverty, Oxford University Press.
World Bank, Agriculture for Development - World Development Report 2008, World Bank and Oxford University Press
N.B. Students are advised not to buy the textbooks before lectures commence in case there are any changes.

AGEC5403

Agricultural Trade

Credit points: 6 **Teacher/Coordinator:** Ms Shauna Phillips **Session:** Semester 1 **Classes:** 2x1-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Assessment:** 1x1hr exam (25%), 1x essay (15%) and 1x2hr exam (60%)

In this unit of study the basic economic principles underlying international trade in agricultural and resource commodities and the policies involved will be presented. Issues related to trade and development will also be considered. The main topics covered will include: trends in agricultural and resources trade; economics and politics of protection, economic integration and impacts on international commodity trade; international trade policy making. An understanding of globalisation, including foreign direct investment, will also be required. Extensive reading will be required.

Textbooks

Collections of readings.

AGEC5404

Industrial Organization of Agribusiness

Credit points: 6 **Teacher/Coordinator:** Dr. Shyamal Chowdhury **Session:** Semester 1 **Classes:** 1x2-hr lectures/week, 1x1-hr tutorial/week commencing week 2 **Assessment:** 1x2000 wd assignment (20%), 1x1000 wd review (10%), 1x15min presentation (5%), 1x1page evaluation of a peer (5%), and 1x2hr final exam (60%)

This unit focuses on applications of economic theory and methods in agribusiness decision making. It provides advanced treatment of the industrial organisation of agribusiness firms. Case studies will be used to examine the economic complexities of global agribusiness systems. Extensive readings make up the central component of the unit.

Textbooks

Collections of readings.

AGEC5405

Quantitative Planning Methods

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** A/Prof Ross Drynan **Session:** Semester 2 **Classes:** (2 lec & 2 tut/lab session)/wk **Assessment:** One end-of-semester exam (2 hours), 2 assignments.

Note: Department permission required for enrolment.

This unit examines the use of mathematical methods and models in planning at both the individual firm level and the sectoral level. While

the principal focus is on formal optimization, simulation and Monte Carlo methods are briefly discussed. Topics include non-linear programming, elements of input-output analysis, computable general equilibrium analysis, dynamic problems and methods (eg. dynamic programming and optimal control). Sectoral level planning applications considered include transportation and plant location studies; spatial equilibrium; and resource utilization across time. Firm level applications include multi-period planning, queuing problems, inventory analysis, and replacement problems. Extensive use is made of computer-based optimization.

The unit includes material dealt with at the advanced undergraduate level. Additional workshops, seminars, tutorials, assignments and/or assessment are provided as appropriate to the postgraduate program.

AGEC5406

Agricultural Finance and Risk

Credit points: 6 **Teacher/Coordinator:** A/Prof Ross Drynan **Session:** Semester 2 **Classes:** (2x1hr lec & 1x2hr tut/lab session)/wk, commencing week 1. **Assessment:** 1x2hr exam (70%) and 2 assignments (better done one 18%, other 12%)

This unit has two related components. One component concerns risk and risk management in agriculture; the other deals with issues of agricultural producer finance. Risk topics include: risk measurement, subjective probability, adjusting beliefs as a result of new information; risk attitudes; decision making under risk; expected utility theory; valuing information; generalizations of expected utility theory; E-V analysis; stochastic dominance; internal measures to cope with risk including diversification and flexibility; insurance, futures, options and other market instruments for managing risk. Finance topics include the implications of capital market imperfections and consequential differences between corporate and small business finance; financial relationships between debt/equity levels and risk, optimal debt levels; cost of capital; short term working capital management; and longer term capital (investment) budgeting. Techniques of valuation of projects in risk-free and risk situations are examined. Financial and risk management practices in Australian agriculture are reviewed.

The unit includes material dealt with at the advanced undergraduate level. Additional workshops, seminars, tutorials, assignments and/or assessment are provided as appropriate to the postgraduate program.

RSEC5431

Benefit Cost Analysis

Credit points: 6 **Teacher/Coordinator:** Dr Michael Harris **Session:** Semester 1 **Classes:** 1x2 hr lecture/wk, commencing week 1, 1x1hr tutorial/wk, commencing week 2 **Assessment:** 1x20 minute presentation (5%), 1x report of 3000 words (20%), 1x1-hr mid-semester exam (25%), 1x2hr final examination (50%)

This unit provides a detailed treatment of benefit-cost analysis and its use in public sector decision making and project evaluation. The underpinning concepts in welfare economics are analysed in detail, such as economic efficiency, criteria for assessing social welfare improvements, and economic surplus measures. Procedures of undertaking a benefit-cost analysis are presented, and tools of non-market valuation for environmental assets are covered in detail. These techniques include both stated and revealed preference techniques, including contingent valuation, choice modeling, hedonic pricing and travel cost methods.

RSEC5432

Environmental Economics

Credit points: 6 **Teacher/Coordinator:** Dr Tihomir Ancew **Session:** Semester 1 **Classes:** 2x1-hr lectures/week commencing week 1, 1x1-hr tutorial/week commencing week 2 **Assessment:** report and presentation from the practical experience in environmental economics (20%), one (1 hr.) mid-term exam (30%), and two hour (2 hr.) final exam (50%)

The course provides theoretical and empirical background necessary for a resource economist to be able to successfully function when faced with various environmental problems. The unit investigates economic aspects of a range of environmental issues. The studied concepts are exemplified with environmental problems related to agriculture (soil salinity, algal blooms, overgrazing etc.) as well as

with environmental problems typical to Australia. The guiding economic themes are: competing uses of the environment / externalities, market failure, the importance of property rights, optimal allocation of pollution abatement, technical issues in non-market valuation methods (measuring benefits without commodities), and the processes for making choices relating to non-market goods. Some social issues with environmental impacts are studied through exploration of the problems of population size and distribution, economic growth, and environmental regulation.

Textbooks

Perman, R., Y. Ma, J. McGilvray and M. Common. *Natural Resource and Environmental Economics*. Pearson, 3rd Ed. 2003
Charles D. Kolstad., *Environmental Economics.*, Oxford University Press, 2000
Tom Tietenberg., *Environmental and Natural Resource Economics.*, 6th Edition, Addison-Wesley, 2003.
Grafton, Adamowics, Dupont, Nelson, Hill and Renzetti. *The Economics of the Environment and Natural Resources*. Blackwell Publishing, 2004
N.B. Students are advised not to buy the textbook before lectures commence in case there are any changes.

RSEC5433

Economics of Mineral & Energy Industries

This unit of study is not available in 2011

Credit points: 6 **Teacher/Coordinator:** Dr Tihomir Ancew **Session:** Semester 2 **Classes:** (2 lec, 1 tut)/wk **Assessment:** One 1 hr midterm exam, written report on field trip activities, one 2 hr end of semester exam.

The unit provides theoretical and empirical background in the economics of minerals exploration, extraction and marketing and in the economics of energy generation, distribution and use. The economics of the minerals and energy commodity markets will be discussed and analyzed. The interactions of mineral extraction and energy generation activities with other natural resources and the environment will be of particular interest (e.g. mine site remediation, land use conflicts). Sustainability and prospects for long term efficient use of these resources, as well as the development and use of alternative technologies will also be discussed. In addition, institutional and policy issues (e.g. regulatory reform), will be analyzed. The unit will discuss the main aspects of the markets for minerals and energy, market structure, business environment and price movements. The unit will also provide an introductory discussion on the markets for derivatives (options, futures, forward, swaps) on minerals and energy commodities.

