



THE UNIVERSITY  

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*of* ADELAIDE

**Undergraduate Courses**

**2011**

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# FACULTY OF SCIENCES

## Science (Faculty-level Courses)

### SCIENCE 1100

#### Principles & Practice Science 1

3 units - semester 1

Up to 6 hours per week

Restriction: Available to BSc students only

Assessment: Reports & assignments

This course will introduce students to the broad array of scientific endeavour, the integrated nature of scientific disciplines, and the importance of scientific process and critical thinking. A number of key contemporary issues in science will be considered as frameworks for discussion and investigation. Students will also be introduced to skills for learning, academic writing and career development in the Sciences.

### SCIENCE 4001

#### The Faculty of Sciences OH&S Induction

0 units - semester 1 or semester 2

## Agribusiness

### AGRIBUS 1009RW

#### Rural Business Planning I

3 units - semester 2

Up to 5 hours per week

Assessment: Weekly tutorial exercises, case study, exam

The concepts involved in planning a farm business and determining options for land use and enterprise selection are presented and the financial tools for measuring farm performance including gross margins and cash flow budgets introduced. Topics include the farm as a system, perspectives of agriculture, management and business planning, options for land use, enterprise selection, production management, sustainability and capability of land for production, resource constraints, marketing in the business plan, physical and financial records, farm business administration, ethics and decision-making.

### AGRIBUS 2009WT

#### Issues in Australian Agribusiness II

3 units - semester 2

Up to 3 hours per week

Assumed Knowledge: General marketing concepts

The course focuses on current agribusiness issues in Australia. Of particular importance are inter-relationships between businesses and the macro environment. Topics will include world food balances, market failure, WTO, globalisation, value adding, diversification, quality and quality management, value chains and other developments in strategic marketing. Student seminar presentations are a critical component of this course.

### AGRIBUS 2500EX

#### Introduction to Business Management II

3 units - semester 1

None: External

Available for Non-Award Study

Assessment: Assignments, Exam

Introduction to management, evolution of management, management environments, decision making, planning, strategic management, organising, organisational structure, human resource management, managing change and innovation, behaviour, motivation, leadership, communication, control, operations management, international Management.

### AGRIBUS 2501RW

#### Agricultural Markets and Policy II

3 units - semester 1

Up to 3 hours per week

Assessment: Essay/s, oral presentation/s & exam

This course provides a basic understanding of the nature, function and structure of agricultural markets, including the economics of commodity markets and of market failure, the role of international trade policy, and how governmental policy, at home and abroad, impacts on producers in Australia.

### AGRIBUS 2502RW

#### Rural Finance II

3 units - semester 2

Up to 3 hours per week

Assumed Knowledge: AGRIBUS 1009RW

Assessment: Exam, assignments

Financial decision making: measuring business growth, assets, liabilities and equity, financial tools including profit and loss statements and balance sheets; comparative analysis and benchmarking; investment appraisal tools and investment decision-making including machinery; taxation and tax management; legal issues including land purchase and succession planning.

### AGRIBUS 2520WT

#### Agribusiness II

3 units - semester 2

Up to 5 hours per week

Assumed Knowledge: AGRIC 1510WT & AGRIC 1520WT

Assessment: Assignments, case studies, Examination

This course provides a perspective and understanding of the key components of Agricultural Business management, with a focus on the management tools used to measure business performance. There will be an emphasis on evaluating farm businesses incorporating financial, marketing, production and human resource management tools, decision making techniques, technology adoption and management of risk.

### AGRIBUS 3012RW

#### Rural Business Management III

3 units - semester 1

Up to 5 hours per week

Assumed Knowledge: AGRIBUS 2033RW

Assessment: Case studies, tutorial exercises

A case study approach incorporating financial, marketing and production and human resource management tools will be used and emphasis given to decision making techniques, technology adoption and management of risk, along with monitoring and evaluating the farm business. Topics include: agriculture in the economy, introduction to production economics, forward selling, futures and options, alternative enterprises/new industries and management of human capital.

### **AGRIBUS 3015WT**

#### **Special Project (Research Paper) B**

3 units - semester 1 or semester 2

By supervision

Assessment: Seminar presentation, dissertation

Each student is to undertake an individual project of significant size which exhibits original investigation, analysis and interpretation, and which results in the production of a well-written and well-presented report. The project may comprise a major literature review (at least 10000 words), research project, case study of a business or related enterprise, or some other approved study.

### **AGRIBUS 3017WT**

#### **Business Management for Applied Sciences III**

3 units - semester 2

Up to 3 hours per week

Assessment: Assignments, tutorial exercises, business plan, exam

The aim of this course is to provide perspective and understanding of the overall role of business and its place in the agricultural industry and the economy and to demonstrate linkages between various management functions. Aspects covered include what is business, business management, business planning, accounting management, marketing management, strategic planning, budgeting, decision making, organisation design, human resources management and monitoring.

### **AGRIBUS 3044RW**

#### **Individual Studies Rural Enterprise Management III**

3 units - semester 2

Assessment: written report, seminar

A guided study program approved by the Course Adviser in an area applicable to the student and on a defined situation or problem.

## **Agriculture and Natural Resource**

### **AGRIC 1000RW**

#### **Perspectives on Modern Agriculture I**

3 units - semester 1

Up to 6 hours per week

Incompatible: PLANT SC 1000, PLANT SC 1000RW & AGRONOMY 1010RW

Assessment: Assignments, written exam

The course examines important concepts and issues of modern agriculture in Australia and internationally. Perspectives on Modern Agriculture will provide an overview of the development of present-day agricultural systems, the successes and problems associated with this development and examine the opportunities for agricultural science to contribute to sustainable improvements in productivity and quality and to the development of new products and markets. The course will examine technological, economic and social drivers of change in modern agriculture and the response of the agricultural industries to these influences.

### **AGRIC 1510WT**

#### **Agricultural Systems IA**

3 units - semester 1

Up to 5 hours per week

Incompatible: AGRIC 1000RW

Assessment: Essay, Tutorial Assignments, Practical Reports & Examination

The need to develop sustainable and profitable agricultural systems to meet the demands of a burgeoning global population and during a time of major changes in the environment is a major challenge for agricultural science. This course provides a general introduction to Australian agricultural systems within this global context. It will examine the physical, biological and economic characteristics of Australian agricultural systems. The course will examine climatology and meteorology, characteristics of sustainable production systems, Australian agriculture in a global context and an overview of the major Australian industries.

### **AGRIC 1520WT**

#### **Agricultural Systems IB**

3 units - semester 2

Up to 6 hours per week, plus 4 day field trip

Incompatible: AGRIC 1000RW

Assessment: Final examination, Tutorial & practical assignments, Consultant's report, Plant collection

This course will examine the specific characteristics of the cropping, livestock and horticultural industries in Australia. It will describe the structural characteristics of the industries, outline current best practice and the recent trends in production, marketing and trade. This course will complement the semester 1 course Agricultural Systems IA.

### **AGRIC 2500RW**

#### **Animal and Plant Biochemistry II**

3 units - semester 1

Up to 6 hours per week

Pre-Requisite(s): CHEM 1100 or CHEM 1101 & CHEM 1200 or CHEM 1201

Assumed Knowledge: 6 units of Level I Biology

This course provides an advanced introduction to the fundamental processes of plant, animal and microbial metabolism. Topics will include protein structure and function, mechanisms and control of enzyme action, the biochemistry of carbohydrate, fat and protein metabolism, energy generation, and the fundamentals of nucleic acid biochemistry. Examples of the application and context of key biochemical concepts to areas of science including plant and animal science, viticulture and oenology, veterinary medicine and food technology will be used to highlight the importance of biochemistry to all sectors of these sciences.

### **AGRIC 2500WT**

#### **Animal and Plant Biochemistry II**

3 units - semester 1

Up to 5.5 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 1100 or CHEM 1101 & CHEM 1200 or CHEM 1201

Assumed Knowledge: 6 units of Level I Biology

This course provides an advanced introduction to the fundamental processes of plant, animal and microbial metabolism. Topics will include protein structure and function, mechanisms and control of enzyme action, the biochemistry of carbohydrate, fat and protein metabolism, energy generation, and the fundamentals of nucleic acid biochemistry. Examples of the application and context of key biochemical concepts to areas of science including plant and animal science, viticulture and oenology, veterinary medicine and food

technology will be used to highlight the importance of biochemistry to all sectors of these sciences.

#### **AGRIC 2501RW**

##### **Animal and Plant Biochemistry (Pre-Vet) II**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): CHEM 1510 or CHEM 1511 & CHEM 1520 or CHEM 1521

Assumed Knowledge: BIOLOGY 1510 & BIOLOGY 1520

This course provides an advanced introduction to the fundamental processes of plant, animal and microbial metabolism. Topics will include protein structure and function, mechanisms and control of enzyme action, the biochemistry of carbohydrate, fat and protein metabolism, energy generation, and the fundamentals of nucleic acid biochemistry. Examples of the application and context of key biochemical concepts to areas of science including plant and animal science, viticulture and oenology, veterinary medicine and food technology will be used to highlight the importance of biochemistry to all sectors of these sciences.

#### **AGRIC 2505RW**

##### **Crop and Pasture Production II**

3 units - semester 2

Up to 6 hours per week

Pre-Requisite(s): AGRIC 1501WT or AGRIC 1502WT

Incompatible: AGRONOMY 2502RW

Assessment: Exam and practical reports

This course delivers an overview of agronomic production systems from a diverse array of dryland pastures and crops. In particular the course provides a practical understanding of selection, establishment, management and utilisation of crops and pastures in the main rainfall and soil environments encountered in southern Australia. Topics include: weed, pest and disease management; species and cultivar identification and selection; selection and use of crops and pastures; rotations; tillage; nutrition and fertilisers; and the interrelationship of agronomy and the environment.

#### **AGRIC 4001ARW/BRW**

##### **Honours Agricultural Science Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

This course comprises a substantial research project of the student's choosing on a topic acceptable to the Head of School of Agriculture, Food and Wine, two seminars on that topic, and coursework, essays or other assignments deemed appropriate to the individual student's honours program.

#### **AGRIC 4001AWT/BWT**

##### **Honours Agricultural Science Part 1 & 2**

24 units - full year

Up to 40 hours per week

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Thesis, seminars, remainder as deemed appropriate to the student's program

This course comprises a substantial research project of the student's choosing on a topic acceptable to the Head of School of Agriculture, Food and Wine, two seminars on that topic, and coursework, essays or other assignments deemed appropriate to the individual student's honours program.

## **Agronomy**

#### **AGRONOMY 2500RW**

##### **Agricultural Experience II**

3 units - semester 2

Up to 8 hours per week

Restriction: Available to B Agriculture students only

Assessment: Reports, seminars, practical experience

Students are rostered on agricultural enterprises where skills and knowledge in the practice of agriculture are developed. Students are involved in the management of the farm enterprise and are required to undertake a problem solving contract which addresses the issues and provides practical recommendations. Students are required to undertake 35 days off campus work experience on an approved farm, which will provide them with the opportunity to evaluate forms of agricultural productivity and management practices.

#### **AGRONOMY 2501RW**

##### **Introduction to Engineering in Agriculture II**

3 units - semester 1

Up to 5 hours per week

Restriction: Available to B Agriculture & B Sc (Agricultural Sci) students only

Incompatible: CHEM ENG 1001

Assessment: Exam, assignments, practical exercises

Engineering has made modern agriculture possible and knowledge of some aspects of this discipline may be used in the improved management of many enterprises. This course uses practical agricultural applications of engineering to illustrate engineering principles and assist managers. Topics in the course include tractor safety and performance, oil hydraulics, pumps, water supply systems, building materials, structural components, surveying, electrical supply systems and equipment and tension and electric fencing to illustrate the basic principles of engineering applied to machinery, fluids, structures and electricity.

#### **AGRONOMY 2502RW**

##### **Production Agronomy II**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: AGRIC 1000RW, BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Assessment: Exam, practical, tutorial

This course delivers practical understanding of selection, establishment, management and utilisation of crops and pastures in the main rainfall and soil environments encountered in southern Australia. Topics include: weed, pest and disease management; species and cultivar identification; selection and use of crops and pastures; rotations and planning; tillage, nutrition and fertilisers; irrigated agriculture.

#### **AGRONOMY 3000RW**

##### **Agroforestry III**

3 units - semester 2

Up to 6 hours per week

Assessment: Written exam, planning assignment, practical

Topics include: Agroforestry for functional mimicry of natural ecosystems; Landuse systems with balanced water use; Trees for shelter, shade and soil conservation; Biodiversity and habitat management; Farm sawlog, firewood and pulpwood production systems; Trees in grazing and fodder systems; Specialty tree products; Integrated production systems; Design and evaluation of agroforestry; Establishing trees on farms; Socio-economic evaluation of agroforestry for the management of dryland salinity; Adoption of agroforestry in Australia; Institutions supporting the implementation of agroforestry.

#### **AGRONOMY 3004RW**

##### **Land Management Systems for the Future III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: AGRIC 1000RW

Assessment: Assignments, reports

Australia faces a number of constraints and uncertainties in achieving an effectively integrated approach to agricultural and natural resource management, including the biophysical environment, political/economic pressures, problems of scale and social/cultural factors. This capstone course in integrated, regional, environmental and land-use planning and management allows students to explore these issues, and any others they identify as relevant to their future. Topics include: natural resource accounting and the emergence of ecological economics, land ownership evaluation and legislative influences; current and future options for alternative land management systems; holistic management of on and off site impacts for intensive and extensive agri-industries; environmental management systems; alternative energy sources.

#### **AGRONOMY 3008RW**

##### **Individual Studies (Ag) III**

3 units - semester 1 or semester 2

By supervision

Assumed Knowledge: AGRONOMY 1006ARW/BRW & AGRONOMY 2008RW

Assessment: Contract/project

Either an individual project/case study of significant size which exhibits original investigation, analysis and interpretation, and results in the production of a well-written, well-presented report. The project may comprise a major literature review, research project or some other approved study; or a self-directed consultancy/contact which involves the identification of a management issue on either a campus or external commercial enterprise.

#### **AGRONOMY 3012RW**

##### **Advanced Agronomy III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: AGRONOMY 2013RW or PLANT SC 2001WT or ENV BIOL 2006

Assessment: Exam, essays/practical report

This course aims to provide students with an understanding of some of the important physiological principles to crop and pasture production and how these principles can be applied to agricultural systems. The course has three modules: physiological bases of crop and pasture growth and resource utilisation, the use of simulation modelling to understand and explore the function of production systems and a series of case studies on topical issues related to crop and pasture production. Specific topics covered include water use and water use efficiency, dry matter production and partitioning, the dynamics of water and nitrogen balances in

agricultural systems, competitive crops, abiotic stress and its management and high performance pastures.

#### **AGRONOMY 3016RW**

##### **Crop and Pasture Ecology III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: PLANT SCI 2001WT or ENV BIOL 2006 or AGRONOMY 2013RW

Assessment: Exam, assignments

Crops and pastures are plant communities that are managed mainly for the production of food and fibre. Those used in agriculture range from natural vegetation to specialised, sown annual monocultures. It is important to understand how these communities function if they are to be productive. This course examines the structure and functioning of agricultural plant communities. Topics that will be covered include an examination of the similarities to, and differences between sown and natural communities, the effects of climate on the distribution and productivity of crops and pastures, interaction between a crop or pasture and its environment, competition, the impact of the grazing animal and the importance of genetic diversity among plants to adaptation to the environment and to agricultural productivity.

#### **AGRONOMY 3020RW**

##### **Principles and Practice of Communications III**

3 units - semester 1

Up to 6 hours per week

Assessment: Exam, assignments, practical exercises

This course develops the communication skills and knowledge necessary for all levels of professional activity in rural resource management. Communication theory and context is discussed through topics of: extension science and technology transfer; adult and action learning theory; how groups work and facilitating community participation; gender and diversity; community-based natural resource management. Invited speakers from agribusiness, government, rural community and research sectors provide current and practical perspectives to this theory. Specific skills are developed in: oral presentation, selection and preparation of information and its presentation medium for a variety of audiences and purposes; interpersonal communication; conflict resolution and negotiation; leadership; the process of the planning and evaluation of communication programs; and job search and interview techniques.