Textbooks

T. J. Brennan, L. K. Palmer, and A. S. Martinez, *Alternating Currents: Electricity Markets and Public Policy*, Resources for the Future Press, Washington D.C., 2002.
J. E. Tilton, *On Borrowed Time? Assessing the Threat of Mineral Depletion*, Resources for the Future Press, Washington D.C., 2003.
R. Perman, Y. Ma, J. McGilvray and M. Common. *Natural Resource and Environmental Economics*. Pearson, 3rd Ed. 2003.
T. Tietenberg., *Environmental and Natural Resource Economics.*, 6th Edition, Addison-Wesley, 2003.
F. E. Banks., *Energy Economics: A Modern Introduction.*, Kluwer Academic Publishers, 2000.
S. Kesler., *Mineral Resources, Economics and the Environment*, Maxwell Macmillan International, 1994. N.B. Students are advised not to buy the textbook before lectures commence in case there are any changes.

RSEC5434

Economics of Water and Bio-resources

Credit points: 6 **Teacher/Coordinator:** Dr Tihomir Ancew **Session:** Semester 2 **Classes:** 2x1-hr lectures/week commencing week 1, 1x1-hr tutorial/week commencing week 2 **Assessment:** one essay (35%), one (1 hr.) mid-term exam (25%); two hour (2 hr.) final exam (40%)

The main objective of the economics of biological resources will be to introduce students to the bio-economic modeling of the resources that experience biological growth. The unit consists of two complementary parts: water economics and economics of biological resources (fisheries, forestry, other wildlife). The main objective of the water economic component is to investigate the economic aspects of water use and water quality. In particular approaches toward efficient use of the water resource over time, optimal allocation of water among competing uses and achievement of the socially optimal level of water quality will be discussed. The demand for water from various sectors will be analysed in both static and dynamic settings. Issues considered

include the selection and construction of water storages, aquifer water extraction and alternative water sources. The issues of waste water disposal and water quality, changing water technologies, and water pollution will be also discussed. The unit will also discuss the economics of wildlife preservation and protection, as well as the economics of biodiversity. Particular attention will be devoted to the economic mechanisms for managing the water resources including property rights, water allocation and water markets. The key policy instruments (taxes, quotas, standards) in these areas are analyzed and discussed. The institutional and policy aspects will also be considered through analysis of water policy reform in Australia and elsewhere.

Textbooks

Bergstrom, Boule and Poe (Eds.), *The Economic Value of Water Quality*, Edward Elgar Pub., 2001.

Easter, Rosegrant and Dinar (Eds.), *Markets for Water: Potential and Performance*, Kluwer Academic Pub., 1998.

D. Smith, *Water in Australia*, Oxford University Press, 1999.

R. Perman, Y. Ma, J. McGilvray and M. Common. *Natural Resource and Environmental Economics*. Pearson, 3rd Ed. 2003.

J. M. Hartwick and Nancy D. Olewiler., *The Economics of Natural Resource Use.*, 2nd Ed. , Addison-Wesley, 1998.

J. M. Conrad, (1999), *Resource Economics*, Cambridge University Press, Cambridge.

N.B. Students are advised not to buy the textbook before lectures commence in case there are any changes.

Postgraduate degree resolutions and policies

Resolutions of the faculty

Master of Science in Agriculture

Master of Agricultural Economics

Doctor of Philosophy

These resolutions should be read in conjunction with The University of Sydney (Doctor of Philosophy (PhD)) Rule 2004 as outlined in The University of Sydney Calendar and the Resolutions of the Academic Board relating to the degree of Doctor of Philosophy.

1 Course codes

Code	Course title
BC001	Master of Science in Agriculture
BC002	Master of Agricultural Economics
BB000	Doctor of Philosophy

2 Candidature

A candidate for the degree of Master of Science in Agriculture, Master of Agricultural Economics or Doctor of Philosophy, will proceed by research and submission of a thesis.

3 Admission requirements

- (1) An applicant for admission to candidature for a research degree will:
 - (a) hold a degree of Bachelor of the Faculty with First or Second Class Honours or equivalent of the University of Sydney; or
 - (b) for the Master of Agricultural Economics or Master of Science in Agriculture, hold a degree of Bachelor of the Faculty with a credit grade or above in the fourth year in the field in which the candidate is proceeding; or
 - (c) have completed courses in another faculty or institution, these courses being deemed by the Faculty to be equivalent.
- (2) Demonstrated research ability will be considered when determining eligibility; applicants proposing to proceed primarily by research and thesis should provide evidence such as publications in scientific journals.
- (3) A research topic, which is satisfactory in terms of research interests, resources and availability of supervision within the discipline, must be agreed upon between the applicant and the supervisor.
 - (a) The Faculty will require a person admitted as a candidate for the degree of Master of Science in Agriculture, Master of Agricultural Economics or Doctor of Philosophy to serve a period of probation for not more than two semesters and to complete such work during the period as it may prescribe, and at the completion of the period, the Faculty will review the candidature and the work completed, and may confirm or terminate the candidature.
 - (b) If the Faculty confirms the candidature, it will be deemed to have commenced at the beginning of the period of probation.
 - (c) Applicants may be required to provide evidence of adequate financial resources for personal support and compulsory fees during candidature.

- (d) They may be required to demonstrate to the satisfaction of the Faculty a proficiency in the English language adequate to undertake the proposed candidature.

4 Availability

- (1) The number of students admitted may be limited and will be determined by:
 - (a) availability of resources, including space, library, equipment and computing facilities, and
 - (b) availability of adequate and appropriate supervision.
- (2) In considering an application for admission to candidature the Faculty will take account of resource limitations and will select in preference applicants who are most meritorious in terms of section 3 above.

5 Periods of candidature

- (1) The minimum period of candidature for a full-time candidate for the degree of Master of Science in Agriculture or the degree of Master of Agricultural Economics will be four semesters, except in the case of a candidate who holds the degree of Bachelor of the Faculty with first- or second-class Honours or another qualification accepted by the Faculty as equivalent, for whom the minimum period will be two semesters.
- (2) The maximum period of full-time candidature for the Master of Science in Agriculture or the Master of Agricultural Economics will be six semesters, but the Faculty may, in special circumstances, extend a candidature.
- (3) The minimum period of candidature for a full-time candidate for the degree of Doctor of Philosophy will usually be six semesters.
- (4) The Faculty will determine the minimum and maximum periods of candidature for part-time candidates on a pro-rata basis.
- (5) The Faculty may deem time spent or work done for another research degree of The University of Sydney to be time spent or work done for the degree of Master of Science in Agriculture or the degree of Master of Agricultural Economics if the candidate has ceased to be a candidate for the other degree, and the Faculty may reduce the minimum and maximum periods of candidature accordingly.

6 Part-time candidature

- (1) The Faculty may permit candidates to enrol in part-time candidature provided they supply a satisfactorily detailed plan of their proposed program and attend at the University for such consultation with the supervisor and participate in such faculty activities as are required by the Associate Dean (Postgraduate).
- (2) The Faculty may permit part-time candidates for the Master of Agricultural Economics, Master of Science in Agriculture or Doctor of Philosophy admitted under the provisions of chapter 10 of the by-laws to complete the investigation elsewhere, after four semesters have been spent in this or equivalent candidature within the University.
- (3) Candidates admitted to part-time candidature are expected to devote a minimum of 20 hours per week (or equivalent) to their candidature.
- (4) Research assistants or associate lecturers in the University will enrol part-time unless they can demonstrate to the satisfaction of the Faculty that they have sufficient time to pursue full-time candidature.



7 Control of candidature

- (1) Each candidate for the Master of Agricultural Economics, Master of Science in Agriculture or Doctor of Philosophy will pursue his or her course of advanced study and research wholly under the control of the Faculty.
- (2) Where a candidate is employed by an institution other than the University, the Faculty may require a statement by that employer acknowledging that the candidature will be under the control of the Faculty.

8 Appointment of supervisor

- (1) The Faculty will appoint a member of the full-time academic or research staff of the Discipline in which a candidate for the Master of Agricultural Economics, Master of Science in Agriculture or Doctor of Philosophy is proceeding to be the candidate's supervisor.
- (2) The Faculty will also appoint one or more associate supervisor/s of the candidate who may be a member of the academic or research staff of the University, an Honorary Research Associate, or a person with appropriate qualifications in another institution or organisation.

9 Progress

- (1) Each candidate will report regularly to the Faculty on his or her progress towards completing the requirements for the degree.
- (2) The Faculty will consider the report of each candidate and may, if it considers that a candidate has not made satisfactory progress towards completing the requirements for the degree, terminate the candidature.

10 Discontinuation of enrolment and readmission after discontinuation

- (1) A Master of Agricultural Economics, Master of Science in Agriculture or Doctor of Philosophy candidate will be presumed to have discontinued enrolment in a unit of study or the degree from the date of application to the Faculty unless evidence is produced
 - (a) that the discontinuation occurred at an earlier date, and
 - (b) that there was good reason why the application could not be made at the earlier time.
- (2) A candidate who discontinues enrolment in a unit of study or degree before 31 March or 31 August will be recorded as having withdrawn from that unit or degree.
- (3) A candidate who discontinues enrolment in a unit of study or degree after 31 March or 31 August will be recorded as 'Discontinued - Not to count as failure'.
- (4) A candidate who at any time discontinues enrolment from a degree will not be entitled to re-enrol in that degree unless the candidate is readmitted to candidature for that degree.
- (5) Subject to section (1), candidates may not discontinue enrolment in a unit of study after the end of classes in that unit, unless the degree regulations permit otherwise.
- (6) The Dean, Pro Dean or an Associate Dean of a Faculty may act on behalf of that Faculty in the administration of these resolutions.

11 Lodgement of thesis

- (1) Not earlier than the end of the minimum period of candidature, each candidate proceeding by research and thesis will lodge with the Faculty copies of a thesis embodying the results of an original investigation carried out by the candidate.
- (2) Three copies of a thesis are required from Masters candidates and four copies from PhD candidates.
- (3) The candidate will state in the thesis, generally in a preface and specifically in notes, the sources from which the information was derived, the extent to which the candidate has made use of the work of others, and the portion of the thesis the candidate claims to be original.

- (4) The thesis will be accompanied by a certificate from the candidate's supervisor stating whether, in the supervisor's opinion, the form of presentation of the thesis is satisfactory.
- (5) A candidate must be enrolled at the time of submission of the thesis.

12 Form of a thesis

- (1) A thesis may be bound for submission in either a temporary or a permanent form.
- (2) Temporary binding must be strong enough to withstand ordinary handling and postage. The preferred form of binding is the 'Perfect Binding' system; ring-back or spiral binding is not permitted.
- (3) The cover of a temporarily bound thesis must have a label with the candidate's name, name of the degree, the title of the thesis and the year of submission.
- (4) The requirements for permanent binding are set out in the Statutes and Regulations in the Academic Board's resolutions for binding of PhD theses.
- (5) Following examination, and emendation if necessary, at least one copy of a thesis (the Rare Book Library copy) must be bound in permanent form on archive paper.
- (6) If emendations are required, all copies of a thesis which are to remain available within the University must be amended.

13 Examination

- (1) The Faculty will appoint three examiners for a PhD thesis, of whom at least two will be external to the University. An internal examiner need not be expected and the supervisor can not be an examiner.
- (2) The Faculty will generally appoint two examiners for a Masters thesis of whom at least one will be external to the University. The supervisor can not be an examiner.

14 Result of candidature

- (1) The Board of Postgraduate Studies awards, or for the PhD degree the PhD Awards Sub Committee of the University's Research and Research Training Committee recommends the award of, the degree whenever:
 - (a) the examiners have recommended without reservation that the degree be awarded and the Pro Dean concurs; or
 - (b) all of the examiners have recommended that the degree be awarded or awarded subject to emendations to all copies of the thesis which are to remain available within the University and the Pro Dean concurs; or
 - (c) the Board of Postgraduate Studies unanimously accepts a recommendation from the Discipline Leader to award or award subject to emendations despite reservations expressed by one or more of the examiners; or
- (2) The Board of Postgraduate Studies may permit an unsuccessful candidate to prepare for re-examination if, in its opinion, the candidate's work is of sufficient merit to warrant this concession and the Pro Dean has so recommended.

15 Authority

- (1) In accordance with Senate Resolutions, the Board of Postgraduate Studies exercises the Faculty's powers and functions in
- (2) regard to Faculty's management of each higher degree candidature.
- (3) The Board of Postgraduate Studies may authorise the Associate Dean (Postgraduate Studies) to take executive action on behalf of the Board when, in his or her opinion, timely action is necessary and unlikely to be contentious in discussion by the Board, with such actions taken and relevant documents to be reported and tabled at the next meeting of the Board of Postgraduate Studies for consideration and formal approval.
- (4) Allowable actions include approval of:

- (a) award of the degree of Doctor of Philosophy under conditions approved by the University's Academic Board.
- (b) award of the Master of Science in Agriculture and Master of Agricultural Economics degrees.
- (c) nomination of examiners
- (d) admission to candidature
- (e) supervisory arrangements
- (f) variation of candidature
- (g) extension of candidature
- (h) completion of candidature away from the University
- (i) suspension of candidature
- (j) the award of Faculty scholarships, the Faculty Research Support Scheme(FRSS) and the Postgraduate Research Support Scheme(PRSS) monies.
- (k) continuance following receipt of annual progress reports.

16 Board of Postgraduate Studies

- (1) Pursuant to the resolutions of Senate the Faculty appoints the following to the Board of Postgraduate Studies:
 - (a) Dean
 - (b) Pro Dean
 - (c) Associate Dean (Postgraduate Studies)
 - (d) Professors of the Faculty
 - (e) Postgraduate Coordinators or their nominees

Graduate Certificate in Agriculture

Graduate Diploma in Agriculture

Master of Agriculture

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

Code	Course title
BG000	Graduate Certificate in Agriculture
BF018	Graduate Diploma in Agriculture
BC030	Master of Agriculture

2 Master's type

The master's degree in these resolutions is an advanced learning master's course, as defined by the Coursework Rule.

3 Embedded courses in this sequence

- (1) The embedded courses in this sequence are:
 - (a) the Graduate Certificate in Agriculture
 - (b) the Graduate Diploma in Agriculture
 - (c) the Master of Agriculture
- (2) Providing candidates satisfy the admission requirements for each stage, a candidate may progress to the award of any of the courses in this sequence. Only the longest award completed will be conferred. The graduate diploma is a terminating qualification that cannot progress to the Master of Agriculture.

4 Admission

- (1) Available places will be offered to qualified applicants in the order in which complete applications are received, according

to the following admissions criteria. In exceptional circumstances the Dean may admit applicants without these qualifications who, in the opinion of the faculty, have qualifications and evidence of experience and achievement sufficient to successfully undertake the award.

- (2) Admission to the Graduate Certificate in Agriculture requires a bachelor's degree or an equivalent qualification.
- (3) Admission to the Graduate Diploma in Agriculture requires:
 - (a) a bachelor's degree or an equivalent qualification;
 - (b) completion of the requirements of an embedded graduate certificate in this discipline from the University of Sydney, or equivalent qualification.
- (4) Admission to the Master of Agriculture requires:
 - (a) a bachelor's degree with a credit average or an equivalent qualification; or
 - (b) completion of the requirements of an embedded graduate certificate in this discipline from the University of Sydney, or equivalent qualification.

5 Requirements for award

- (1) The units of study that may be taken for the courses are set out in Table A.
- (2) To qualify for the award of the Graduate Certificate in Agriculture a candidate must complete 24 credit points including one specialisation.
- (3) To qualify for the award of the Graduate Diploma in Agriculture a candidate must complete 36 credit points including one specialisation.
- (4) To qualify for the award of the Master of Agriculture a candidate must complete 48 credit points, including:
 - (a) 24 credit points of core units of study; and
 - (b) 24 credit points of elective units of study.
 - (c) With permission, up to 12 credit points of the elective requirements may be taken from other graduate courses outside the Faculty.