#### **AGRONOMY 3026RW**

##### **Ecology and Management of Rangelands III**

3 units - semester 2

Part semester, winter vacation - includes 9 day field camp

Assessment: Project reports, theory exam

Note: This course involves teaching sessions that may be attended by both Undergraduate and Postgraduate students.

A course in ecology emphasising the study of interactions between grazing animals and the vegetation in arid areas, the principles involved and their application to management practices. Particular attention is paid to the impact of domestic, feral and native herbivores on the population dynamics of the dominant woody perennials, and the maintenance of their stabilising influence on the landscape. The bulk of the teaching is done at Middleback, a working sheep station set in the western myall woodlands on the southern margins of the north-west pastoral district of South Australia. The main focus on ecology of these arid woodlands and their highly productive saltbush-bluebush understorey, is taught in

the context of the history of land use, subsequent research, the ensuing legislation, and its administration, with input from pastoralists and government officers where appropriate.

### **AGRONOMY 3130WT**

#### **Viticultural Engineering and Irrigation III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: CHEM ENG 1001, PHYSICS 1008 & SOIL&WAT 2013RW or AGRONOMY 2120RW or equivalent

Incompatible: AGRONOMY 3005WT

Assessment: May include practical reports, assignments, trip reports, individual projects, exam

Students will be introduced to the concepts and techniques used in the engineering aspects of trellis design, tractor operation and maintenance, oil hydraulic systems and irrigation systems.

### **AGRONOMY 4001ARW/BRW**

#### **Honours Agronomy & Farming Systems Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research thesis, associated seminars - remainder as deemed appropriate to student's program

This course comprises a substantial research project chosen by the student on a topic suitable to the Discipline. The results of the project will be presented in a written thesis and the presentation of a seminar. In addition, coursework, essays or other assignments deemed appropriate will be completed by the student after consultation with the Honours coordinator and approved by the Head of Discipline.

Intending students should consult the Head of Discipline and potential academic supervisors during the final year of their degree.

## **Animal Science**

### **ANIML SC 1015RW**

#### **Animal Handling & Husbandry I**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Animal Sci) students only

Assessment: Exam, tutorials, practical reports, group project

The course will provide students with a basic understanding of production animals and horses and the respective industries in Australia and overseas. A general overview of agricultural production will also be covered. Themes to be studied include agricultural systems; the equine industry; ovine, bovine and equine physical examination; agricultural economics; livestock industries; alternative animal industries; animal production and welfare. There will be tutorials covering library and computer based information retrieval skills and specific animal handling topics. Practical exercises will include instruction on the handling of sheep, cattle, horses, and wildlife.

### **ANIML SC 1016RW**

#### **Principles in Animal Behaviour Welfare Ethics I**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Animal Sci) students only

Assessment: Exam, written assignment

The course will provide the students with an introduction to the principles of animal ethics, behaviour and welfare. Subject areas which will be covered include introduction to animal welfare; animal welfare issues and current developments; animal welfare legislation; introduction to animal ethics; the history of animal behaviour; introduction to animal behaviour in the wild and domesticated species. Knowledge gained in the lecture material will be put into practice in the practical exercises.

### **ANIML SC 1017RW**

#### **Animal Handling & Husbandry I (Pre-Vet)**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Assessment: Exam, tutorials, practical reports, group project

The course will provide students with a basic understanding of production animals and horses and the respective industries in Australia and overseas. A general overview of agricultural production will also be covered. Themes to be studied include agricultural systems; the equine industry; ovine, bovine and equine physical examination; agricultural economics; livestock industries; alternative animal industries; animal production and welfare. There will be tutorials covering library and computer based information retrieval skills and specific animal handling topics. Practical exercises will include instruction on the handling of sheep, cattle, horses, and wildlife. In addition there will be instruction on the physical examination of these animals from the veterinary perspective.

### **ANIML SC 1018RW**

#### **Princ in Animal Behav Welfare Ethics I (Pre-Vet)**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Assessment: Exam, written assignment

The course will provide the students with an introduction to the principles of animal ethics, behaviour and welfare and how these relate to the veterinary profession. Subject areas which will be covered include introduction to animal welfare; animal welfare issues and current developments; animal welfare legislation; introduction to animal ethics; the history of animal behaviour; introduction to animal behaviour in the wild and domesticated species. Knowledge gained in the lecture material will be put into practice in the practical exercises.

### **ANIML SC 2500RW**

#### **Companion Animal and Equine Studies II**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Animal Sci) students only

Assessment: Exam, other written and oral assignments

The course will provide students with an overview of the origins and husbandry of companion animals, including horses, dogs, cats, birds, reptiles and pocket pets. The roles of companion animals in society will also be covered. Students will learn the common breeds and terminology relating to companion animal species. There will be opportunities for students to learn the correct handling of some of these species.

### **ANIML SC 2501RW**

#### **Genes and Inheritance II**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Animal Sci) students only

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1202

Assessment: Tests, practical reports, presentations, participation, exercises, exam

The nature and structure of genetic material and the role of genes in determining the characteristics of organisms. The basis of inheritance and utilisation of variation in breeding programs and natural selection. The relationship between genetics and the composition of natural and managed populations. The role of new technologies in genetic improvement will be discussed.

### **ANIML SC 2501WT**

#### **Genes and Inheritance II**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Agricultural Sci), B Viticulture & Oenology, B. Agricultural Sciences & B. Food&NS students only

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1202 or equivalent

Assessment: Tests, practical reports, presentations, participation, exercises, exam

The nature and structure of genetic material and the role of genes in determining the characteristics of organisms. The basis of inheritance and utilisation of variation in breeding programs and natural selection. The relationship between genetics and the composition of natural and managed populations. The role of new technologies in genetic improvement will be discussed.

### **ANIML SC 2502RW**

#### **Wildlife Management II**

3 units - semester 1

Presented online, 5 Day Field Trip

Available for Non-Award Study

Assumed Knowledge: BIOLOGY 1101 & BIOLOGY 1201 or 1202

Assessment: Discussion contributions, assignments, field trip, exam

The course deals with the survey & management of captive and wild populations of vertebrate animals. Topics covered include: the reasons for management; conflicts between humans & wildlife; the philosophical rationale for maintaining captive collections; development of ecologically based management strategies for the purpose of conservation; management of endangered species; management of harvested and pest populations; legal & administrative framework; the impact of diseases on wild animal populations. The course is structured as a guided reading course focussing on scientific papers dealing with populations of wild animals. A vacation field camp demonstrates some of the wildlife survey & handling techniques that provide some of the data on which wildlife management programs are based.

### **ANIML SC 2503RW**

#### **Livestock Production Science II**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: BIOLOGY 1103RW or BIOLOGY 1101, BIOLOGY 1201 or BIOLOGY 1202 & AGRIC 1000RW or ANIML SC 1015RW

Assessment: Practical reports, tests, essays, exam

Livestock Production Science deals with the application of science to animal production systems. The primary species are sheep and

cattle but with reference to other species. Topics include on-farm management to maximise profit and quality, animal welfare and handling, meat, milk and wool processing. A major focus is grazing management and supplementary feeding common to all systems. The course also includes anatomy and physiology of muscles, skin, and the mammary system. Practicals include modelling production systems, assessing product quality, assessing live animals, and field trips.

### **ANIML SC 2505RW**

#### **Animal Nutrition & Metabolism II (Pre-Vet)**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): BIOLOGY 1510 & BIOLOGY 1520 & CHEM 1510 or CHEM 1511 & CHEM 1520 or CHEM 1521 or equivalent

Incompatible: ANIML SC 3015RW

Assessment: Written exam, practical exam, oral presentation, group work, formative tests

This course will discuss the principles and application of animal nutrition across a range of species, focusing mostly, although not exclusively, on livestock species. Students will develop an understanding of the nutritional components of feedstuffs and nutrient requirements, including requirements for energy, protein, carbohydrate, fat, minerals and vitamins. The effects of nutrient supply on growth, reproduction, body composition (eg, fatness), health and welfare and product quality (for agricultural animals) are considered. The hormonal regulation of nutrient partitioning is also discussed, with particular reference to the changing requirements associated with growth, pregnancy and lactation. The role of nutritionists in animal-based enterprises, including the use of least-cost ration formulation is discussed. The course includes lectures and practicals, including hands-on animal trials.

### **ANIML SC 2506RW**

#### **Comparative Animal Anatomy & Physiology IIA**

3 units - semester 1

Up to 7 hours per week

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1202

Assumed Knowledge: 6 units of Level I Chemistry

Incompatible: ANIML SC 3017RW, ENV BIOL 3003, PHYSIOL 2003, PHYSIOL 2004, VET SC 2510RW or VET SC 2520RW

Assessment: Practical reports, case study, exam

The course deals with the physiology and anatomy in a wide variety of animals; specifically, the tissues, physiology and anatomy of the major systems including skeletal, muscular, circulatory, nervous, and endocrine. The focus is comparative and demonstrates how different animal species have developed anatomical and physiological variation to cope with different environments.

### **ANIML SC 2507RW**

#### **Comparative Animal Anatomy & Physiology IIB**

3 units - semester 2

Up to 7 hours per week

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1202

Assumed Knowledge: 6 units of Level I Chemistry

Incompatible: ANIML SC 3017RW, ENV BIOL 3003, PHYSIOL 2003, PHYSIOL 2004, VET SC 2510RW or VET SC 2520RW

Assessment: Practical reports, case study, exam

The course deals with the physiology and anatomy in a wide variety of animals; specifically, the tissues, physiology and anatomy of the

major systems including skeletal, muscular, circulatory, nervous, and endocrine. The focus is comparative and demonstrates how different animal species have developed anatomical and physiological variation to cope with different environments.

#### **ANIML SC 2508RW**

##### **Genes and Inheritance II (Pre-Vet)**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): BIOLOGY 1510 & BIOLOGY 1520

Assessment: Tests, practical reports, presentations, participation, exam

The nature and structure of genetic material and the role of genes in determining the characteristics of organisms. The basis of inheritance and utilisation of variation in breeding programs and natural selection. The relationship between genetics and the composition of natural and managed populations. The role of new technologies in genetic improvement will be discussed.

#### **ANIML SC 3015RW**

##### **Animal Nutrition and Metabolism III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: ANIML SC 2503RW & ANIML SC 2506RW & ANIML SC 2507RW

Incompatible: ANIML SC 2505RW

Assessment: Exam, practicals, assignments

This course will discuss the principles and application of animal nutrition across a range of species, focusing mostly, although not exclusively, on livestock species. Students will develop an understanding of the nutritional components of feedstuffs and nutrient requirements, including requirements for energy, protein, carbohydrate, fat, minerals and vitamins. The effects of nutrient supply on growth, reproduction, body composition (eg. fatness), health and welfare and product quality (for agricultural animals) are considered. The hormonal regulation of nutrient partitioning is also discussed, with particular reference to the changing requirements associated with growth, pregnancy and lactation. The role of nutritionists in animal-based enterprises, including the use of least-cost ration formulation is discussed. The course includes lectures and practicals, including hands-on animal trials.

#### **ANIML SC 3016RW**

##### **Animal Health III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: ANIML SC 2503RW & ANIML SC 2506RW & ANIML SC 2507RW

Incompatible: ANIML SC 3010RW & ANIML SC 3016RW

Assessment: Exam, essay, practical reports

Basic pathology, immunology, and epidemiology. Common diseases of Australian native animals and farm animals caused by viral, bacterial, fungal and parasitic infections. Non-infectious diseases including metabolic disturbances, trace element deficiencies and genetic diseases.

#### **ANIML SC 3018RW**

##### **Pig Production - Science into Management III**

3 units - summer semester

Assumed Knowledge: ANIML SC 2503RW

Incompatible: ANIML SC 3001RW

Pork is the most consumed meat in the world and the second largest agricultural commodity. The management of modern pork production systems is based on detailed information on all aspects of the enterprise, including genetics and breeding, animal nutrition and growth performance, environmental and welfare requirements, health status, reproductive efficiency and product (meat) quality. This course will consider the advantages and disadvantages of various modern pork production systems (including welfare considerations, economic factors, the demand for product consistency, food safety issues, and other consumer expectations). The main factors that are required for the successful management of pigs are discussed, focusing on the management of suckling piglet, the weaner/grower pig and the breeding sow. This course is offered by the National Centre for Pork Industry Training and Education, based at Roseworthy Campus. It includes lectures; site visits to commercial operations, and other practical sessions. It is intended that students completing the course will understand both commercial pork production and the science that underlies it.

#### **ANIML SC 3019RW**

##### **Ecology and Management of Vertebrate Pests III**

3 units - summer semester

10 days during Summer semester

Available for Non-Award Study

A quota will apply

Assumed Knowledge: BIOLOGY 1202 or BIOLOGY 1203RW

Assessment: Exam, written assignments

This course strongly emphasises the field application of vertebrate pest control techniques and provides the theoretical bases for these techniques. Topics covered are the biology and ecology of vertebrate pests; the damage caused by pest animals; the legislative and administrative aspects of vertebrate pest control; district organisations; extension; vertebrate pest control practice.

#### **ANIML SC 3020RW**

##### **Animal Microbiology & Invertebrates III**

3 units - semester 1

Up to 7 hours per week

Restriction: Available to BSc (Animal Sci) students only

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1202

Assumed Knowledge: 6 units of Level I Chemistry

Incompatible: PLANT SC 2003RW, PLANT SC 2500RW & MICRO 2500

Assessment: Examination, test, practical reports, case study reports

An introduction to the biology of microorganisms and invertebrates of importance in and to animals. Topics to be considered include: form and function of major groups of microorganisms (including bacteria, viruses, fungi and protozoans); classification and identification; features of pathogenic, symbiotic and commensal lifestyles; basic concepts of invertebrate arthropod and helminth taxonomy, physiology and function; reproduction and life cycles; practical skills for manipulating microorganisms and invertebrates and studying their activities.

#### **ANIML SC 3043RW**

##### **Animal Biotechnology III**

3 units - summer semester

Intensive

Assumed Knowledge: BIOLOGY 1101 & BIOLOGY 1202 & ANIML SC 2503RW

Assessment: Written assignment, practical report

The application of biotechnology to animals will be examined. Challenges facing the intensive and extensive livestock industries, as well as wildlife management and conservation, will be discussed and debated in the context of biotechnologies that may be applied. Problems specific to horses and companion animals will be also considered. In addition, the use of biotechnology for animal related issues such as food safety, disease control and biosecurity will be addressed.

A range of genetic, immunological and reproductive technologies will be introduced with some practical exposure. The integration of these technologies to improve animal production, health and welfare will be explored. Lastly, biotechnological animal models will be examined for potential application to human and veterinarian medicine.

#### **ANIML SC 3045RW**

##### **Animal Breeding and Genetics III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: ANIML SC 2501WT or ANIML SC 2501RW & ANIML SC 2503RW

Incompatible: ANIML SC 2504RW, PLANT SC 3007WT & PLANT SC 3018WT

The application of scientific methods to animal breeding has led to major improvements in the output, cost and quality of meat, milk and fibre. In addition, animal breeding plans are important for continued improvement of companion animals and management of endangered species. Topics include an introduction to quantitative genetics, maximising response to selection, crossbreeding, estimation of genetic parameters and breeding values, mode of inheritance, mating systems, fitness and quality traits, animal diversity, development of breeding programs, use of biotechnology in breeding programs including gene mapping and parentage testing. Examples will be drawn from Australia's livestock industries as well as wildlife and companion animals.

#### **ANIML SC 3046RW**

##### **Animal Reproduction and Development III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: BIOLOGY 1101 & BIOLOGY 1202 or ANIML SC 2503RW

Incompatible: ANIML SC 3043RW (pre-2008) & ANAT SC 3102

Assessment: Exam, written assignment, presentations, practical reports

This course will provide students with an understanding of reproductive and developmental biology in animals. The physiological basis for reproduction in animals, including livestock, companion and wildlife species will be studied. Topics covered will include comparative structure and function of male and female reproductive systems; endocrine, neuroendocrine and environmental control of reproduction; development of the gametes, embryo, foetus and placenta; and pregnancy and parturition. How the understanding of reproductive physiology informs the management of reproduction and fertility in animals and provides the basis for reproductive technologies including artificial insemination and embryo transfer will be considered.