6 Specialisations

- (1) Completion of a specialisation is a requirement of the graduate certificate and graduate diploma, and requires the accumulation of 12 credit points chosen from units of study listed in the table for that specialisation. The specialisations available are:
 - (a) Agribusiness
 - (b) Agricultural Economics
 - (c) Agricultural Technologies
 - (d) Natural Resource Management
 - (e) Resource Economics
 - (f) Sustainable Agriculture
 - (g) Turf Management
- (2) Not every specialisation is available every year.
- (3) Candidates for the Master of Agriculture will be awarded a specialisation based on the research area covered in their core units.

7 Course transfer

A candidate for the master or graduate diploma may elect to discontinue study and graduate with a shorter award from this embedded sequence, with the approval of the Dean, and provided the requirements of the shorter award have been met.

8 Transitional provisions

- (1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
- (2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed by 1 January, 2016. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.

Senate and Faculty Resolutions

Resolutions of the Senate

1 Degrees, diplomas and certificates of the Faculty of Agriculture, Food and Natural Resources.

- (1) With the exception of the Doctor of Agricultural Economics, the Doctor of Science in Agriculture and the Doctor of Philosophy, the Senate, by authority of the University of Sydney Act 1989 (as amended), provides and confers the following degrees, diplomas and certificates, according to the rules specified by the Faculty of Agriculture, Food and Natural Resources. The Doctor of Agricultural Economics, the Doctor of Science in Agriculture and the Doctor of Philosophy are provided and conferred according to the rules specified by the Senate and the Academic Board.
- (2) This list is amended with effect from 1 January, 2011. Degrees, diplomas and certificates no longer open for admission will be conferred by the Senate according to the rules previously specified by the Faculty.

2 Degrees

Code	Course title	Abbreviation	Credit points
BA003	Doctor of Agricultural Economics	DAgrEc	Published Work
BA000	Doctor of Science in Agriculture	DScAgr	Published Work
BB000	Doctor of Philosophy	PhD	Research
BC001	Master of Science in Agriculture	MScAgr	Research
BC002	Master of Agricultural Economics	MAgrEc	Research
BC030	Master of Agriculture	MAgr	48
BH002	Bachelor of Agricultural Economics [^]	BAgrEc	192
BH007	Bachelor of Environmental Systems	BEnvSys	144
BH004	Bachelor of Resource Economics [^]	BResEc	192
BH000	Bachelor of Science in Agriculture [^]	BScAgr	192

[^]may be awarded with honours in an integrated program.

3 Graduate diplomas

Code	Course title	Abbreviation	Credit points
BF018	Graduate Diploma in Agriculture	Grad - DipAgr	36

4 Graduate certificates

Code	Course title	Abbreviation	Credit points
BG000	Graduate Certificate in Agriculture	GradCertAgr	24

Resolutions of the Faculty of Agriculture, Food and Natural Resources for coursework awards

These resolutions apply to all undergraduate and postgraduate coursework award courses in the Faculty, unless specifically indicated otherwise. Students enrolled in postgraduate research awards should consult the resolutions for their course. These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the resolutions for the course of enrolment, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Part 1: Course enrolment

1 Enrolment restrictions

The Coursework Rule limits the maximum number of credit points students may take in any given semester. The Faculty does not encourage full time students to exceed the recommended enrolment patterns for its courses.

2 Time limits

The Coursework Rule limits the time students may take to complete their course; part time students should ensure their enrolment pattern allows completion within the maximum time. The Rule also defines how time limits are affected by periods of suspension or absence, and the time limits for recognition of credit for previous study.

3 Suspension, discontinuation and lapse of candidature

The Coursework Rule specifies the conditions for suspending or discontinuing candidature, and return to candidature after these events. The Rule also defines the circumstances when candidature is deemed to have lapsed. Students should pay careful attention to the significant dates in these processes and their effect on results and financial liability.

4 Credit for previous study

- (1) For undergraduate degrees: the Dean may approve a maximum of 96 credit points of credit towards the requirements. A maximum of 36 unspecified credit points for units of study not comparable to units listed in table units for each degree may be granted as part of the 96 credit point maximum credit transfer permitted.
- (2) For postgraduate courses: a maximum of six credit points may be granted to graduate certificates, and 12 credit points to graduate diplomas and master's, except that full credit will be awarded for students moving through an embedded sequence.

Part 2: Unit of study enrolment

5 Cross-institutional study

- (1) Provided that permission has been obtained in advance, the Dean may permit a student to complete a unit of study at another institution and have that unit credited to the student's course requirements provided that:



- (a) the unit of study content is material not taught in any corresponding unit of study in the University; or
 - (b) the student is unable for good reason to attend a corresponding unit of study at the University.
- (2) Cross institutional study is regarded as another form of credit and will be counted as such when considering eligibility.

6 International Exchange

The faculty encourages students with a minimum credit average, to participate in international exchange programs. For more information refer to the International Office.

Part 3: Studying and Assessment

7 Attendance

- (1) Students are required to be in attendance at the correct time and place of any formal or informal examinations. Non attendance on any grounds insufficient to claim special consideration will result in the forfeiture of marks associated with the assessment. Participation in a minimum number of assessment items may be included in the requirements specified for a unit of study.
- (2) Students are expected to attend a minimum of 90% of timetabled activities for a unit of study, unless granted exemption by the Dean. A student who has not met the minimum attendance requirements in a unit may be deemed to have failed to complete the requirements and may be excluded by the Dean from admission to examinations in that unit.

8 Late submission policy

- (1) It is expected that unless an application for special consideration has been approved, students will submit all assessment for a unit of study on the due date specified. If the assessment is completed or submitted within the period of extension, no academic penalty will be applied to that piece of assessment.
- (2) If an extension is either not sought, not granted or is granted but work is submitted after the extended due date, the late submission of assessment will result in an academic penalty at the discretion of the unit coordinator or as advised in the unit outline.

9 Special consideration for illness, injury or misadventure

Special consideration is a process that affords equal opportunity to students who have experienced circumstances that adversely impact their ability to adequately complete an assessment task in a unit of study. The Coursework Rule provides full details of the University policy. The procedures for applying for special consideration are described in each unit of study outline.

10 Concessional pass

In this Faculty the grade PCON (Concessional Pass) is not awarded.

11 Re-assessment

- (1) In this Faculty re-assessment is offered to students whose performance is in the prescribed range and circumstances.
- (2) Students whose final mark for their unit of study is within the range 45-49 may be offered the chance to complete re-assessment. Re-assessment will normally be offered within 3 weeks at the end of the formal examination period and it is the student's responsibility to be available to attend during this time. The maximum mark awarded for a unit of study in these circumstances will be 50 - Pass.
- (3) Students who have successfully requested special consideration may be allowed to sit the exam or submit the required work at a negotiated date that should not be longer than the period of incapacitation and in any case not longer

than 3 months. After this time the student will be considered to have discontinued with permission. Marks will be awarded at full value for re-assessment where special consideration is approved.

Part 4: Progression, Results and Graduation

12 Satisfactory progress

- (1) The Faculty will monitor students for satisfactory progress towards the completion of their award course. In addition to the common triggers used to identify students not meeting academic progression requirements (as defined by the Progression requirements of the Coursework Rule), students must pass any unit of study identified in the course resolutions as being critical to progression through the course.
- (2) An undergraduate student must obtain the written permission of the Associate Dean (Teaching and Learning) to enrol in level 3000 units of study unless he/she has successfully completed all required level 1000 units of study and has successfully completed or is concurrently enrolled in compulsory level 2000 units of study.

13 Award of the degree of bachelor with honours

- (1) To qualify for the award of honours a student must:
 - (a) have a Year 2/3 WAM of at least 65 across years two/three; and
 - (b) complete an independent research component as part of the final year of the program with an overall honours mark of at least 65.
- (2) General conditions of candidature include:
 - (a) In the event of a recommendation for the award of honours that departs from these standards, it shall be incumbent upon the Degree Coordinator and section concerned to make out a substantial case for such a departure.
 - (b) Admissible grounds for departure would include medical disability or misadventure early in the course, and of a nature for which allowance could not be made through the normal special consideration processes for units of study.
- (3) The honours mark is determined by the overall honours mark at the end of the fourth year and shall be the average of the Year 2/3 WAM and the Year 4 WAM.
- (4) Honours is awarded in the following classes:

Level of honours	Overall honours mark	Minimum WAM Years 2/3
First Class	mark \geq 75	65
Second Class, Division 1	70 \leq mark $<$ 75	65
Second Class, Division 2	65 \leq mark $<$ 70	65
Honours not awarded	mark $<$ 65	n/a

14 University medal

A student with a year four WAM of at least 85 and a year two/three WAM of at least 80, may be awarded a university medal. The medal is awarded at the discretion of the faculty to the highest achieving students who in the opinion of the Faculty have an outstanding academic record, in accordance with Coursework Rule.

15 Weighted average mark (WAM)

- (1) The University has a formula for calculating a Weighted Average Mark and this is defined in the University Glossary. WAMs are used by the University as one indicator of performance. For example, WAMs can be used in assessing admission to and award of honours, eligibility for prizes and scholarships, or assessing progression through a course.
- (2) For the BAgEc and BResEc, the Faculty of Agriculture, Food and Natural Resources uses a Year 2/3 WAM that includes

all 2000 level and 3000 level units of study. All 4000 level units of study count towards Year 4 WAM.

- (3) For the BScAgr, the Faculty of Agriculture, Food and Natural Resources uses a Year 2/3 WAM that includes all 2000 level and 3000 level units of study, except those 3000 level units of study taken to fulfil part of the requirements for Year 4. For the BScAgr, the Year 4 WAM includes all 4000 level units of study as well as any 3000 level unit of study taken to fulfil part of the requirements for Year 4.
- (4) The WAM calculations use the following formula:

$\text{WAM} = \frac{\text{sum}(Wc \times Mc)}{\text{sum}(Wc)}$
--

where Wc is the unit of study credit points x the unit weighting and Mc is the mark achieved for the unit. The mark used for units with a grade AF is zero. Pass/fail units and credited units from other institutions are not counted. All units carry a weighting of one, except the individual research

components of undergraduate degrees, which carry a weighting of two.

Part 5: Other

16 Transitional provisions

- (1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
- (2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed by 1 January, 2016. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.

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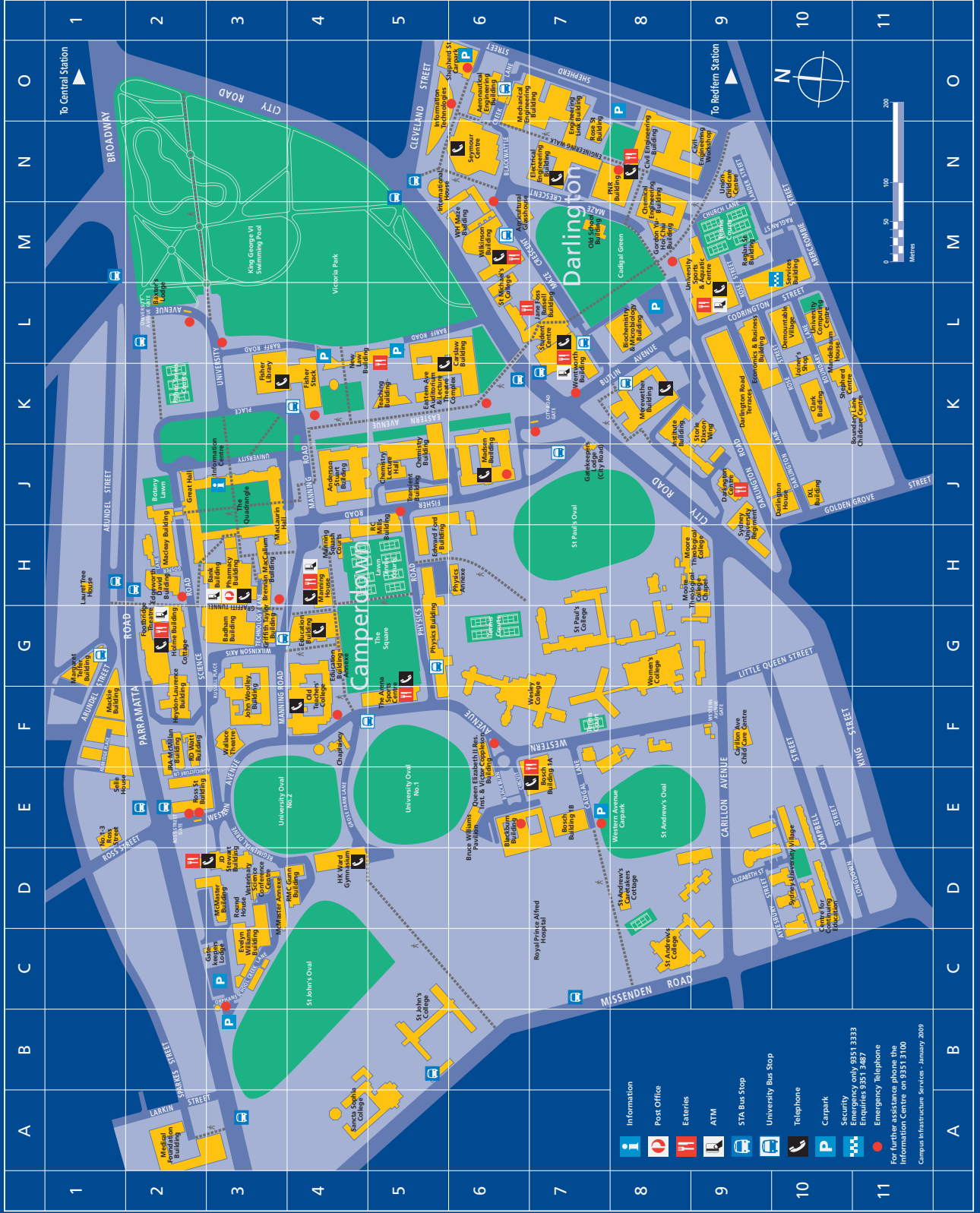
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Camperdown and Darlington Campuses



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-  Entries
-  ATM
-  STA Bus Stop
-  University Bus Stop
-  Telephone
-  Carpark
-  Security
Security only: 0351 3333
Enquiries: 0351 3487
-  Emergency Telephone
For further assistance phone the
Information Centre on 0351 3100