#### **ANIML SC 3100RW**

##### **Laboratory Animal Science III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: BIOLOGY 1101 & AGRIC 2500WT/RW

This course aims to instil the major principles of the study of laboratory animals and their utilisation for teaching, research and commercial purposes. This will include developing a scientific understanding of the applications and limitations of various laboratory animal species in addition to practical experience in animal handling and other procedures.

Topics will include animal handling, breeding, feeding, maintenance, minor interceptions and minor surgical procedures. Students will be involved with a research project in which relevant aspects of laboratory animal science will be undertaken. Species studied will include mice, rats, guinea pigs and rabbits. The student will become familiar with processes associated with induction of gastrointestinal diseases and disorders which affect humans, in rats and mice. These disorders could include chemotherapy-induced mucositis, gastric ulceration and inflammatory bowel disease. Students will also be exposed to the ways in which the animal models can be utilised, for example, in the testing of new treatment modalities.

#### **ANIML SC 3240RW**

##### **Introduction to Aquaculture & Disease Management**

3 units - summer semester

Up to 7 hours per day over 3 weeks

Available for Non-Award Study

Assumed Knowledge: 12 units level II science courses

Assessment: Group assignment & oral presentation, exam, practical assessment

This course will provide an overview of the basics of the aquaculture industry, providing introduction to anatomy, physiology, nutrition and genetics in the culture of finfish, crustaceans, molluscs and algae. The focus of this course will be disease pathology and etiological agents focusing on aspects including emergence, detection, management and control. Environmental impacts of aquaculture systems will also be considered.

#### **ANIML SC 4004ARW/BRW**

##### **Honours Animal Science Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research thesis, associated seminars - remainder as deemed appropriate to student's program

This course comprises a substantial research project of the students choosing on a topic acceptable to the Discipline of Agricultural and Animal Science, as well as coursework, essays or other assignments deemed appropriate to each student's Honours program.

Intending candidates should consult the Head of Discipline and potential supervisors during the final year of the degree and be prepared to begin studies in early February, or other vacations.

## **Biochemistry**

#### **BIOCHEM 2500**

##### **Biochemistry II: Molecular and Cell Biology**

3 units - semester 1

Up to 6 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 1100 & CHEM 1200, BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Incompatible: BIOCHEM 2502 & BIOCHEM 2504

Assessment: Exam, tutorial assessments, continuous assessments in the form of tests, and practical component assessments

This Biochemistry course aims to provide students with an understanding and an appreciation of Molecular Biology and Metabolic Biochemistry concepts. The topics covered include: DNA structure, synthesis and repair, RNA and protein synthesis and the control of gene expression, recombinant DNA technology, cell structure and organisation and signal transduction pathways.

The practical component for this course draws from the MBS Practical series: Prac A, Prac B and Prac C. Students should be referred to Current Students Online information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for information about enrolling in these practicals.

### **BIOCHEM 2501**

#### **Biochemistry II: Metabolism**

3 units - semester 2

Up to 6 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 1100 & CHEM 1200, BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Incompatible: BIOCHEM 2503 & BIOCHEM 2505

Assessment: Exam, tutorial assessments, continuous assessments in the form of tests and practical reports

This Biochemistry course aims to provide students with an understanding and an appreciation of Molecular Biology and Metabolic Biochemistry concepts. The topics covered include: specialised proteins, enzyme specificity and regulation, tissue specific metabolism and its control, some disease states that illustrate this control, how the body adjusts to variations in the demand for energy, mechanisms of hormone action and extensions of the signal transduction pathways covered in semester 1.

The practical component for this course draws from the MBS Practical series: Prac A, Prac B and Prac C. Students should be referred to Current Students Online information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for information about enrolling in these practicals.

### **BIOCHEM 2502**

#### **Biochem II (Biotech): Molecular and Cell Biology**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Biotechnology) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200, BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Incompatible: BIOCHEM 2500 & BIOCHEM 2504

Assessment: Exam, tutorial assessments, continuous assessments in the form of tests and practical reports

This Biochemistry course aims to provide students with an understanding and an appreciation of Molecular Biology and Metabolic Biochemistry concepts. The topics covered include: DNA structure, synthesis and repair, RNA and protein synthesis and the control of gene expression, recombinant DNA technology, cell structure and organisation and signal transduction pathways.

The practical component for this course draws from the MBS Practical series: Prac A, Prac B and Prac C. Students should be referred to Current Students Online information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for information about enrolling in these practicals.

### **BIOCHEM 2503**

#### **Biochemistry II (Biotechnology): Metabolism**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Biotechnology) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200, BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Incompatible: BIOCHEM 2501 & BIOCHEM 2505

Assessment: Exam, tutorial assessments, continuous assessments in the form of tests and practical reports

This Biochemistry course aims to provide students with an understanding and an appreciation of Molecular Biology and Metabolic Biochemistry concepts. The topics covered include: specialised proteins, enzyme specificity and regulation, tissue specific metabolism and its control, some disease states that illustrate this control, how the body adjusts to variations in the demand for energy, mechanisms of hormone action and extensions of the signal transduction pathways covered in semester 1.

The practical component for this course draws from the MBS Practical series: Prac A, Prac B and Prac C. Students should be referred to Current Students Online information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for information about enrolling in these practicals.

### **BIOCHEM 2504**

#### **Biochem II (Mol Biol): Molecular and Cell Biology**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Molecular Biology) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200, BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Incompatible: BIOCHEM 2500 & BIOCHEM 2502

Assessment: Exam, tutorial assessments, continuous assessments in the form of tests and practical reports

This Biochemistry course aims to provide students with an understanding and an appreciation of Molecular Biology and Metabolic Biochemistry concepts. The topics covered include: DNA structure, synthesis and repair, RNA and protein synthesis and the control of gene expression, recombinant DNA technology, cell structure and organisation and signal transduction pathways.

The practical component for this course draws from the MBS Practical series: Prac A, Prac B and Prac C.

### **BIOCHEM 2505**

#### **Biochemistry II (Mol Biol): Metabolism**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Molecular Biology) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200, BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Co-Requisite(s): BIOCHEM 2520

Incompatible: BIOCHEM 2501 & BIOCHEM 2503

Assessment: Exam, tutorial assessments, continuous assessments in the form of tests and practical reports

Biochemistry provides an understanding and an appreciation of Molecular Biology, Cell Biology and Metabolic Biochemistry. The topics covered include: specialised proteins, enzyme specificity and regulation, tissue specific metabolism and its control, how the body adjusts to variations in the demand for energy, mechanisms of hormone action and signal transduction pathways including some disease states.

## **BIOCHEM 2510**

### **Advanced Molecular Biology IIA**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Molecular Biology) students only

Pre-Requisite(s): BIOLOGY 1101 & 1201, 6 units of Level I Chemistry

Co-Requisite(s): CHEM 2510 or CHEM 2101

Assessment: Tutorial and practical assessments

This course combines special set of tutorials centred around research activities in molecular biology with practical exercises and/or laboratory placements. The content is designed to provide students with a perspective of how cutting edge molecular biology principles and techniques are applied to major research questions. The tutorial segment of the course will include aspects of biochemistry, genetics, microbiology/immunology and chemistry. This course will illustrate that cross disciplinary approaches are essential in modern research.

## **BIOCHEM 2520**

### **Advanced Molecular Biology IIB**

3 units - semester 2

Up to 4 hours per week

Restriction: Available to B Sc (Molecular Biology) students only

Pre-Requisite(s): BIOLOGY 1101 & 1201, 6 units of Level I Chemistry

Co-Requisite(s): CHEM 2520 or CHEM 2201

Assessment: Tutorial, practical assessments

This course combines special set of tutorials centred around research activities in molecular biology with practical exercises and/or laboratory placements. The content is designed to provide students with a perspective of how cutting edge molecular biology principles and techniques are applied to major research questions. The tutorial segment of the course will include aspects of biochemistry, genetics, microbiology/immunology and chemistry. This course will illustrate that cross disciplinary approaches are essential in modern research.

## **BIOCHEM 3000**

### **Molecular and Structural Biology III**

6 units - semester 1

Up to 19 hours per week

Available for Non-Award Study

Pre-Requisite(s): BIOCHEM 2500 & BIOCHEM 2501 or equivalent

Incompatible: BIOCHEM 3110

Assessment: Exam on lecture material, practical component

This course has two major aims - to extend the discussions presented in Biochemistry II of molecular biology, and structure and function of proteins. Topics include - structure and function of different classes of proteins, protein folding, molecular recognition, chromatin structure and its remodelling during transcription, RNA synthesis, processing, modification, stability, translation, and manipulation of these to effect selective gene expression.

## **BIOCHEM 3001**

### **Cell and Developmental Biology III**

6 units - semester 2

Up to 19 hours per week

Available for Non-Award Study

Pre-Requisite(s): BIOCHEM 2500 & BIOCHEM 2501 or equivalent

Assumed Knowledge: BIOCHEM 3000

Assessment: Exam on lecture material, practical component

This course will focus on molecular aspects of cell and developmental biology. Over the last few years major advances have been made towards a complete understanding of cell behaviour, how cells respond to intracellular and extracellular signalling pathways and how this plays a central role in control of cell proliferation, development and disease states such as cancer. Topics include - intracellular compartments, trafficking of proteins and other molecules; the cytoskeleton and its role in determining cell shape; cell adhesion and cell migration. The course also examines molecular mechanisms underlying cell-cell communication, signal transduction pathways, control of cell proliferation, cell fate decisions and differentiation. Specific topics include cell cycle control, chromosomal DNA replication, programmed cell death/apoptosis and molecular control of cell lineage. All of these concepts are finally integrated to discuss the role of oncogenes and tumour suppressor genes in the molecular basis of cancer. The molecular basis of animal development in both simple systems and vertebrates will be discussed, including limb regeneration, differentiation and morphogenesis, the molecular basis of segmentation and body plan, cellular events during embryogenesis, the role of growth factors in developmental decisions and medical applications. Animal transgenesis will also be discussed.

## **BIOCHEM 3125**

### **Advanced Molecular Biology IIIA (Biochemistry)**

6 units - semester 1

Up to 16 hours per week

Restriction: Available to BSc(MolBiol) students only

Pre-Requisite(s): BIOCHEM 2510, BIOCHEM 2520, BIOCHEM 2102 & BIOCHEM 2202

Incompatible: BIOCHEM 3000 & GENETICS 3110

Assessment: Written exam on lecture material, written & oral reports on practicals & tutorials

This course combines lectures from Molecular and Structural Biology 3 with practical exercises and/or laboratory placements in professional research laboratories. It includes a special set of tutorial/Problem Based Learning (PBL) exercises, not offered in any other course, which are designed to provide students with a perspective of how cutting edge molecular biology principles and techniques are applied to major research questions. The PBL segment of course will include aspects of biochemistry, genetics, microbiology/immunology and chemistry. This course will illustrate that cross-disciplinary approaches are essential in modern research.

## **BIOCHEM 3225**

### **Advanced Molecular Biology IIIB (Biochemistry)**

6 units - semester 2

Up to 16 hours per week

Restriction: Available to BSc(MolBiol) students only

Pre-Requisite(s): BIOCHEM 2510, BIOCHEM 2520, BIOCHEM 2102 & BIOCHEM 2202

Assumed Knowledge: BIOCHEM 3125

Incompatible: BIOCHEM 3001 & GENETICS 3210

Assessment: Written exam on lecture material, written and oral reports on practicals and tutorials

This course combines lectures from Cell and Development Biology 3 with practical exercises and/or laboratory placements in professional research laboratories. It includes a special set of tutorial/Problem Based Learning (PBL) exercises, not offered in any other course, which are designed to provide students with a perspective of how cutting edge molecular biology principles and techniques are applied to major research questions. The PBL segment of the course will include aspects of biochemistry, genetics, microbiology/immunology and chemistry. This course will illustrate that cross-disciplinary approaches are essential in modern research.

### **BIOCHEM 3230**

#### **Molecular & Structural Biology III (Biomed Sci)**

6 units - semester 1

Up to 14 hours per week

Restriction: Available to BSc(BiomedSc) students only

Pre-Requisite(s): BIOCHEM 2500 & BIOCHEM 2501

Incompatible: BIOCHEM 3000

Assessment: Exam, Practical Reports, PBL exercises & online assessment

This course combines lectures from Cell and Developmental Biology III (BIOCHEM 3001) with practical exercises and/or laboratory placements in professional research laboratories in the first 6 weeks of the semester. In the final six weeks of the semester, it includes a special set of tutorial/Problem Based Learning (PBL)/Tutorial exercises, not offered in any other course, which are designed to provide students with a perspective of how cutting edge biomedical science principles and techniques are applied to major research questions. This course will illustrate that cross disciplinary approaches are essential in modern biomedical science research.

### **BIOCHEM 3235**

#### **Cell and Developmental Biology III (Biomed Sci)**

6 units - semester 2

Up to 14 hours per week

Restriction: Available to BSc(BiomedSc) students only

Pre-Requisite(s): BIOCHEM 2500 & BIOCHEM 2501

Incompatible: BIOCHEM 3001

Assessment: Exam, Practical Reports, PBL exercises & online assessment

This course combines lectures from Cell and Developmental Biology III (BIOCHEM 3001) with practical exercises and/or laboratory placements in professional research laboratories in the first 6 weeks of the semester. In the final six weeks of the semester, it includes a special set of tutorial/Problem Based Learning (PBL)/Tutorial exercises, not offered in any other course, which are designed to provide students with a perspective of how cutting edge biomedical science principles and techniques are applied to major research questions. This course will illustrate that cross disciplinary approaches are essential in modern biomedical science research.

### **BIOCHEM 4000A/B**

#### **Honours Biochemistry Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Candidates are required to give their full time to a special program of study and experimental work. Candidates will normally be expected to start the program on the first Monday of February, but this can be altered in special circumstances by arrangement with the Discipline Leader for Biochemistry. The work includes

participation in a series of lecture-symposia on topics of modern biochemistry; participation in research seminars, and importantly, the performance of research work under the supervision of one or more members of the Biochemistry staff. Early in the year students will report on the aim, significance and approach of their research topic. During the program candidates may present and defend an original proposition on science and submit the results of their research in the form of a thesis, which will also contain a literature review surrounding their research topic. Intending Honours candidates should consult the Head of Biochemistry during the final year of the BSc.

## **Biology**

### **BIOLOGY 1101**

#### **Biology I: Molecules, Genes and Cells**

3 units - semester 1

Up to 5.5 hours per week

Available for Non-Award Study

Incompatible: BIOLOGY 1101MED, BIOLOGY 1102MED, ENV BIOD 1000AIB & GENETICS 1000AIB

Assessment: Exams, practical work/workshops, tutorial assessment

The study of biology covers an incredibly wide range of themes; from simple molecules, cells, organelles and tissues to whole organisms and their interaction with the environment and their ability to evolve. The aim of this course is to introduce many of these concepts, thereby providing the foundation for further studies in semester 2 courses and more specialist level II/III courses. Topics to be covered include the chemicals of life, macromolecules, the role of nucleic acids in genetic information transfer, protein synthesis, lipid membranes and the structure of cells, storage and utilisation of energy, meiosis and mitosis.

### **BIOLOGY 1101MED**

#### **Biology I: Molecules, Genes and Cells**

3 units - semester 1

Up to 5.5 hours per week

Restriction: Available to MBBS students only

The study of biology covers an incredibly wide range of themes; from simple molecules, cells, organelles and tissues to whole organisms and their interaction with the environment and their ability to evolve. The aim of this course is to introduce many of these concepts, thereby providing the foundation for further studies in semester 2 courses and more specialist level II/III courses. Topics to be covered include the chemicals of life, macromolecules, the role of nucleic acids in genetic information transfer, protein synthesis, lipid membranes and the structure of cells, storage and utilisation of energy, meiosis and mitosis.