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Directory

University buildings

O6	Aeronautical Engineering Building	L4	Law School
J4	Anderson Stuart Building	F1	Mackie Building
G3	Badham Building	H3	MacLaurin Hall
H3	Bank Building	H2	Macleay Building
L2	Baxter's Lodge	G1	Margaret Telfer Building
L8	Biochemistry and Microbiology Building	J6	Madsen Building
E6	Blackburn Building	H4	Manning House
E7	Bosch Building 1A	H4	Manning Squash Courts
E7	Bosch Building 1B	D3	McMaster Annex
H3	Brennan MacCallum Building	D3	McMaster Building
E6	Bruce Williams Pavilion	O6	Mechanical Engineering Building
L6	Carlaw Building	A2	Mechanical Foundation Building
F4	Chaplaincy	K8	Merevether Building
M8	Chemical Engineering Building	L4	New Law Building
J5	Chemistry Building	E1	No. 1-3 Ross Street
N8	Civil Engineering Building	M7	Old School Building
N9	Civil Engineering Workshop	F4	Old Teachers' College
K10	Clark Building	H3	Pharmacy Building
J9	Darlington Centre	H6	Physics Annex
J10	Darlington House	G5	Physics Building
K9	Darlington Road Terraces	N8	PNR Building
L10	Demountable Village	E6	Queen Elizabeth II Research Institute
K5	Eastern Avenue Auditorium & Lecture Theatre Complex	H5	RC Mills Building
L9	Economics and Business Building	F2	RD Watt Building
H2	Edgeworth David Geology Building	D4	RMC Gunn Building
G4	Education Building	M9	Raglan Street Building
H4	Education Building Annex	N7	Rose Street Building
H5	Edward Ford Building	E2	Ross Street Building
N7	Electrical Engineering Building	G2	Science Road Cottage
N7	Engineering Link Building	E1	Selle House
C3	Evelyn Williams Building	M10	Services Building
K3	Fisher Library	N6	Seymour Centre
K4	Fisher Library Stack	K10	Shepherd Centre
G2	Footbridge Theatre	O6	Shepherd Street Carpark
C3	Gatekeeper's Lodge	K9	Storie Dixon Wing
J7	Gatekeeper's Lodge (City Road)	L4	Sydney Law School
M8	Gordon Yu-Hoi Chui Building	K5	Teaching Building
J2	Great Hall	F5	The Arena Sports Centre
G3	Griffith Taylor Building	J3	The Quadrangle
D4	HK Ward Gymnasium	J5	Transient Building
F2	Heydon-Laurence Building	L10	University Computing Centre
G2	Holme Building	M9	University Sports & Aquatic Centre
N5	Information Technologies	D3	Veterinary Science Conference Centre
K8	Institute Building	E6	Victor Coppleston Building
N5	International House	F3	Wallace Theatre
J10	IXL Building	K7	Wentworth Building
D3	JD Stewart Building	E7	Western Avenue Carpark
F2	JRA McMillan Building	M6	WH Mase Building
L7	Jane Foss Russell Building	M6	Wilkinson Building
F3	John Woolley Building		

Childcare centres

K11	Boundary Lane
F9	Carlton Avenue
N9	KU Union
H1	Laurel Tree House

Colleges & residential accommodation

J10	Darlington House
K9	Darlington Road Terraces
N5	International House
L10	Mandelbaum House
A4	Sancta Sophia College
C8	St Andrew's College
B5	St John's College
L6	St Michael's College
B6	St Paul's College
G7	Selle House
E1	Sydney University Village
D10	Sydney University Village
F7	Wesley College
G8	Women's College

Computer Access Centres

H3	Brennan
G4	Education
K3	Fisher
N7	Link
L6	McGrath (Carlaw)
H3	Pharmacy

Cultural venues

H2	Macleay Museum
J3	Nidholson Museum
N6	Seymour Centre
K7	Sir Hermann Black Gallery
M6	Tin Sheds Gallery
J2	University Art Gallery

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F2	Agriculture, Food and Natural Resources
M6	Architecture
H3	Arts
K8	Economics & Business
G4	Education and Social Work
N7	Engineering
L4	Law
H5	Medicine
H3	Pharmacy
L6	Science
D3	Veterinary Science

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G3	Badham
H5	Burkitt-Ford
K3	Fisher
L4	Freehills Law Library
E7	Medical
H5	Schaeffer Fine Arts
L7	SciTech

Retail

H3	Australia Post Office
J9	Darlington Centre
G2	Hoime Building
L7	Jane Foss Russell Building
H4	Manning House
F5	The Arena Sports Centre
M9	University Copy Centre
K7	University Health Service
M9	University Sports & Aquatic Centre
M9	University Co-op Bookshop
C3	Valentine Charlton Cat Centre
C3	Veterinary Hospital & Clinic
K7	Wentworth Building

Security

M10	Emergency Services
M10	Lost Property
M10	Traffic & Parking

Sports & recreational venues

K2	Fisher Tennis Courts
D4	HK Ward Gymnasium
H5	Lawn Tennis Courts
H4	Manning Squash Courts
F5	The Arena Sports Centre
G5	The Square
E5	University Oval No. 1
E3	University Oval No. 2
M9	University Sports & Aquatic Centre

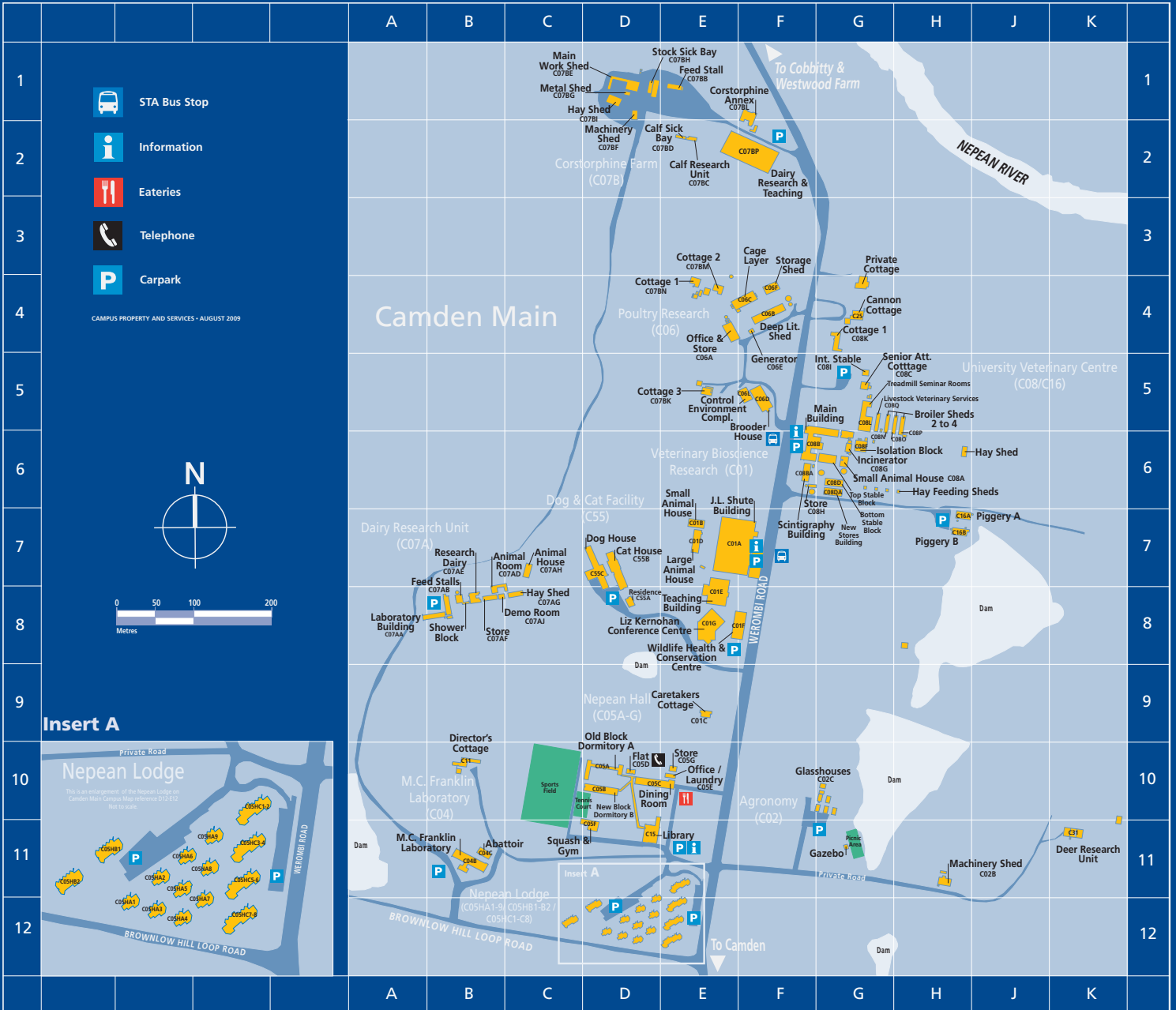
Unions & associations (offices)

K7	Students' Representative Council (SRC)
M9	Sydney University Postgraduate Representative Association (SUPRA)
M9	Sydney Uni Sport & Fitness
G2	University of Sydney Union