### **BIOLOGY 1201**

#### **Biology I: Human Perspectives**

3 units - semester 2

Up to 5.5 hours per week

Available for Non-Award Study

Assumed Knowledge: BIOLOGY 1101

Incompatible: ENV BIOL 1000A/B, GENETICS 1000A/B & BIOLOGY 1202

Assessment: Exams, practical work/tutorial assessment

This course builds on fundamentals of biology that have been developed in Molecules, Genes and Cells. The course takes molecular, cellular, whole body, population and evolutionary approaches to understanding biology as it pertains to human

function and the interactions of the body with the environment. In many cases, our understanding of human function is best derived for studies of mammalian and non-mammalian organisms, and where appropriate, such models will be discussed. The themes that will be covered include: the organisation of the body, evolution, inheritance, regulation of gene expression, communication and control systems in the body; developmental biology and defence systems. Sessions, which provide opportunities to integrate the information and demonstrate how it provides an understanding of normal human function and of disease, will be a regular feature of the course.

### **BIOLOGY 1201MED**

#### **Biology I: Human Perspectives**

3 units - semester 2

Up to 4.5 hours per week

Restriction: Available to MBBS students only

Assumed Knowledge: BIOLOGY 1101

Incompatible: Medical students only

This course builds on fundamentals of biology that have been developed in Molecules, Genes and Cells. The course takes molecular, cellular, whole body, population and evolutionary approaches to understanding biology as it pertains to human function and the interactions of the body with the environment. In many cases, our understanding of human function is best derived for studies of mammalian and non-mammalian organisms, and where appropriate, such models will be discussed. The themes that will be covered include: the organisation of the body, evolution, inheritance, regulation of gene expression, communication and control systems in the body; developmental biology and defence systems. Sessions, which provide opportunities to integrate the information and demonstrate how it provides an understanding of normal human function and of disease, will be a regular feature of the course.

### **BIOLOGY 1202**

#### **Biology I: Organisms**

3 units - semester 2

Up to 7 hours per week

Assumed Knowledge: BIOLOGY 1101 or BIOLOGY 1102

Incompatible: ENV BIOL 1000A/B, GENETICS 1000A/B, BIOLOGY 1201 & ENV BIOL 1003

Assessment: Exam, assignment, practical reports

This course focuses on the biology and diversity of multicellular organisms, with evolution as the central theme. It addresses key questions in biology: What are plants and animals? How do they evolve? How do they function? How do they interact with other organisms and the environment? These questions are answered by analysing the scientific evidence that supports current theory

### **BIOLOGY 1301**

#### **Foundations of Biomedical Science A**

3 units - semester 1

Up to 5 hours per week

Restriction: Available to MBBS students only

Incompatible: BIOLOGY 1101, BIOLOGY 1102, BIOLOGY 1510, BIOLOGY 1520

Assessment: Exams, on-line quizzes, practical reports, tutorial papers, written tests

Medicine and Biomedical Research are underpinned by an understanding of fundamental human biomedical science. This course describes how simple molecules and cells are built up to

form the complexity of the human body including the complex network of tissues and organ systems, their interactions with the environment and potential pathogens. By identifying and linking these important concepts this course provides the foundation for further studies in semester 2 courses and more specialist level II/III courses. Topics to be covered include the chemicals of life, macromolecules, transfer of genetic information, lipid membranes and the structure of cells, homeostasis, the storage and utilisation of energy, the physical basis of medical imaging.

### **BIOLOGY 1302**

#### **Foundations of Biomedical Science B**

3 units - semester 2

Up to 5 hours per week

Restriction: Available to MBBS students only

Incompatible: BIOLOGY 1101, BIOLOGY 1102, BIOLOGY 1510, BIOLOGY 1520

Assessment: Exams, on-line quizzes, practical reports, tutorial papers, written tests

Medicine and Biomedical Research are underpinned by an understanding of fundamental human biomedical science. This course builds on the knowledge from the semester 1 course and describes how cells in the human body function in a coordinated way to establish the various organ systems. By identifying and linking these important concepts, this course provides the foundation for further studies in more-specialist level II/III courses. Topics to be covered include the transfer of genetic information, patterns of inheritance and evolution, the control of cell division, cell shape and cell death, reproduction, growth and development, hormone networks, signaling and pharmacology.

### **BIOLOGY 1510**

#### **Biology I: Molecules, Genes & Cells (Pre-Vet)**

3 units - semester 1

Up to 5.5 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Assessment: Exams, practical work/workshops, tutorial assessment

The study of biology covers an incredibly wide range of themes; from simple molecules, cells, organelles and tissues to whole organisms and their interaction with the environment and their ability to evolve. The aim of this course is to introduce many of these concepts, thereby providing the foundation for further studies in semester 2 courses and more specialist level II/III courses. Topics to be covered include the chemicals of life, macromolecules, the role of nucleic acids in genetic information transfer, protein synthesis, lipid membranes and the structure of cells, storage and utilisation of energy, meiosis and mitosis.

### **BIOLOGY 1520**

#### **Biology I: Organisms (Pre-Vet)**

3 units - semester 2

Up to 7 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Assessment: Exam, assignment, practical reports

This course focuses on the biology and diversity of multicellular organisms, with evolution as the central theme. It addresses key questions in biology: What are plants and animals? How do they evolve? How do they function? How do they interact with other organisms and the environment? These questions are answered by analysing the scientific evidence that supports current theory.

## Biomedical

### BIOMED 2510

#### Biomedical Science IIA

3 units - semester 1

Up to 8 hours per week

Restriction: Available to BSc(BiomedSc) students only

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201

Assumed Knowledge: At least 6 units of Level I Chemistry

Assessment: Written & oral assignments, tests

Biomedical Science IIA provides students with a context for modern biomedical research, from a historical perspective through to current innovations. This course will highlight methods used to detect, characterise and treat various diseases and disorders. Ethical issues associated with biomedical research will be discussed. Specific topics include: biomedical experimental design, model organisms for understanding human disease, bioinformatics and computational biology. The focus will be on the contribution and future promise of techniques, technologies and experimental approaches to our understanding of key human diseases (communicable and non-communicable, inherited and non inherited).

### BIOMED 2520

#### Biomedical Science IIB

3 units - semester 2

Up to 8 hours per week

Restriction: Available to BSc (BiomedSc) students only

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201

Assumed Knowledge: At least 6 units of Level I Chemistry

Assessment: Written & oral assignments, tests

Biomedical Science IIB provides students with an overview of key areas of biomedical research including gene discovery; elucidation of biological mechanisms in health and illness and the prevention or alleviation of disease. In addition, key research activities within the School of Molecular and Biomedical Science will be used to illustrate and provide examples of the above concepts. Student assessment focuses on two main aspects: (i) the acquisition, analysis and interpretation of scientific data and (ii) scientific communication.

## Biometrics

### BIOMET 2500RW

#### Research Methodology II

3 units - semester 2

Up to 5 hours per week

Assumed Knowledge: STATS 1000 or STATS 1004

Assessment: Reports, assignments, exam

This course is concerned with understanding and application of the scientific method in biological research. The course has a foundation in the philosophy of science. Particular emphasis is given to the application of statistical hypothesis testing, which is explored in a series of case studies. In addition, research skills in project management, teamwork and presentations skills are developed in the context of scientific research.

### BIOMET 2500WT

#### Research Methodology II

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: STATS 1000 or STATS 1004

Assessment: Reports, assignments, exam

This course is concerned with understanding and application of the scientific method in biological research. The course has a foundation in the philosophy of science. Particular emphasis is given to the application of statistical hypothesis testing, which is explored in a series of case studies. In addition, research skills in project management, teamwork and presentations skills are developed in the context of scientific research.

### BIOMET 3000WT

#### Agricultural Experimentation III

3 units - semester 1

Up to 5 hours per week

Pre-Requisite(s): STATS 1004 or STATS 1000

Assessment: Individual assignment, written assignments, final exam

The philosophy of science via experimental design and data analysis. Topics covered include: Simple Linear Regression, Polynomial and Multiple Regression. Analysis of Variance including, One-way (without or with Blocking), Latin Squares, Factorial, and Split-Plot Designs. In addition, Analysis of Covariance, Linear Contrast (including Orthogonal Polynomials), advanced Regression and Generalised Linear Models may be covered. The statistical package GenStat will be used for the designing of experiments and the analysis of data sets.

## Biotechnology

### BIOTECH 1000

#### Introduction to Biotechnology I

3 units - semester 1

Up to 6 hours per week

Restriction: Available to BSc (Biotech) students only

Assessment: Exam, assignments/group projects

Global significance of biotechnology, categories of biotechnology processes and products, "traditional" vs "modern" biotechnology processes; key developments in history of biotechnology, enabling technologies - fermentation, downstream processing; recombinant methods, antibody monoclonals, analysis and automation, PCR, genomics, proteomics, metabolomics; biotechnology enterprises in South Australia and Australia, global biotechnology enterprises/industries; biotechnology and society - perceived vs actual benefits and drawbacks, legal and ethical issues, regulations governing biotechnology research and industry; considerations in the genesis of the typical biotechnology process/product/enterprise: development costs, venture capital, patenting, product safety, legislation, marketing. Case studies on the interdisciplinary nature of biotechnology and factors favouring local/regional development of a biotechnology industry will also be included. Some field trips may be required.

### BIOTECH 3000

#### Biotechnology Practice III

6 units - semester 2

Up to 9 hours per week

Restriction: Available to BSc (Biotech) students only

Pre-Requisite(s): MICRO 2504, MICRO 2505, BIOCHEM 2502 & BIOCHEM 2503

Assessment: Written exam, project

The aim of this course is to add to the strong scientific focus of the degree by providing an introduction to aspects of technology, business and ethical issues relevant to the diverse nature of biotechnology industry. Students completing this course should be well equipped to undertake further studies (e.g. Honours in Biotechnology or a Master of Business Administration), obtain employment in research laboratories, obtain employment in local, interstate and overseas biotechnology companies or create their own business. Topics include intellectual property and its commercialisation, basic business accounting, preparing a business plan, principles in bioprocess engineering and design, use of animal and plant cell culture systems, validation and monitoring, food biotechnology, genetically modified organisms, food additives and byproducts. The group-based project involves preparation of a business plan to operate a model biotechnology business.

## Chemistry

### CHEM 1100

#### Chemistry IA

3 units - semester 1

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): SACE Stage 2 Chemistry with Subject Achievement score of at least 13 or equivalent - in exceptional circumstances, consult Head of Chemistry

Incompatible: CHEM 1101 & CHEM 1201

Assessment: Exam, practical work, computer assessed tutorials

Atoms to Molecules - structure of the atom and molecular bonding. Periodicity and the Main Group - chemistry of the main group metals and non-metals. Energy and Equilibrium - the relevance of intermolecular forces, chemical equilibrium, energy considerations and chemical reactivity applied to aspects of chemistry and biochemistry. Transition Metal Chemistry - an introduction to bonding in transition (d-block) elements, coordination complexes, bioinorganic systems.

### CHEM 1101

#### Foundations of Chemistry IA

3 units - semester 1

Up to 7 hours per week

Restriction: SACE Stage 2 Chemistry Subject Achievement score of less than 13 or equiv or with no SACE Stage 2 Chemistry.

Available for Non-Award Study

Assumed Knowledge: SACE Stage 2 Chemistry or equivalent

Incompatible: CHEM 1100 & CHEM 1200

Assessment: Exam, practical work, computer assessed tutorials

Atoms, Molecules & Structure - an introduction to theories of molecule formation and structure including the importance of molecular shape; intermolecular forces. Chemistry of the Elements - an introduction to the chemistry of the elements, including redox processes, natural and biological element cycles, atmospheric chemistry and the crucial differences in the chemistries of the s-, p- and d-block elements.

### CHEM 1200

#### Chemistry IB

3 units - semester 2

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): SACE Stage 2 Chemistry with Subject Achievement score of at least 13 or equivalent - in exceptional circumstances, consult Head of Chemistry

Assumed Knowledge: CHEM 1100

Incompatible: CHEM 1101 & CHEM 1201

Assessment: Exam, practical work, computer assessed tutorials

Acids, Bases and Electrochemistry - aspects of acid/base equilibria and electrochemical processes. Structure Determination - the importance of molecular shape and how chemists determine the structure of compounds using spectroscopic techniques including ultraviolet, infrared and nuclear magnetic resonance spectroscopy. Synthetic and Bio-organic Chemistry - an introduction to chemical synthesis with particular reference to addition and substitution reactions. Strategies for synthesis and properties of biologically significant molecules will also be addressed.

### CHEM 1201

#### Foundations of Chemistry IB

3 units - semester 2

Up to 7 hours per week

Restriction: SACE Stage 2 Chemistry Subject Achievement score of less than 13 or equiv or with no SACE Stage 2 Chemistry.

Available for Non-Award Study

Assumed Knowledge: CHEM 1101

Incompatible: CHEM 1100 & CHEM 1200

Assessment: Exam, practical work, computer assessed tutorials

Equilibrium & Energy - Introduction to chemical equilibrium - acids and bases, titrations, buffers. Energy considerations applied to aspects of chemistry and biochemistry. Bio-organic & Polymer Chemistry - introduction to spectroscopic identification of functional groups and molecular structure, chemistry of synthetic and biological polymers including polyalkenes, polyesters and polyamides; peptides and proteins.

### CHEM 1510

#### Chemistry IA (Pre-Vet)

3 units - semester 1

Up to 7 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): SACE Stage 2 Chemistry with Subject Achievement score of at least 13 or equivalent - in exceptional circumstances, consult Head of Chemistry

Incompatible: CHEM 1511 & CHEM 1521

Assessment: Exam, practical work, computer assessed tutorials

Atoms to Molecules - structure of the atom and molecular bonding. Periodicity and the Main Group - chemistry of the main group metals and non-metals. Energy and Equilibrium - the relevance of intermolecular forces, chemical equilibrium, energy considerations and chemical reactivity applied to aspects of chemistry and biochemistry. Transition Metal Chemistry - an introduction to bonding in transition (d-block) elements, coordination complexes, bioinorganic systems.

### CHEM 1511

#### Foundations of Chemistry IA (Pre-Vet)

3 units - semester 1

Up to 7 hours per week

Restriction: BSc (Pre-Veterinary) with SACE Stage 2 Chemistry Subject Achievement score of less than 13 or equiv or with no SACE Stage 2 Chemistry.

Assumed Knowledge: SACE Stage 2 Chemistry or equivalent

Incompatible: CHEM 1510 & CHEM 1520

Assessment: Exam, practical work, computer assessed tutorials

Atoms, Molecules & Structure - an introduction to theories of molecule formation and structure including the importance of molecular shape; intermolecular forces. Chemistry of the Elements - an introduction to the chemistry of the elements, including redox processes, natural and biological element cycles, atmospheric chemistry and the crucial differences in the chemistries of the s-, p- and d-block elements.

### **CHEM 1520**

#### **Chemistry IB (Pre-Vet)**

3 units - semester 2

Up to 7 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): SACE Stage 2 Chemistry with Subject Achievement score of at least 13 or equivalent - in exceptional circumstances, consult Head of Chemistry

Assumed Knowledge: CHEM 1510

Incompatible: CHEM 1511 & CHEM 1521

Assessment: exam, practical work, computer assessed tutorials

Matter and Energy - the relevance of intermolecular forces, chemical equilibrium, energy considerations and chemical reactivity applied to aspects of chemistry and biochemistry. Synthetic and Bioorganic Chemistry - an introduction to chemical synthesis with particular reference to addition and substitution reactions. Strategies for synthesis and properties of biologically significant molecules will also be addressed

### **CHEM 1521**

#### **Foundations of Chemistry IB (Pre-Vet)**

3 units - semester 2

Up to 7 hours per week

Restriction: BSc (Pre-Veterinary) with SACE Stage 2 Chemistry Subject Achievement score of less than 13 or equiv or with no SACE Stage 2 Chemistry.

Assumed Knowledge: CHEM 1511

Incompatible: CHEM 1510 & CHEM 1520

Assessment: Exam, practical work, computer assessed tutorials

Equilibrium & Energy - Introduction to chemical equilibrium - acids and bases, titrations, buffers. Energy considerations applied to aspects of chemistry and biochemistry. Bio-organic & Polymer Chemistry - introduction to spectroscopic identification of functional groups and molecular structure, chemistry of synthetic and biological polymers including polyalkenes, polyesters and polyamides; peptides and proteins.

### **CHEM 2510**

#### **Chemistry IIA**

3 units - semester 1

Up to 7.5 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Incompatible: CHEM 2512, CHEM 2514, CHEM 2516, CHEM 2100, CHEM 2105, CHEM 2106 & CHEM 2107

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIA focuses on chemical reactivity and illustrates how reactions occur and how structure influences the properties of molecules. The examples used to illustrate these points draw on expertise in the areas of stereochemistry, synthesis, properties and reactions of molecules, thermodynamics, kinetics and the principles of metal ligand chemistry.

### **CHEM 2512**

#### **Chemistry IIA (Ecochemistry)**

3 units - semester 1

Up to 7.5 hours per week

Restriction: Available to B Sc (Ecochemistry) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Incompatible: CHEM 2510, CHEM 2514, CHEM 2516, CHEM 2100, CHEM 2105, CHEM 2106 & CHEM 2107

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIA (Ecochemistry) focuses on chemical reactivity and illustrates how reactions occur and how structure influences the properties of molecules. The examples used to illustrate these points draw on expertise in the areas of stereochemistry, synthesis, properties and reactions of molecules, thermodynamics, kinetics and the principles of metal ligand chemistry.

### **CHEM 2514**

#### **Chemistry IIA (Molecular and Drug Design)**

3 units - semester 1

Up to 7.5 hours per week

Restriction: Available to B Sc (Molecular & Drug Design) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Incompatible: CHEM 2510, CHEM 2512, CHEM 2516, CHEM 2100, CHEM 2105, CHEM 2106 & CHEM 2107

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIA (Molecular and Drug Design) focuses on chemical reactivity and illustrates how reactions occur and how structure influences the properties of molecules. The examples used to illustrate these points draw on expertise in the areas of stereochemistry, synthesis, properties and reactions of molecules,

thermodynamics, kinetics and the principles of metal ligand chemistry.

### **CHEM 2516**

#### **Chemistry IIA (Nanoscience and Materials)**

3 units - semester 1

Up to 7.5 hours per week

Restriction: Available to B Sc (Nanoscience & Materials) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Incompatible: CHEM 2510, CHEM 2512, CHEM 2514, CHEM 2100, CHEM 2105, CHEM 2106 & CHEM 2107

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIA (Nanoscience and Materials) focuses on chemical reactivity and illustrates how reactions occur and how structure influences the properties of molecules. The examples used to illustrate these points draw on expertise in the areas of stereochemistry, synthesis, properties and reactions of molecules, thermodynamics, kinetics and the principles of metal ligand chemistry.

### **CHEM 2520**

#### **Chemistry IIB**

3 units - semester 2

Up to 7.5 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Assumed Knowledge: CHEM 2510

Incompatible: CHEM 2522, CHEM 2524, CHEM 2526, CHEM 2200, CHEM 2205, CHEM 2206 & CHEM 2210

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIB focuses on structure determination and the spectroscopic and geometric properties of molecules, and how these influence reactivity. The examples used to illustrate these points draw on expertise in atomic and molecular spectroscopy, symmetry, and organic synthesis.

### **CHEM 2522**

#### **Chemistry IIB (Ecochemistry)**

3 units - semester 2

Up to 7.5 hours per week

Restriction: Available to B Sc (Ecochemistry) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Assumed Knowledge: CHEM 2512

Incompatible: CHEM 2520, CHEM 2524, CHEM 2526, CHEM 2200, CHEM 2205, CHEM 2206 & CHEM 2210

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIB focuses on structure determination and the spectroscopic and geometric properties of molecules, and how these influence reactivity. The examples used to illustrate these points draw on expertise in atomic and molecular spectroscopy, symmetry, and organic synthesis.

### **CHEM 2524**

#### **Chemistry IIB (Molecular and Drug Design)**

3 units - semester 2

Up to 7.5 hours per week

Restriction: Available to B Sc (Molecular & Drug Design) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Assumed Knowledge: CHEM 2514

Incompatible: CHEM 2520, CHEM 2522, CHEM 2526, CHEM 2200, CHEM 2205, CHEM 2206 & CHEM 2210

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIB focuses on structure determination and the spectroscopic and geometric properties of molecules, and how these influence reactivity. The examples used to illustrate these points draw on expertise in atomic and molecular spectroscopy, symmetry, and organic synthesis.

### **CHEM 2526**

#### **Chemistry IIB (Nanoscience and Materials)**

3 units - semester 2

Up to 7.5 hours per week

Restriction: Available to B Sc (Nanoscience & Materials) students only

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or Credit in CHEM 1101 & CHEM 1201. Other students may apply to Head of Chemistry for exemption

Assumed Knowledge: CHEM 2516

Incompatible: CHEM 2520, CHEM 2522, CHEM 2524, CHEM 2200, CHEM 2205, CHEM 2206 & CHEM 2210

Assessment: Exam, practical work, tutorials

Studies in Chemistry at Level II deal with a range of fundamental concepts that can be used to explain various phenomena in

chemistry, biology and materials science. The courses have been designed to provide students who have an interest in chemistry with the necessary knowledge and skills to undertake further studies in chemistry or pursue alternative pathways in the biological, environmental, earth and physical sciences.

Chemistry IIB focuses on structure determination and the spectroscopic and geometric properties of molecules, and how these influence reactivity. The examples used to illustrate these points draw on expertise in atomic and molecular spectroscopy, symmetry, and organic synthesis.

### **CHEM 2530**

#### **Environmental & Analytical Chemistry II**

3 units - semester 1

Up to 7.5 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 1100 & CHEM 1200 or CHEM 1101 & CHEM 1201

Incompatible: CHEM 2532, CHEM 2534 & CHEM 2536

Assessment: Exam, practical work, assignment & presentation

This course aims to establish a sound understanding of the chemistry of the biosphere and the impact of natural and human induced events on local and global environments. The atmospheric, terrestrial, riverine and oceanic chemical compositions and their interactions to produce climate and other environmental variations are also examined. Students are trained in the application of techniques used by professional chemists to determine chemical composition and analyse for trace compounds, which is central to the aforementioned discussions. These techniques include chromatography, electrochemical and optical spectroscopies, statistical analysis of data and use of advanced instrumentation and data logging devices. The environmental impact of human activities, such as farming, mining and other industries is examined in general terms and by use of case studies, as are the issues surrounding the ethical practice of chemistry and science in general.

### **CHEM 2540**

#### **Medicinal & Biological Chemistry II**

3 units - semester 2

Up to 7.5 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 1100 & 1200 or a credit in CHEM 1101 & 1201

Assumed Knowledge: CHEM 2542

Assessment: Exam, practical work, assignment & presentation

An introduction to the principles and methods of medicinal chemistry including natural product and biopolymer isolation, lead generation, lead optimisation and quantitative structure-activity relationships will be presented. An introduction to the principles of biophysical chemistry will be presented, which will include techniques focused on enzyme activity and inhibition. The different classes of biologically important molecules will be introduced, including discussion on their biosynthesis. An introduction to metalloprotein and bioinorganic chemistry will be presented, including discussion of the structure and function of metalloenzymes and metalloproteins.

### **CHEM 3005**

#### **Topics in Chemistry IIIA**

6 units - semester 1

Up to 15 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520 or equivalent

Course content by arrangement with the Head of Chemistry

### **CHEM 3006**

#### **Topics in Chemistry IIIB**

6 units - semester 2

Up to 15 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520 or equivalent

Course content by arrangement with Head of Chemistry.

### **CHEM 3111**

#### **Chemistry III**

6 units - semester 1

Up to 18 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520 or equivalent

Assessment: Exam, practical work

This course is foundational to all Level 3 studies in Chemistry. It will commence with a review of molecular symmetry with applications to molecular orbitals and spectroscopy. The spectroscopic interaction of matter with varying forms of radiation will be examined, including the phenomena of absorption, fluorescence and phosphorescence. A variety of spectroscopies will be explored in detail. The use of spectroscopic techniques, particularly IR & NMR, and mass spectrometry for the determination of chemical structures will be described. Strategies for solving problems related to chemical composition and structure will be emphasised. Introduction to metal mediated reactions and catalytic cycles relevant to synthesis will be explored, particularly chemistry based around Group 10 metals. This includes an introduction to fundamental aspects of organometallic chemistry. Strategy and tactics used in the synthesis of new molecular architectures will be introduced. There will be an emphasis on developing a logical approach to planning a synthesis. Finally, aspects relating to electron and redox chemistry will be undertaken.

### **CHEM 3211**

#### **Heterocyclic Chemistry and Molecular Devices III**

3 units - semester 2

Up to 9 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520 or equivalent

Assumed Knowledge: CHEM 3111

Incompatible: CHEM 3109, CHEM 3110, CHEM 3209 & CHEM 3210

Assessment: Exam, practical work

This course will begin with a survey of the common heterocyclic ring systems including their distribution and importance. A discussion of the chemistry, synthesis and reactions of aromatic heterocyclic compounds with emphasis on their biological significance will then follow. Particular emphasis will be placed on reagents and mechanisms of these processes. This will be followed by a section on the synthesis and structures of metallo-supramolecular assemblies, which can be prepared from aromatic heterocyclic compounds. In addition to discussing the structures and approaches to synthesising metallo-supramolecular assemblies, the properties of selected compounds will be discussed. Finally, the synthesis, properties and utility of a range of macrocycles including coronands and cryptands will then be presented. Recognition of metal ions by coronands and cryptands will be used as an introduction to the

principles of host-guest chemistry. The recognition of hydrophobic species by cyclodextrins will then be presented. Aspects of the construction of molecular devices will be discussed.

#### **CHEM 3212**

##### **Materials Chemistry III**

3 units - semester 2

Up to 9 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520 or equivalent

Assumed Knowledge: CHEM 3111

Incompatible: CHEM 3109, CHEM 3110, CHEM 3209 & CHEM 3210

Assessment: Exam, practical work

This course will consider the application of a number of chemical principles. An introduction to Frontier Molecular Orbital theory as a means of rationalising electrocyclic reactions, cycloaddition reactions and sigmatropic rearrangements will be presented. The Woodward-Hoffman rules will be introduced. The interaction of metals with unsaturated organic molecules will be discussed as a prelude to consideration of some processes used in industry, including the use of Group 4 based metallocenes. Understanding statistical methods and processes with application to chemical systems will be also addressed. Principles of synchrotron and free-electron laser sources will also be presented including an introduction to diffraction techniques (X-ray, neutron and electron).

#### **CHEM 3213**

##### **Advanced Synthetic Methods III**

3 units - semester 2

Up to 9 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520 or equivalent

Assumed Knowledge: CHEM 3111

Incompatible: CHEM 3109A, CHEM 3110, CHEM 3209 & CHEM 3210

Assessment: Exam, practical work

Theoretical aspects and applications of a variety of synthetically useful reactions will be presented. During the course, we will continually expand the arsenal of powerful synthetic methods available and exemplify their uses. We will focus on efficiency (how do you get the greatest amount of the desired compound in the fewest steps?), chemo- and regio-selectivity (how do you get only the reaction you want and only at the site of interest?) and stereochemistry (how do you control the absolute and relative stereochemistry of the products of various reactions?). An overview will be given of synthetic strategy including the design and control of stereochemistry in the synthesis of complex molecules. The applications of chemical principles in a variety of contexts including industrial processes & chiral synthesis will be addressed.

#### **CHEM 3214**

##### **Medicinal and Biological Chemistry III**

3 units - semester 2

Up to 9 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520 or equivalent

Assumed Knowledge: CHEM 3111

Incompatible: CHEM 3109, CHEM 3110, CHEM 3209 & CHEM 3210

Assessment: Exam, practical work

An introduction to the principles of medicinal chemistry including natural product isolation, lead generation, lead optimisation and quantitative structure-activity relationships will be presented. The principles of parallel and combinatorial synthesis will be presented in this context. Applications of mass spectrometry, NMR spectroscopy and other techniques to the structure determination of biologically important molecules (particularly proteins) will be presented. The chemistry of a number of key biological processes (e.g. enzyme chemistry, action of antibiotics on membranes etc.) will also be presented. An introduction to the arena of biomimetic inorganic chemistry will be presented, including extensive discussion of the structure and function of metalloenzymes. The section will emphasise how the principles of nature can be applied to the rational design of metallic species capable of controlled small molecule activation.

#### **CHEM 3214PE**

##### **Medicinal and Biological Chemistry III**

3 units - semester 2

Up to 9 hours per week

Restriction: Available to BE(Pharmaceutical) students only

Pre-Requisite(s): CHEM 2510 & CHEM 2540

Assumed Knowledge: CHEM 3111

Incompatible: CHEM 3109, CHEM 3110, CHEM 3209 & CHEM 3210

Assessment: exam, practical work

An introduction to the principles of medicinal chemistry including natural product isolation, lead generation, lead optimisation and quantitative structure-activity relationships will be presented. The principles of parallel and combinatorial synthesis will be presented in this context. Applications of mass spectrometry, NMR spectroscopy and other techniques to the structure determination of biologically important molecules (particularly proteins) will be presented. The chemistry of a number of key biological processes (e.g. enzyme chemistry, action of antibiotics on membranes etc.) will also be presented. An introduction to the arena of biomimetic inorganic chemistry will be presented, including extensive discussion of the structure and function of metalloenzymes. The section will emphasise how the principles of nature can be applied to the rational design of metallic species capable of controlled small molecule activation.

#### **CHEM 3530**

##### **Environmental and Analytical Chemistry III**

3 units - semester 1

Up to 9 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2530 or CHEM 2510 & CHEM 2520 or equivalent

Incompatible: CHEM 2003, CHEM 2207

Assessment: Exam, practical work, presentation

The course aims to apply environmental and analytical chemistry concepts and techniques to chemical variations in the environment. A sound physical understanding of the techniques used to determine chemical composition and analyse for trace compounds is core. Techniques introduced in the course include x-ray fluorescence, x-ray diffraction and photochemical methods. A central theme of the course is energy and fuels, e.g. fossil fuels, the hydrogen economy, solar power and nuclear power. Accordingly, the course content touches on the energy problems faced by Australia going forward into the 21st century.

### **CHEM 3540**

#### **Research Methods in Chemistry III**

3 units - semester 1

Up to 9 hours per week

Available for Non-Award Study

Pre-Requisite(s): CHEM 2510 & CHEM 2520

Co-Requisite(s): CHEM 3111

Incompatible: CHEM 3112

Assessment: Research laboratory projects, exam and verbal presentation

This course will consider the application of a number of principles as applied to chemical research. This will be achieved by placing students in active research groups in the Discipline of Chemistry and providing them with the opportunity to carry out research activities. Lecture material will be provided that supplements the research placements, providing students with the opportunity to develop skills in verbal and visual communication.

### **CHEM 3542**

#### **Research Methods in Chemistry III (ND)**

3 units - semester 2

Up to 9 hours per week

Restriction: Available to BSc(EcoC), BSc(M&DD) & BSc(NScM) students only

Pre-Requisite(s): CHEM 3111

Incompatible: CHEM 3112 & CHEM 3540

Assessment: Research laboratory projects, exam and verbal presentation

This course will consider the application of a number of principles as applied to chemical research. This will be achieved by placing students in active research groups in the Discipline of Chemistry and providing them with the opportunity to carry out research activities. Lecture material will be provided that supplements the research placements, providing students with the opportunity to develop skills in verbal and visual communication.

### **CHEM 4000A/B**

#### **Honours Chemistry Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Coursework, research report, oral exam, seminar

Intending Honours students should consult the Head of Chemistry during the preceding year. The Discipline of Chemistry runs Honours programs commencing in February and August (mid year intake). Each student is required to devote their full time to a coursework program and a research project. The course work covers a range of advanced topics, the methods of presentation and assessment of which vary according to topic. Honours students are required to attend seminars and research colloquia. The research project, chosen after consultation with academic staff, is designed to broaden and deepen student's chemical understanding, experimental skills, independent thought and communication skills. Each student will be required to present a seminar and a research report on their project at the end of the Honours year.