University administration, centres & services

L7	Accommodation Service
H3	Alumni Relations Office
L7	Careers Centre
L7	Cashier
D10	Centre for Continuing Education
K7	Centre for English Teaching
H3	Chancellor
L7	Counselling Service
L7	Disability Services
L7	Equity Support Services
H2	Executive Offices
L7	Financial Assistance Office
G1	Financial Services
J3	Information Centre
L10	Information and Communications Technology Services
L7	International Office
L7	International Student Support Unit
G4	Learning Centre
L6	Mathematics Learning Centre
H2	Media Office
G1	Office of General Counsel
L7	Research Office
L7	Scholarships and Prizes Office
L7	Student Centre
L7	Student Support Services
K8	Summer School
K8	Support Sydney
M10	SydneyPeople – HR Service Centre
D9	SydneyPeople – Learning Solutions
E1	SydneyPeople – Unistaff
L7	Sydney Talent
O5	Sydnovate
F3	United States Studies Centre
G2	University of Sydney Venue Collection
C3	Veterinary Hospital & Clinic
H2	Vice-Chancellor

CAMDEN MAIN



Directory

University Buildings

Agronomy

- H11 Machinery Shed (C02B)
- G10 Glasshouses & Boiler Room (C02C)
- K11 Deer Research Unit (C02D)

Corstorphine Farm

- E1 Feeding Stalls & Office (C07BB)
- E2 Calf Research Unit (C07BC)
- E2 Calf Sick Bay (C07BD)
- D1 Main Work Shed (C07BE)
- D1 Machinery Shed (C07BF)
- D1 Metal Shed (C07BG)
- D1 Stock Sick Bay (C07BH)
- D1 Hay Shed (C07BI)
- E5 Cottage No. 3 (C07BK)
- F1 Corstorphine Annexe (C07BL)
- E4 Cottage No. 2 (C07BM)
- E4 Cottage No. 1 (C07BN)
- F2 Dairy Research & Learning (C07BP)

Dairy Research Unit

- B8 Laboratory (C07AA)
- B8 Feed Stalls (C07AB)
- B8 Animal Room (C07AD)
- B8 Research Dairy (C07AE)
- B8 Store (C07AF)
- C8 Hay Shed (C07AG)

- C8 Animal House (C07AH)
- B8 Demo Room (C07AJ)

Dog and Cat facility

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- D7 Cat House (C55B)
- DT Dog House (C55D)

M.C. Franklin

- B11 Laboratory (C04B)
- B11 Abattoir (C04C)
- B10 Director's Cottage (C11)

Nepean Hall

- D10 Old Block - Dormitory A (C05A)
- D10 New Block - Dormitory B (C05B)
- D10 Dining Room (C05C)
- D10 Flat (C05D)
- E10 Office & Laundry (C05E)
- D11 Squash Court & Gym (C05F)
- E10 Store (C05G)
- D11 Library (C15)

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- D12 Group B, No1 (C05HB1)
- D12 Group B, No2 (C05HB2)
- E11 Group C, No1 & 2 (C05HC1-2)
- E12 Group C, No3 & 4 (C05HC3-4)

- E12 Group C, No5 & 6 (C05HC5-6)
- E12 Group C, No7 & 8 (C05HC7-8)

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- F4 Deep Lit. Shed (C06B)
- F4 Cage Layer Shed (C06C)
- F5 Brooder House (C06D)
- F4 Generator Building (C06E)
- F4 Storage Shed (C06F)
- F5 Control Environment Compl. (C06L)

University Veterinary Centre

- G6 Small Animal House (C08A)
- F6 Main Building (C08B)
- G5 Senior Att. Cottage (C08C)
- G6 Cattle Unit (C08D)
- G6 Isolation Block (C08F)
- G6 Incinerator (C08G)
- F6 Store (C08H)
- G4 Cottage 1 (C08K)
- G5 Interlock Stable (C08I)
- H7 Piggery A (C16A)
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- G4 Cottage No.1 (C08K)
- G5 Treadmill Seminar Rooms (C08L)
- H5 Broiler Shed 2 to 4 (C08N-O-P)
- G5 Livestock Veterinary Services (C08Q)
- G5 Cannon Cottage (C25)

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- E7 J.L. Shute Building (C01A)
- E7 Small Animal House (C01B)
- E9 Caretaker's Cottage (C01C)
- E7 Large Animal House (C01D)
- E8 General Teaching Building (C01E)
- E8 Wildlife Health & Conservation Centre (C01F)
- E8 Liz Kernohan Conference Centre

Campus Facilities

- E8 Computer Laboratories (C01E)
- E8 Auditorium (C01E)
- E8 Seminar Rooms (C01E)

Residential accomodation

- D12 Nepean lodge
- D10 Old Block Dormitory A
- D10 New Block Dormitory B

Sports & Recreational Venues

- D11 Squash & Gym

Libraries

- D11 Library

Unions & Associations (offices)

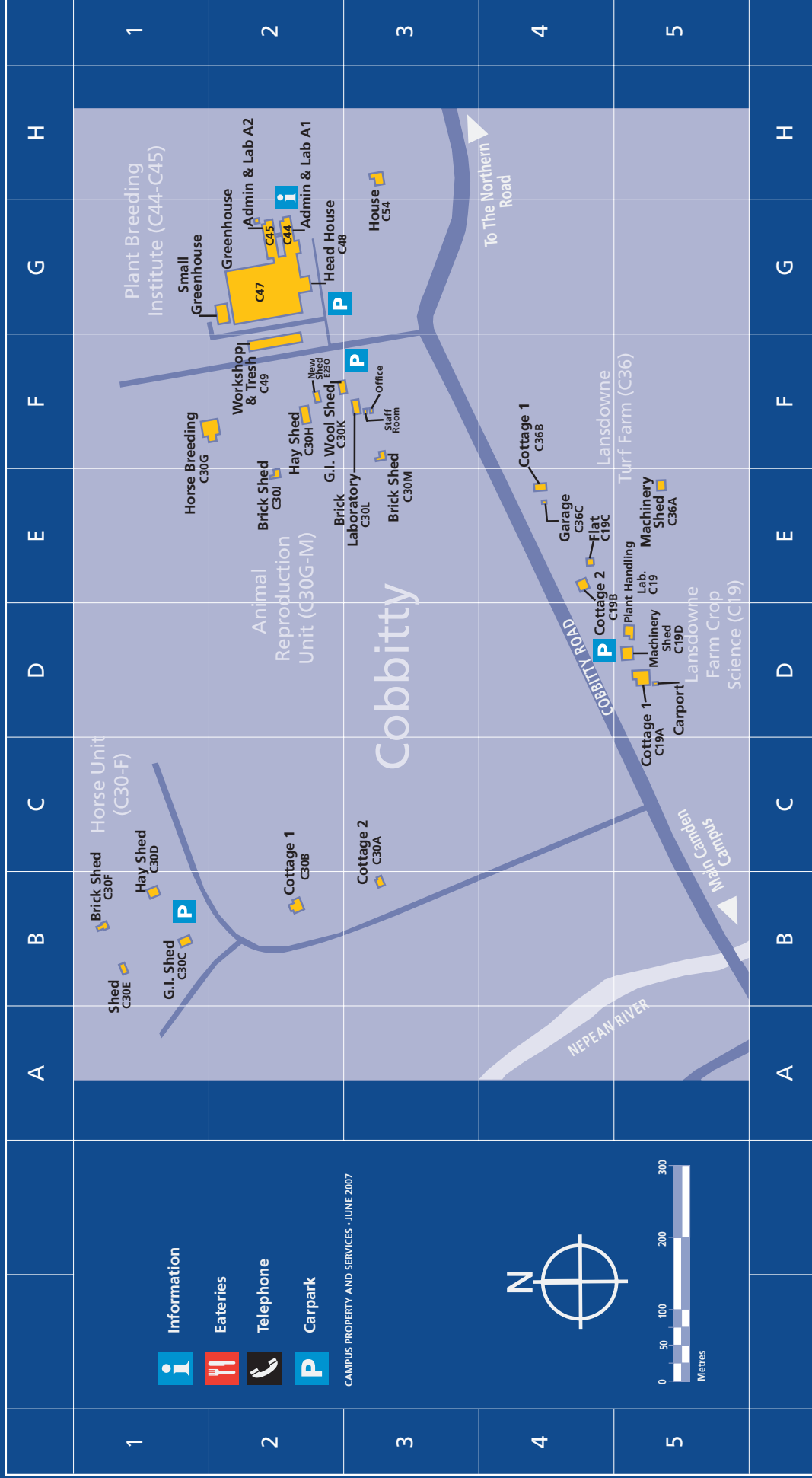
- E7 Students' Association (C01A)