## **Environmental Biology**

### **ENV BIOL 1002**

#### **Ecological Issues I**

3 units - semester 2

Up to 6 hours per week, plus field trips

Incompatible: ENV BIOL 1002RW

Assessment: Exam, written assignments

The principal aim of this course is to provide students with the knowledge that will enable them to participate actively in a rational debate about environmental problems. It introduces the 'scientific method' and illustrates its use via laboratory and field practicals that are written up as reports. The lectures cover the significant environmental issues of: resource utilisation and waste, ecosystem services and ecological footprints, global cycles, Australian landscapes and soils, biodiversity, grazing and indigenous knowledge, agricultural problems, invasive species, pests and quarantine, freshwater and marine ecosystems, conservation biology and adaptive management. There is the opportunity to discuss problems via tutorials.

Details of field trips communicated at the start of the course.

### **ENV BIOL 2005**

#### **Ecology for Engineers II**

3 units - semester 2

Up to 5 hours per week, plus field trip

Restriction: Available to B Eng students only, or by permission of the Course Coordinator

Incompatible: ENV BIOL 2901A, ENV BIOL 2005 and ENV BIOL 2003

Assessment: Assignments and/or exam - further details available at beginning of semester

This course aims to teach students the core principles of modern ecology, to provide basic skills for the conduct of field studies, and to foster the development of scientific analysis of ecological systems. The topics are integrated into a conceptual framework that will allow students the analysis of real situations. Topics include the description and study of biological populations and communities, the factors that determine their properties and dynamics, the properties of fragmented systems, the patterns and consequences of species diversity, and the biotic and abiotic factors that control the dynamics of ecological systems. Case studies are used to illustrate the underlying theory, and the application of the ecological theory to the management of natural resources for exploitation and conservation. The course is relevant for students interested in furthering their understanding of the basic ecological principles, in the management of rangelands, fisheries, forests, and human made systems, and in the conservation of natural ecosystems.

Details of field trip communicated at start of the course.

### **ENV BIOL 2500**

#### **Botany II**

3 units - semester 1

Up to 5 hours per week

Assumed Knowledge: BIOLOGY 1101

Incompatible: BIOLOGY 1203RW

Assessment: Exam, practical reports & assignments

A general introduction to the biology of plants. Lectures and practicals cover plant structure, function, classification, diversity, evolution and responses to environmental stress. Provides a valuable basis for future plant-related courses.

### **ENV BIOL 2501**

#### **Evolutionary Biology II**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Assessment: Practical work, seminar presentations, exam

This course addresses key components of evolutionary biology from the perspective of molecular evolution, from the perspective of individual organisms evolving attributes to cope with and exploit spatially and/or temporally variable and different environments, and from a macro-evolutionary perspective. Natural selection, sexual selection, kin selection and inclusive fitness are used to develop an understanding of the behavioural, morphological and physiological adaptations of individual organisms to their environments, as well as an understanding of the interactions and co-evolutionary processes that occur between organisms both intra- and inter-specific (reproductive strategies, mating systems, competition, predator-prey, plant-herbivore, host-parasite, mutualisms, facilitation). Molecular evolution and population genetics provide the mechanics for evolution. Knowledge of these and biogeographic changes are used to develop the ideas of species and speciation, to construct phylogenies, and to interpret the fossil record and patterns of extinction

### **ENV BIOL 2502**

#### **Ecology II**

3 units - semester 2

Up to 5 hours per week, plus field trip

Assumed Knowledge: BIOLOGY 1202

Assessment: Practical, field work, exam

This course introduces the core principles of modern ecology, provides basic skills for the conduction of field studies, and fosters the development of the skills needed for the scientific analysis of ecological systems. The topics are integrated into a conceptual framework that allows students to analyse real situations. Topics include the description and study of biological populations and communities, the factors that determine their properties and dynamics, the patterns and consequences of species diversity, and the biotic and abiotic factors that control the dynamics of ecological systems. Across these topics, the impact of human activities on ecosystem processes is discussed. Case studies are used to illustrate the underlying theory, and the application of the ecological theory to the management of natural resources for use and conservation. The course is relevant for students interested in furthering their understanding of ecological principles, in the management of rangelands, wildlife, fisheries, forests, and human made systems, and in the conservation of natural ecosystems.

Details of field trip communicated at start of the course.

### **ENV BIOL 2503**

#### **Zoology II**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Assessment: Practical work, essay, exam

The course begins with the relationship between structure and function. Concepts of phylogeny will be introduced and the enormous diversity of animals will be examined in a phylogenetic framework. The major event in animal evolution as demonstrated by adaptations to parasitism, the marine environment and life on land will be provided. The section on invertebrate diversity will be concluded with a state-of-the-art lecture on the extraordinary discoveries that are currently being made of new species and even new groups and how scientists determine where they fit in the tree of life. The biology of the vertebrates will follow groups from fishes to terrestrial vertebrates, including the amphibians, reptiles, birds

and mammals. We will flavour these with interesting lectures on animal adaptations and some of the major evolutionary hurdles in vertebrate evolution. Topics in animal physiology relevant to both vertebrates and invertebrates will include the flow of energy through organisms, the process of respiration and the function of the nervous and sensory systems as well as muscle function.

### **ENV BIOL 3002**

#### **Australian Biota: Past, Present and Future III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: ENV BIOL 2500 or ENV BIOL 2006, ENV BIOL 2501 or ENV BIOL 2001, ENV BIOL 2503 or ENV BIOL 2000

Assessment: Exams, tutorials, practical assignments, field excursion

This course examines the origins and evolution of Australia's unique flora and fauna, and the way it has been shaped by historical and more contemporary events. Topics will include continental connections and isolation; past climates and geology; past vegetation assemblages and 'ancient' habitats; the unique Tertiary fauna; the Pleistocene megafauna; the Quaternary 'filter' and how it has shaped the present day biota; composition of the present day flora including the impact of poor soils and fire; the dominance of Myrtaceae and Proteaceae, and their pollination systems; origins and unique aspects of the vertebrate fauna; Australian marine organism, the impact of aboriginal people and the effect of European settlement on the continent's biota. Several major themes will be explored in detail throughout the course, in particular the evolution of pollination systems; adaptations among plants and animals to arid and marine environments, and the evolution of vertebrate reproductive strategies.

### **ENV BIOL 3003**

#### **Ecophysiology of Animals III**

3 units - semester 2

Up to 7 hours per week

Assumed Knowledge: 6 units of Level II Environmental Biology courses, SACE Stage 2 Chemistry and/or Physics

Assessment: Quizzes, practical work & essay

This course covers the intersection between three biological fields - physiology, ecology and behaviour, and examines some of the ways animals are adapted to the environments in which they live. In many cases, these are adaptations to severe environments such as deserts, polar regions, high altitude and deep sea, where nature poses apparently insurmountable problems to survival. The primary approach is to examine the biophysical exchanges between the animal and its environment. Another approach is to look at the physiology of animals with different life styles, and examine their evolutionary strategies for locomotion, digestion, reproduction, thermoregulation, osmoregulation, circulation and respiration.

### **ENV BIOL 3004**

#### **Freshwater Ecology III**

3 units - semester 1

Up to 6 hours per week, plus field camp

Assumed Knowledge: 6 units of Level II Environmental Biology courses (Science students) & ENV BIOL 2005 or approval of Head for BE students

Incompatible: WRM 7024

Assessment: Assignments, written test

The course provides theoretical understanding and practical implications of the ecology and restoration of freshwater habitats. It

distinguishes habitats of lakes, wetlands, streams and rivers by varying circulation types, nutrient cycles and food webs. Complementary practicals will be conducted in order to provide skills for the identification of algae, zooplankton and water plants as well as for monitoring, assessment and management of drinking water reservoirs, urban and floodplain wetlands, and rivers.

This course will include a field camp up to 5 days. Details will be provided at the start of the course.

### **ENV BIOL 3006**

#### **Research Methods in Environmental Biology III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: 6 units of Level II Environmental Biology courses & STATS 1000 or STATS 1003 or equivalent

Assessment: Practical work, exam, review assignment

An introduction to systematic methods of collection, analysis and reporting of field and laboratory data, and basic experimental design. Lectures outline the nature of research and the value of experimental methods. Some knowledge of basic statistics is required. Experimental design will be emphasised, and the elements of statistical tests, particularly analysis of variance, will be considered in a biological context. Practical work involves use of computers and software, and generally will complement methods introduced in lectures.

### **ENV BIOL 3008**

#### **Conservation and Restoration III**

3 units - semester 2

Up to 5 hours per week, plus fieldwork

Assumed Knowledge: ENV BIOL 2503 or ENV BIOL 2003 or equivalent

Incompatible: ENV BIOL 3023

Assessment: Exams, practical & project assignments

This course will examine theoretical and practical aspects of conservation biology, ecological management and restoration of natural systems. The course will focus on terrestrial systems. It will cover the effects of introduced herbivores, carnivores, competitors, pathogens, vegetation clearance, habitat fragmentation, habitat degradation, disturbances (e.g. fire) and remedial actions (e.g. revegetation) on Australian flora, fauna and ecological processes (e.g. dryland salinisation, pollination, gene flow, animal dispersal). Edge effects, corridors, succession, endangered species management, conservation genetics, abundant species management, biological and mechanical control of unwanted species, rehabilitation, re-introduction and translocation biology will also be covered. Establishing adequate and effective monitoring programs, reserve design and risk assessment, as well as social and political factors in decision making will provide a practical element to the course. Students will be expected to conduct a small research project on some current conservation or restoration issue as part of the course.

This course will include 4-5 days of field work either as a series of day trips or as a field camp. Details will be provided at the start of the course.

### **ENV BIOL 3009**

#### **Ecophysiology of Plants III**

3 units - semester 2

Up to 6 hours per week, plus field trip

Assumed Knowledge: ENV BIOL 2006 or PLANT SC 2001WT

Incompatible: ENV BIOL 3009

Assessment: Exam & continuous assessment

This course explores interactions between plants and their environment from a physiological perspective. It will consolidate and extend knowledge of the processes involved in the acquisition and transport of resources by plants and use this knowledge to examine the ways plants have adapted to a range of environments, some of which can be considered as extreme. The course will also look at how plants respond to environmental challenges such as climate change, ozone depletion, salinisation and heavy metal toxicity. Interactions with other organisms will also be examined including mycorrhizas and parasitic plants. Practical work will include small group experiments.

Details of field trip communicated at start of the course.

### **ENV BIOL 3010**

#### **Marine Ecology III**

3 units - semester 2

Up to 6 hours per week, plus field trip

Assumed Knowledge: 6 units of Level II Environmental Biology courses or equivalent & ENV BIOL 3006

Assessment: Exam, assignments, field trip report

This course will provide an understanding of the patterns of abundance and diversity of marine plants and animals and the processes that structure these patterns. Emphasis is placed on the challenges and solutions to understanding the complexity of marine systems. This course will demonstrate the use of coherent logical procedures and rigorous experimental design to provide practical evidence for the development of theory and solutions to environmental and conservation problems in coastal habitats. The habitats and organisms used to illustrate lectures are derived from ecological studies of subtidal rocky and coral reefs, intertidal rocky reefs, mangrove forests, salt marshes, seagrass meadows, urban structures and pelagic habitats.

Details of field trip communicated at start of the course.

### **ENV BIOL 3011**

#### **Evolution and Diversity of Insects III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: ENV BIOL 2000 or equivalent

Incompatible: ENV BIOL 3011WT

Assessment: Exams, Insect collection

After a brief review covering the internal anatomy of insects and the processes involved in metamorphosis, excretion and reproduction, a number of specific topics will be explored in more detail, including: morphological and biological characteristics of the major insect orders; life histories of selected pest and beneficial species; sociality, caste formation and nest building in termites; sound production methods and functions; feeding mechanisms; adaptations and biology of vertebrate ectoparasites; insects as disease vectors of plants and animals; production and function of silk in insects and arachnids; mimicry and defensive adaptations; sociality and parasitism in the Hymenoptera.

The practical component will examine collecting techniques, identification of adult insects to family level, identification of immature stages and feeding damage. A requirement of the course is the presentation of a well-curated insect collection.

### **ENV BIOL 3012WT**

#### **Integrated Catchment Management III**

3 units - semester 2

Up to 6 hours per week, including fieldwork

Assumed Knowledge: ENV BIOL 2003, SOIL&WAT 2005WT or AGRONOMY 2000ARW/BRW

Assessment: Theory, practicals/assignments

This course provides students with an understanding of ecological and hydrological processes governing catchment systems and concepts for the assessment and management of catchment systems. Catchments are characterised by their geology, soils, land use, hydrology and water quality. Management of catchments considers changed land use and vegetation, soil treatment, riparian wetlands, water quality management and environmental flows. A multidisciplinary team of lecturers jointly teach the course. Field practicals are conducted in the Bradbury Catchment of the Mt. Lofty Ranges.

### **ENV BIOL 3024**

#### **Insect Identification and Taxonomy III**

3 units - summer semester

Up to 5 hours per week

Restriction: Available to Non University of Adelaide students only

Available for Non-Award Study

Assumed Knowledge: Equivalent of level 1 & 2 Biology

Incompatible: ENV BIOL 3011

Assessment: Quizzes, Insect Collection, Theory/Practical Examination

This course takes an evolutionary approach to examining insect diversification, the most species-rich component of terrestrial ecosystems. It covers various aspects of insect systematics and evolution, including the integration of morphology, life history, behaviour and ecology. After a brief review covering the internal anatomy of insects and the processes involved in metamorphosis, excretion and reproduction, a number of specific topics will be explored in more detail, including: morphological and biological characteristics of the major insect orders; life histories of selected pest and beneficial species; sociality; sound production methods and functions; feeding mechanisms; adaptations and biology of vertebrate ectoparasites; insects as disease vectors of plants and animals; mimicry and defensive adaptations; parasitism.

The practical component will examine collecting techniques, identification of adult insects to family level, identification of immature stages and feeding damage. A requirement of the course is the presentation of a well-curated insect collection and attendance at a compulsory residential course.

### **ENV BIOL 3121**

#### **Concepts in Ecology III**

3 units - semester 1

Up to 5 hours per week, plus field trip

Assumed Knowledge: ENV BIOL 2502 or ENV BIOL 2003 or equivalent

Assessment: Exam, practical assignments

This course addresses advanced ecological concepts, building upon Ecology II, and providing a common anchor to other Ecology courses in Year III. It deals with populations, communities and ecosystems, and examines various approaches to their studies, including experiments and models. It provides both an understanding of theoretical ecology as well as a foundation for ecological applications.

Details of field trip communicated at start of the course.

### **ENV BIOL 3122**

#### **Evolution and Palaeobiology III**

3 units - semester 1

Up to 5 hours per week, plus field trip

Pre-Requisite(s): ENV BIOL 2501

Assessment: Exams, tutorials, practical assignments, field excursion

This course aims to provide advanced understanding of fundamental principles and modern advances in techniques for systematics, evolution and the fossil record, and the application of these to the study of the evolution and conservation of biodiversity. Topics discussed will include: Evolution, phylogeny and evidence; Human evolution; ancient DNA; Evolution of Life History data, adaptations and co-evolution; marine biogeography, palaeoceanographic transformation and environmental forcing of evolution; stratigraphy, extinction and the origin and diversification of major animal groups; methods for assessing evolutionary relationships, particularly cladistics; molecular approaches to systematics; constructing the tree of life; measuring biodiversity at different scales; phylogenetic approaches to understanding life history and ecology; importance of fossils for understanding relationships and major evolutionary events; bioinformatics; systematics and biogeography.

### **ENV BIOL 3123**

#### **Issues in Evolutionary Biology III**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BSc(EvolBiol) students only

Assessment: Essays, project assignments

This course comprises advanced level project work and a series of seminars by invited speakers that covers the latest issues as they relate to the two majors in the degree: paleontology/systematics and molecular evolution

### **ENV BIOL 3124**

#### **Frontiers in Marine Biology III**

3 units - semester 1

Up to 4 hours per week

Restriction: Available to BSc (MarineBiol) students only

Assumed Knowledge: Completion of Level I and II of BSc (Marine Biology)

Assessment: Tutorials, assignments

This course is about contemporary frontiers in marine biology, which will be presented by researchers that are actively pushing these boundaries. Each researcher will provide several research examples relating to their particular frontier (lectures and reading material) that will form the basis of lively discussion (tutorials). The exact identity of frontiers change as new issues and government priorities arise, hence topics will change frequently but are likely to include the science and politics of marine protected areas, novel approaches to fisheries biology and management, use of marine parasitologists in improving multi-million dollar aquaculture and fisheries ventures, new possibilities in use of molecular techniques, and the emerging crisis of coastal water pollution locally (South Australia) and globally.

### **ENV BIOL 3220**

#### **Issues in Sustainable Environments III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: Completed 12 units at Level II

Assessment: Reports, research proposal, oral presentations

This course is designed to teach students to conceptualise and analyse our natural and built environments as an interconnected

system. This means that it is multi-disciplinary in content and will require students to understand the trade-offs between use and conservation of resources. The course will emphasise the biophysical, social and economic dimensions of current and emerging environmental and resource management issues. It comprises a series of seminars by invited speakers from research, government, community and business sectors. Students will be expected to improve their skills in critical thinking and issue analysis, present a logical and succinct opinion piece on an environmental issue and write a scientifically informed article suitable for popular media.

#### **ENV BIOL 3221**

##### **Research Methods in Marine Biology III**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BSc(MarineBio) students only

Assumed Knowledge: Completion of Level I and II of BSc (Marine Biology)

Assessment: Research reports and a poster

This course demonstrates fundamental approaches and specialist techniques required of contemporary investigations in marine biology and ecology. It promotes an awareness of modern research programs of governmental and non-governmental agencies and demonstrates key analytical techniques, many of which are not taught at Australian universities at any undergraduate or postgraduate level. The course combines current thinking (theory) and practical measurement (practice) used to understand natural influences and human domination of top-down processes (e.g. Marine Protected Areas and fishing) and bottom-up processes (e.g. waste water treatment, catchment management) that maintain and disrupt ecosystem function and sustainability. Particular emphasis is placed on temperate coasts for which the Australian population is largest and most dense, coastal-ocean problems most expensive and intense, and career opportunities most diverse and numerous.

#### **ENV BIOL 4000A/B**

##### **Honours Environmental Biology Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research thesis, seminar, literature review, research proposal, 2 essays

Candidates are expected to study Environmental Biology more deeply in a research exercise and to present the results in a written thesis. In addition to the thesis, students will be assigned essays and a research proposal, all designed to broaden the learning experience relevant to environmental science. There will be emphasis on developing written and oral communication skills that are expected of an environmental scientist.

Interested students should consult the Honours Coordinator during the final year of the degree program. The Honours program normally commences at the beginning of first or second semester.

## **Food Science**

#### **FOOD SC 1000RG**

##### **Introduction to Food Technology I**

3 units - semester 1

Up to 6 hours per week

Assessment: Written exam, laboratory reports, assignments, report of industry visits

This course provides an overview of the food processing industry at local national and international levels. Emphasis is at the local (South Australian) level and covers many of the key areas of responsibility of a food technologist. A nationally accredited short course - Hygiene for Food Handlers - is included. Food processing techniques, particularly techniques for analysing and preserving food and processing meat, cereals, milk, fruit and vegetables are described. Management operations including total quality management, plant hygiene and sanitation, occupational health, safety and welfare, HACCP, ISO, and legislation are overviewed. The course includes industry tours and guest lectures by industry representatives.

#### **FOOD SC 1001**

##### **Consumers, Food and Health I**

3 units - semester 1

Up to 3 hours per week

Assessment: Assignments, student diary, student led discussion, participation, exam

Healthy eating, dietary guidelines, core food groups, food composition, nutrient reference values, nutrient deficiencies/toxicities, functions of principal nutrients, energy, nutrient calculations, non-nutrient components of food, nutrition throughout the life-cycle, diet-related lifestyle disorders, chronic disease, vegetarianism, dietary supplementation, weight control practices, under nutrition, food allergies, food intolerance, food law, food-borne illness, food labelling.

History of food in Australia, definition of health, social determinants of health, socio-economic and cultural factors that influence food choices and habits, food systems, nutrition research, report writing, critical review of nutrition-related scientific literature.

#### **FOOD SC 1001WT**

##### **Consumers, Food and Health I**

3 units - semester 1

Up to 3 hours per week

Assessment: Assignments, student diary, student led discussion, participation, exam

Healthy eating, dietary guidelines, core food groups, food composition, nutrient reference values, nutrient deficiencies/toxicities, functions of principal nutrients, energy, nutrient calculations, non-nutrient components of food, nutrition throughout the life-cycle, diet-related lifestyle disorders, chronic disease, vegetarianism, dietary supplementation, weight control practices, under nutrition, food allergies, food intolerance, food law, food-borne illness, food labelling.

History of food in Australia, definition of health, social determinants of health, socio-economic and cultural factors that influence food choices and habits, food systems, nutrition research, report writing, critical review of nutrition-related scientific literature.

#### **FOOD SC 1002RG**

##### **Practical Food Production I**

3 units - semester 2

Up to 7 hours per week (weeks 3-9), plus 5 x 6 hour practical (5 consecutive days in mid semester break)

Restriction: Available to B Food & Nutrition Sci students only

Assumed Knowledge: FOOD SC 1000RG

Assessment: Assignments, oral presentation and exam

This course provides students with the opportunity to manufacture processed food on a large scale under simulated industry conditions. Students will be involved in production runs of one or

more of the following foods: cheese, bakery goods, smallgoods, wine and coffee. Students will be expected to implement Good Manufacturing Practices as learned in Introduction to Food Technology and to apply quality management principles. They will also demonstrate an ability to develop food safety systems.

### **FOOD SC 2500RG**

#### **Food Chemistry II**

3 units - semester 2

Up to 5 hours per week

Restriction: Available to BFNS students only

Assumed Knowledge: AGRIC 2500WT

The chemistry and analysis of food and its components: water, amino acids, peptides and protein, sugars, polysaccharides, lipids, vitamins, minerals. Reactions of food components during processing: Maillard reaction, enzymic browning. Non-microbial contaminants such as heavy metals and pesticides, colour pigments, aroma compounds, sugar and fat replacers.

### **FOOD SC 2501RG**

#### **Food Engineering Principles II**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: FOOD SC 1000RG

Assessment: Assignment, reports, practical/theory test, exam

This course provides practical knowledge on modern engineering solutions for food safety, convenience and to maximise the benefits to human nutrition including; hydronic systems, refrigeration systems, cold storage, optimum cold storage conditions to retain essential nutrients, psychrometrics, heat loads, heat sterilisation systems, boilers and heat exchange systems, compressed air and vacuum systems, food process engineering principles, corrosion principles, material selection, food processing equipment, programmable controllers, Newtonian and non-Newtonian fluids, food rheology, process mass and energy balances, food flavour extraction techniques and safety associated with food engineering systems. Visits will be made to food processing and storage facilities to illustrate the application of food engineering principles.

### **FOOD SC 2502RG**

#### **Food Microbiology II**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BFNS students only

Assumed Knowledge: PLANT SC 2500WT

Assessment: Exam, practical reports, presentation

This course aims to provide instruction in the general principles of food microbiology. It is assumed that students will have received adequate introduction to microbiology per se. The course covers the biology and epidemiology of foodborne microorganisms of public health significance, including bacteria, yeasts, fungi, protozoa and viruses, and food spoilage microorganisms; the microbiology of food preservation and food commodities; fermented and microbial foods; principles and methods for the microbiological examination of foods; micro biological quality control, and quality schemes.

### **FOOD SC 2503RG**

#### **Food Processing Technology II**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: FOOD SC 1000RG

Assessment: Exam, practical report, assignment

Food preservation and packaging. Preservation by fermentation, concentration, drying and dehydration and by chemical agents. Production of a range of foods using these manufacturing techniques and processes. Shelf life and nutritional consequences of preservation. Principles of flexible and rigid packaging of foods. Investigation of packaging types related to use with various food systems and packaging permeability. Passive and active packaging including modified atmosphere packaging and controlled atmosphere storage of foods. Reuse, disposability and printing of packaging. Labelling techniques and legislative requirements for labelling food and beverage products

### **FOOD SC 2504RG**

#### **Sensory Evaluation of Foods II**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BFNS students only

Assumed Knowledge: STATS 1004

The role of sensory evaluation in marketing of food and beverages, physiological and psychological factors affecting sensory perception, relationships between sensory properties and product acceptability, measurement of sensory perception, design and conduct of sensory evaluation experiments, taste process, kinaesthetics, importance of colour, odour and texture in food tasting, difference testing, preference testing, panel selection procedures, focus group, taste and aroma profiling, texture profiling, shelf life determination, sensory quality control, product development and flavour optimisation, changes to taste and texture profiles when developing foods with improved nutritional content, advanced techniques in sensory evaluation, strategies for developing sensory evaluation programs. A range of food and beverage products including wine and olive oil will be assessed using the techniques and principles presented in the lecture program.

### **FOOD SC 2505RG**

#### **Food Quality & Regulation II**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to BFNS students only

Assessment: Assignments, exam

The principles of quality assurance, management and total quality management, HACCP (hazard analysis of critical control points) system implementation, flow charts and identification of hazards and critical points, ISO and NATA accreditation. Learn to generate nutritional panels for food products using the VITAL program. Hygiene and sanitation, including good manufacturing practices, chemistry and application of cleaners and sanitisers, verification of sanitiser action, equipment design to minimise process failure and health risk. Product recall and national and international food legislation including role of FSANZ, Food Standards Code, legislation hierarchy and audit.

### **FOOD SC 3011RG**

#### **Food Chemistry**

3 units - semester 1

Up to 5 hours per week

Assumed Knowledge: BIOCHEM 2106WT

The chemistry and analysis of food and its components: water, amino acids, peptides and protein, sugars, polysaccharides, lipids, vitamins, minerals. Reactions of food components during processing: Maillard reaction, enzymic browning. Non-microbial contaminants such as heavy metals and pesticides, colour pigments, aroma compounds, sugar and fat replacers.

### **FOOD SC 3014RG**

#### **Food Quality and Regulation III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: FOOD SC 2105RG

The principles of quality assurance, management and total quality management, HACCP (hazard analysis of critical control points) system implementation, flow charts and identification of hazards and critical points, ISO and NATA accreditation. Hygiene and sanitation, including good manufacturing practices, chemistry and application of cleaners and sanitisers, verification of sanitiser action, equipment design to minimise process failure and health risk. Product recall and national and international food legislation including role of FSANZ, Food Standards Code, legislation hierarchy and audit.

### **FOOD SC 3021RG**

#### **Food Product Development III**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BFNS students only

Assumed Knowledge: FOOD SC 2500RG, FOOD SC 2502RG, FOOD SC 2505RG

Assessment: Assignments, exam

Product Development: Scale of new product development in market place, concept generation, consumer testing, quality function deployment. Research and Development process. Trends and new techniques in processing, for example extrusion, sous vide, high pressure, electrical and magnetic fields, light pulses, minimal processing, home meal replacements, hurdle technology. Food ingredients and their functions.

### **FOOD SC 3025RG**

#### **Animal Food Processing III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: FOOD SC 2003RG

Red meat processing: Animal slaughter. Factors affecting meat quality. Meat microbiology. Chemistry and physiological structure of meat. Manufactured meat products including non-meat ingredients. Dairy processing: composition of milk. Hazards associated with raw milk. Microbiology of milk. Milk products and processing techniques including membrane technologies. Fish and seafood processing: classification of edible seafoods. Harvesting, storage and processing techniques. Seafood microbiology. Sensory evaluation. Fish and seafood products. Poultry and egg processing: animal slaughter and processing. Poultry microbiology. Handling and storage. Egg structure and composition. Assessment of egg quality. Poultry and egg microbiology. Egg products. HACCP programs and Food Regulations. Students will produce a variety of foods that contain animal tissue and extracts.

### **FOOD SC 3027WT**

#### **Sensory Evaluation of Foods III**

3 units - semester 2

Up to 6 hours per week

The role of sensory evaluation in marketing of food and beverages, physiological and psychological factors affecting sensory perception, relationships between sensory properties and product acceptability, measurement of sensory perception, design and conduct of sensory evaluation experiments, difference testing, preference testing, panel selection procedures, taste and aroma profiling, texture profiling, shelf life determination, sensory quality control, product development and optimisation, strategies for developing sensory evaluation programs. A range of food and beverage products will be assessed using the techniques and principles present in the lecture program.

### **FOOD SC 3500RG**

#### **Food & Nutrition Science - Industry Placement III**

3 units - semester 1

7 weeks work experience (Part-time employment, Orientation week and 3 day per week for 1st half semester 1)

Restriction: Available to BFNS students only

Pre-Requisite(s): AGRIC 2500WT, FOOD SC 2502RG, FOOD SC 2503RG, FOOD SC 2505RG

Assessment: Business case, daily reflective diary, written report, oral presentation

This course provides students with an opportunity to apply their knowledge and understanding of Food and Nutrition Science in an industry setting. Students gain practical experience of the industry, its management systems and structures providing them with a first hand introduction to a food or nutrition business.

A working understanding of several areas will need to be demonstrated. Hands-on experience of the integration of different aspects of the overall business (eg nutritional composition, HACCP plans, production, marketing, and distribution) and an awareness of occupational health and safety procedures will be gained adding to the understanding of course material studied at levels 1 and 2.

### **FOOD SC 3502WT**

#### **Nutrition III**

3 units - semester 2

Up to 5 hours per week

Assumed Knowledge: AGRIC 2500WT

Assessment: Practical Report (s), Assignment, Tutorial Presentation, Written Exam

To provide an overview of the relationship between nutrition research, nutrient reference values and the translation of both of these into government policies (FSANZ) and guidelines aimed at improving the health of a population or subgroup within a population. Critical analysis of scientific literature and lay media nutrition information is an important component of the course. Specific nutrients and food components currently the focus of nutrition research, eg folate and omega 3 fatty acids, are considered. Use of a dietary analysis program to analyse a weighed food record allows comparison of the analysis against current nutrient reference values and healthy eating guidelines. It also gives students an insight into the advantages and disadvantages of the various methods of collecting dietary intake data.

### **FOOD SC 3503RG**

#### **Food Processing Technology III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: FOOD SC 2503RG

Assessment: Examination, Practical Report, Assignment

This course has an advanced food processing component and overviews the various conventional and emerging non thermal food processing methods available to maximize the nutrition levels in the making of foods that are safe, high quality and with maximum shelf life and convenience. The course explores various advanced methods of food processing technology available in Australia. The course will give students an understanding of the advanced principles of food processing and how to choose a method of preservation in relation to food composition. Occupational health and safety, food safety and food quality aspects of food and beverage processing are an integral component of all coursework.

### **FOOD SC 3504RG**

#### **Food Engineering Principles III**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to BFNS students only

Assumed Knowledge: FOOD SC 1000RG

This course provides practical knowledge on modern engineering solutions for food safety, convenience and to maximise the benefits to human nutrition including; hydronic systems, refrigeration systems, cold storage, optimum cold storage conditions to retain essential nutrients, psychrometrics, heat loads, heat sterilisation systems, boilers and heat exchange systems, compressed air and vacuum systems, food process engineering principles, corrosion principles, material selection, food processing equipment, programmable controllers, Newtonian and non-Newtonian fluids, food rheology, process mass and energy balances, food flavour extraction techniques and safety associated with food engineering systems. Visits will be made to food processing and storage facilities to illustrate the application of food engineering principles.

### **FOOD SC 4000AWT/BWT**

#### **Honours Food Science & Technology Part 1 & 2**

24 units - full year

Up to 40 hours per week

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Thesis, seminars, research proposal; remainder as deemed appropriate to the student's program.