Venues

- E7 J.L. Shute Building
- G5 Treadmill Seminar Rooms

MAP CODE: 13C_MAIN

COBBITTY CAMPUS



CAMPUS PROPERTY AND SERVICES - JUNE 2007

Directory

University Buildings

Lansdowne Farm
D5 Plant Handling Lab. (C19)
D5 Cottage 1 (C19A)
E4 Cottage 2 (C19B)
E4 Flat (C19C)
D5 Machinery Shed (C19D)

Lansdowne Turf Farm
E5 Machinery Shed (C36A)
E4 Cottage 1 (C36B)
E4 Garage (C36C)
E4 Carport (C36D)

Horse Unit

B3 Cottage 2 (C30A)
B2 Cottage 1 (C30B)
B1 G.I. Shed (C30C)
B1 Hay Shed (C30D)
B1 Brick Dairy (C30E)
B1 Brick Shed (C30F)

Animal Reproduction Unit

F2 Horse Breeding (C30G)
F2 Hay Shed (C30H)
E2 Brick Veterinary Laboratory (C30J)
F2 G.I. Woolshed (C30K)
F3 Brick Laboratory (C30L)
F3 Brick Veterinary Laboratory (C30M)

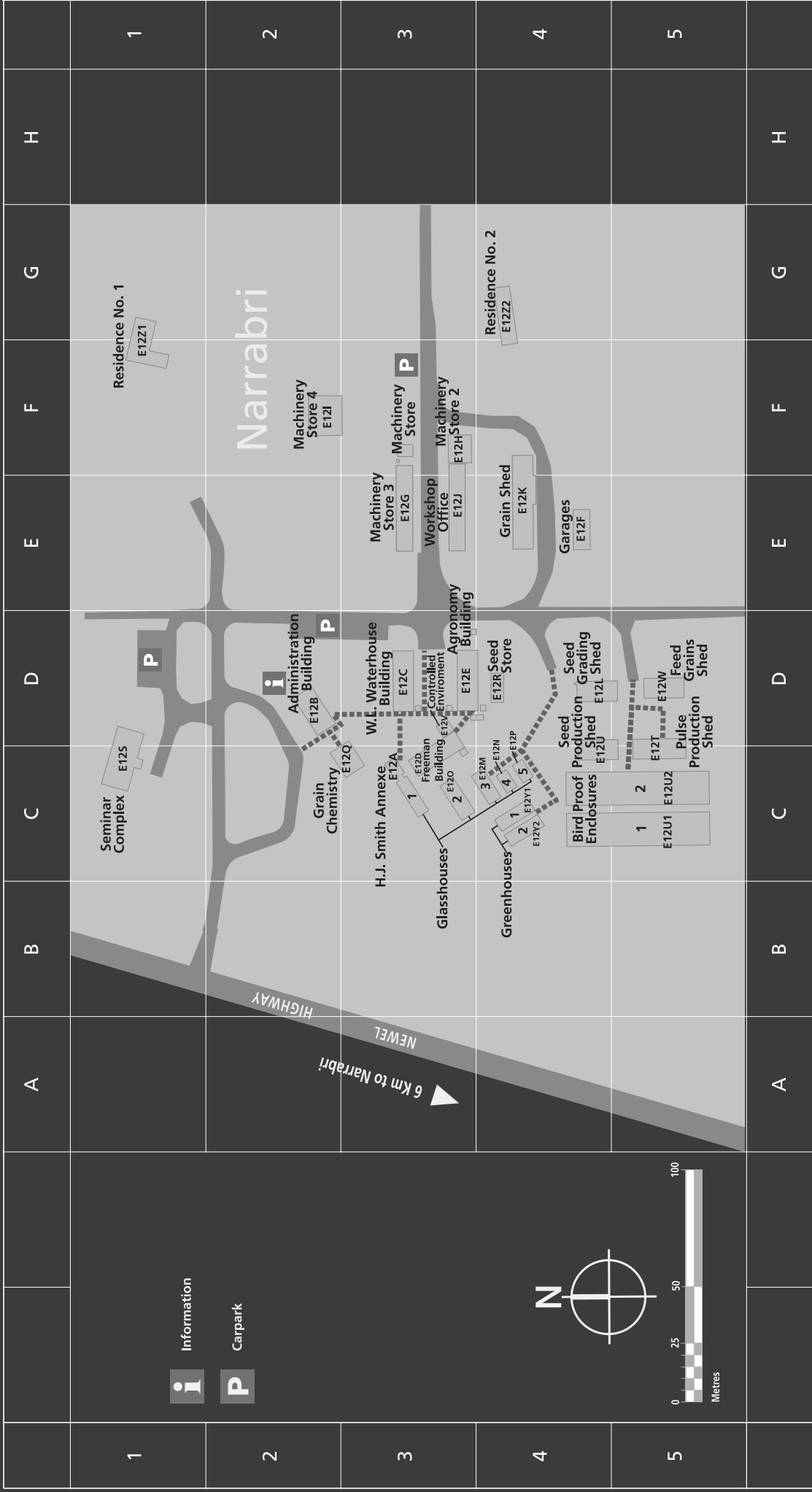
Plant Breeding Institute

G2 Administration & Lab A1 (C44)
G2 Administration & Lab A2 (C45)
G2 Green House (C47)
G2 Head House (C48)
F2 Workshop and Thresh (C49)
H3 House (C54)

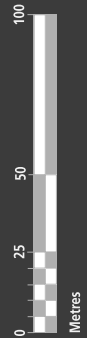
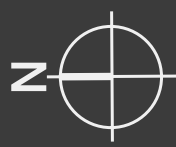
College Facilities

G2 Lecture Theatre (C44)

MAP CODE: 14A_MAIN
NARRABRI CAMPUS



-  Information
-  Carpark



Directory

University Buildings

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D2 Administration Building (E12B)
D3 W.L. Waterhouse Building (E12C)
C3 W.G. Freeman Building (E12D)
D3 Agronomy Building (E12E)
E4 Garages (E12F)
E3 Machinery Store 3 (E12G)
F3 Machinery Store 2 (E12H)
F2 Machinery Store 4 (E12I)
E3 Workshop Office (E12J)
E4 Grain Shed (E12K)
D4 Seed Grading Shed (E12L)
C4 Glasshouse 3 (E12M)
C4 Glasshouse 4 (E12N)
C3 Glasshouse 2 (E12O)

Student services

D2 Student administration (E12B)

Library

D2 Library (E12B)

College Facilities

C1 Seminar Complex (E12S)
E3 Workshop (E12J)

Parking

D1 Northern car park
D2 Southern car park

C4 Glasshouse 5 (E12P)
C3 Grain Chem. Lab (E12Q)
D4 Seed Store 3 (E12R)
C1 Seminar complex (E12S)
C5 Pulse Production Shed (E12T)
C4 Seed Production Shed (E12U)
D3 Controlled Environment (E12V)
D5 Feed Grains Shed (E12W)
D4 Residence No 1 (E12Z1)
C4 Residence No 2 (E12Z2)
C4 Bird Proof Enclosures (E12U1-E12U2)
C3 Greenhouse 1 (E12Y1)
C4 Greenhouse 2 (E12Y2)