This course comprises a substantial research project of the student's choosing on a topic acceptable to the Discipline of Plant and Food Science, two seminars on that topic, and coursework, essays or other assignments deemed appropriate to the individual student's honours program.

## **Genetics**

### **GENETICS 2510**

#### **Genetics IIA: Foundation of Genetics**

3 units - semester 1

Up to 8 hours per week

Available for Non-Award Study

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202 - Students who enrolled in BIOLOGY 1101 only should contact the Course Coordinator to request permission to enrol

Assessment: Exam, tutorial and practical component assessment

Genetics IIA aims to provide a broad understanding of some of the foundation concepts of genetics. We begin with examining different patterns of inheritance and the nature of genetic linkage and recombination, and discuss mutations and the connection between

genotype and phenotype. Further topics include the regulation of gene expression in prokaryotes and eukaryotes.

The practical component for this course draws from the MBS Prac A, Prac B and Prac C series. Refer to Current Students Online Enrolment information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for information about enrolling in these practicals.

### **GENETICS 2520**

#### **Genetics IIB: Function and Diversity of Genomes**

3 units - semester 2

Up to 6 hours per week

Available for Non-Award Study

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202. Students who enrolled in BIOLOGY 1101 only should contact the Course Coordinator to request permission to enrol

Assumed Knowledge: GENETICS 2510

Incompatible: GENETICS 2202 & GENETICS 2521

Assessment: Exam, tutorial and practical component assessment

Genetics IIB aims to build an appreciation of the power of genetic analysis. Building on the foundation concepts developed in Genetics IIA, topics include concepts in human genetics and genetic dissection of developmental processes. Genetics IIB also provides a foundation to modern genetics analysis of evolutionary processes, including the genetics of populations.

The practical component for this course draws from the MBS Prac A, Prac B and Prac C series. Refer to Current Students Online Enrolment information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for information about enrolling in these practicals.

### **GENETICS 3110**

#### **Advanced Molecular Biology IIIA (Genetics)**

6 units - semester 1

Up to 16 hours per week

Restriction: Available to BSc (MolBiol) students only

Pre-Requisite(s): BIOCHEM 2510 or BIOCHEM 2102 & BIOCHEM 2520 or BIOCHEM 2202 & GENETICS 2510 or GENETICS 2102 & GENETICS 2520 or GENETICS 2202

Incompatible: BIOCHEM 3000, BIOCHEM 3125 & GENETICS 3111

Assessment: Written exam on lecture material, written & oral reports on practicals and tutorials

This course combines lectures from GENETICS 3111 with practical exercises and/or laboratory placements in professional research laboratories. It includes a special set of tutorial/Problem Based Learning (PBL) exercises, not offered in any other course, which are designed to provide students with a perspective of how cutting-edge molecular biology principles and techniques are applied to major research questions. The PBL segment of course will include aspects of biochemistry, genetics, microbiology/immunology and chemistry. This course will illustrate that cross-disciplinary approaches are essential in modern research.

### **GENETICS 3111**

#### **Genes, Genomes and Molecular Evolution III**

6 units - semester 1

Up to 16 hours per week

Available for Non-Award Study

Pre-Requisite(s): GENETICS 2510 & GENETICS 2520 or equivalent

Incompatible: GENETICS 3110

Assessment: Exam, practical component, written reports

The DNA molecules that comprise the informational basis of inheritance in living organisms are collectively referred to as the genome. In this course the organisation, origin and mechanisms of change of prokaryotic and eukaryotic genomes are explored using cytogenetic and molecular genetic analyses. Topics include - structure and function of genomes and chromosomes; chromosomes in disease; genomics; genome evolution; interactions between nuclear, mitochondrial and chloroplast genomes; mechanisms for the generation and maintenance of diversity in eukaryotes; the roles of natural selection and chance as drivers of molecular evolution; molecular phylogeny.

### **GENETICS 3210**

#### **Advanced Molecular Biology IIIB (Genetics)**

6 units - semester 2

Up to 19 hours per week

Restriction: Available to BSc(MolBiol) students only

Pre-Requisite(s): BIOCHEM 2510 or BIOCHEM 2102 & BIOCHEM 2520 or BIOCHEM 2202 & GENETICS 2510 or GENETICS 2102 & GENETICS 2520 or GENETICS 2202

Assumed Knowledge: GENETICS 3110

Incompatible: BIOCHEM 3225 & GENETICS 3006

Assessment: written exam on lecture material, written and oral reports on practicals and tutorials

This course combines lectures from GENETICS 3211 Gene Expression and Human & Development Genetics with practical exercises and/or laboratory placements in professional research laboratories. It includes a special set of tutorial/Problem Based Learning (PBL) exercises, not offered in any other course, which are designed to provide students with a perspective of how cutting edge molecular biology principles and techniques are applied to major research questions. The PBL segment of course will include aspects of biochemistry, genetics, microbiology/immunology and chemistry. This course will illustrate that cross-disciplinary approaches are essential in modern research.

### **GENETICS 3211**

#### **Gene Expression & Human Developmental Genetics III**

6 units - semester 2

Up to 19 hours per week

Available for Non-Award Study

Pre-Requisite(s): GENETICS 2510 & GENETICS 2520 or equivalent

Assumed Knowledge: GENETICS 3111

Incompatible: GENETICS 3210

Assessment: Exam, practical component, written reports

This advanced genetics course examines the diverse molecular mechanisms that control the expression of genes in prokaryotes and eukaryotes. It continues with a description of the human genome and a description of how genes are regulated during development. Topics include the regulation of gene expression; epigenetic events; the genetic and epigenetic basis of human disease (including cancer); neurogenetics; gene therapy; genetic control of development.

### **GENETICS 3212**

#### **Gene Expression & Hum Devel Genetics (Biomed) III**

6 units - semester 2

Up to 19 hours per week

Restriction: Available to BSc (BiomedSc) students only

Pre-Requisite(s): GENETICS 2511 & GENETICS 2521 or equivalent

Incompatible: GENETICS 3211

Assessment: Exam, reports of practical component

This advanced genetics course examines the diverse molecular mechanisms that control the expression of genes in prokaryotes and eukaryotes. It continues with a description of the human genome and a description of how genes are regulated during development. Topics include - the regulation of gene expression; epigenetic events; the genetic and epigenetic basis of human disease (including cancer); neurogenetics; gene therapy; genetic control of development.

Subject to availability, the practical component of this course is a placement within a genetic research laboratory which will be arranged by the course convenor.

### **GENETICS 4000A/B**

#### **Honours Genetics Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Details available from School

Candidates are required to give their full attendance for one academic year to a program of study. Each candidate will carry out a research investigation under the supervision of a member of staff. The program will include participation in seminars and discussions on advanced topics, essay writing and a research proposal. Candidates will be required to present the results of their research work in written form.

Intending Honours candidates should consult the Head of Genetics during the final year of the B.Sc.

## **Geology**

### **GEOLOGY 1100**

#### **Earth's Interior I**

3 units - semester 2

Up to 6 hours per week, plus field work

Incompatible: C&ENVENG 1007, GEOLOGY 1104, GEOLOGY 2005 & PETROENG 1003

Assessment: Written exams, assignments, practical work

This course provides a global perspective of Planet Earth and the dynamic processes that have modified it over its 4 billion-year history. We explore Earth's place in space and time and examine the operation of its internal chemical and physical processes. Fundamental concepts are developed: the formation and structure of the Earth; the driving forces of plate tectonics and continental drift; earthquakes and volcanoes, the formation and identification of geological materials, mountain building and rock deformation; the development of the geologic timescale. Emphasis is given to the geological evolution of Australia.

### **GEOLOGY 1103**

#### **Earth Systems I**

3 units - semester 1

Up to 6 hours per week, plus field work

Incompatible: GEOLOGY 1200

Assessment: Written exams, assignments, practical work

This course draws from all fields of geoscience to explore the evolution of Planet Earth. Topics include the evolution of the solar system and the solid earth, the concept of deep time; the Plate Tectonic theory, in which the Earth's plates are colliding, generating earthquakes, volcanoes and mountain belts; the evolution of Earth's atmosphere and oceans; the Earth's climate, including the Earth in space, hydrologic cycle, the carbon cycle and the 'greenhouse

effect'; the development and future of our unique Australian landscape and resources.

### **GEOLOGY 1104**

#### **Geology for Engineers I**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Eng (Civil & Struct), B Eng (Civil & Eng) & B Eng (Mining) students only

Incompatible: GEOLOGY 1100

Assessment: Theory exam, practical work (in class)

This is an introductory course on mineralogy, the major rock groups, plate tectonics and the major geological processes, geophysics, structural geology, the fundamentals of ore deposit geology and metallic and non-metallic exploration. The geology of energy deposits (coal, oil shale, petroleum, hot dry rock and uranium) and environmental matters associated with mining will also be dealt with. There will be laboratory-based practicals introducing identification of minerals and rocks, geophysical site investigations, and practicals based on case studies.

### **GEOLOGY 2500**

#### **Sedimentary Geology II**

3 units - semester 1

Up to 5.5 hours per week, plus field trip

Available for Non-Award Study

Assumed Knowledge: GEOLOGY 1100 or GEOLOGY 1103

Assessment: Exam, practicals, field report

Sediments, both ancient and recent, cover much of the earth's surface. Sediments are immensely important economically, as the host of petroleum and mineral deposits, and to the environment, as aquifers, sinks for contaminants, and the home to a large part of the biosphere. The sedimentary record is also the ultimate repository of the annals of Earth's history. By deciphering the clues held in this record, geologists have reconstructed the history of the earth surface environment, traced the evolution of life, and determined past climate changes. The sedimentology component of this course will provide a broad background to 1) the description of sedimentary rocks and recognition of sedimentary structures, 2) processes by which sediments are transported, deposited, and converted into rocks, 3) the tectonic setting and features of environments in which sediments accumulate, and 4) use of stratigraphy as a tool in Earth history. The Paleontology component of this course will be an introduction to the fossil record, with an emphasis on the patterns of evolution during the Phanerozoic and the application of biostratigraphy.

### **GEOLOGY 2501**

#### **Structural Geology II**

3 units - semester 1

Up to 4 hours per week, plus field trip

Available for Non-Award Study

Co-Requisite(s): GEOLOGY 2500

Assumed Knowledge: GEOLOGY 1100 or GEOLOGY 1103

Assessment: Exam, practicals, field reports

How does the Earth respond to applied force? This course looks at how rocks deform, and how we can recognise and use structures within rocks to determine ancient magnitudes and orientations of stress fields. Students will be introduced to techniques of recording and analysing structural data and taught how to map rock

sequences in the field and interrogate a region to determine how it formed and what has happened to the area since formation.

Details of field trip communicated at start of the course.

### **GEOLOGY 2502**

#### **Igneous and Metamorphic Geology II**

3 units - semester 2

Up to 7 hours per week, plus field trip

Pre-Requisite(s): GEOLOGY 1100 or GEOLOGY 1103

Assessment: Practical work, examination

Mineralogy (mineral chemistry, classification and structure) , minimum optical mineralogy and crystallography required to use the petrographic microscope. Petrography, mineralogy, classification of igneous and metamorphic rocks. Introduction to methods of rock and mineral analysis (XRD, XRF, electron microprobe).

### **GEOLOGY 2503**

#### **Landscape Processes and Environments II**

3 units - semester 2

Up to 6 hours per week, plus field trip

Available for Non-Award Study

Assumed Knowledge: GEOLOGY 1100 or GEOLOGY 1103

Assessment: Field reports, practical work

This course will develop skills and knowledge in 'reading' and understanding landscapes and the associated Earth materials at and near the Earth's surface. The approaches covered are fundamental to environmental geoscience and the management of the Earth's resources. This includes the morphological, geochemical and physical description of pedological and regolith materials such as soils, weathering profiles, sediments, indurated regolith as well as how they interact with other components of the lithosphere, biosphere and hydrosphere. An emphasis will be on describing these materials in the field and collecting field data and its later presentation and interpretation. A field trip to arid zone landscapes such as the Fowlers Gap - Broken Hill region (during mid-year break) provides experience in field mapping and description as well as survey design and sample collection for later laboratory study and data presentation and interpretation. This can be related to both environmental and mineral exploration applications.

Details of field trip communicated at start of the course.

### **GEOLOGY 2504**

#### **Economic & Mine Geology II**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Mineral Geoscience) & B Eng (Mining) students only

Assumed Knowledge: C&ENVENG 1011 & GEOLOGY 1104 or equivalent

Assessment: Exam, practical work & assignment/s

The course looks at the major magmatic ore deposits of diamond, nickel, platinum group elements, chromium and vanadium and examples of major hydrothermal ore deposits of base metals, gold, tin, tungsten, uranium, rare earth elements and surficial deposits of iron, manganese, nickel, cobalt, gold and gems. This information will be integrated with introductory material on exploration, exploitation, minerals processing, metals marketing and mine financing.

### **GEOLOGY 3008**

#### **Geophysics III**

3 units - semester 2

Up to 7 hours per week

Assumed Knowledge: GEOLOGY 2503 or GEOLOGY 2008 or PHYSICS 1100 & PHYSICS 1200 or PHYSICS 1101 or MATHS 1011 & MATHS 1012 or MATHS 1013 & MATHS 2004

Incompatible: GEOLOGY 2002

Assessment: Assignments, exam

Geophysicists are employed in a wide range of industries, including petroleum and mineral exploration, groundwater, contaminants and salinity evaluation, state and government geological surveys, defence science and academic research. This course provides the background for a career in solid-earth, exploration and environmental geophysics. It is split into three sections: (i) seismic methods (ii) electromagnetic methods and (iii) potential field methods (mainly gravity and magnetics). In each section, we start with the underlying mathematical basis and examine applications at global, exploration and environmental scales. The course also involves methods of geophysical data analysis, modelling, visualisation and interpretation through a series of computer laboratories. Students will be introduced to career options through industry visits and involvement with the Australian Society of Exploration Geophysicists. The course is aimed at students from a range of numerate scientific backgrounds including geoscience, physics, engineering, mathematics and computer sciences.

### **GEOLOGY 3013**

#### **Tectonics III**

3 units - semester 1

Up to 7 hours per week, plus field trip

Assumed Knowledge: GEOLOGY 2500, GEOLOGY 2501 or GEOLOGY 2007 & GEOLOGY 2502 or GEOLOGY 2006

Incompatible: GEOLOGY 3002

Assessment: Exam, practical assignments, seminar, field trip reports

This course will develop knowledge of the Earth as a four-dimensional dynamic system. The megascopic structure of the earth -oceanic and continental crust and lithosphere, and the asthenosphere, will be introduced and compared. The basic dynamic potentials acting on the Earth (heat, gravity) will be examined, and their diverse first order effects explored (isostasy, convection, exhumation, pluming). The concepts of rifting and ocean formation will be examined, as will those of subduction and mantle plumes. Processes of orogenesis will be examined in depth. Recent and Mesozoic evidence (structural, geochemical, geophysical, sedimentological) for the operation of these processes will be examined. We will examine evidence and constraints on interpretation of these processes operating in past geological eras: the Palaeozoic, Proterozoic and Archaean. Emphasis will be placed upon understanding examples from the tectonic evolution of the Australian Plate.

Details of field trip communicated at start of the course.

### **GEOLOGY 3014**

#### **Environmental Geoscience Applications III**

3 units - semester 2

Up to 7 hours per week, plus field trips

Assumed Knowledge: GEOLOGY 2503 or GEOLOGY 2008

Incompatible: GEOLOGY 3009 & GEOLOGY 3011

Assessment: Exam, assignments

This course covers advanced aspects of geological processes in near-surface geological environments and the methods used to quantify these processes in time and space. Current applied environmental issues, such as soil salinity, erosion, coastal

degradation and their management will be looked at from the geological perspective. The relevance of the geochemistry of soil and regolith are treated in their application in mineral exploration, contamination control and waste management. Natural geohazards like earthquakes and floods are related to tectonic activities and climatic variation on local, regional and global scales.

Man-made and natural environmental impacts will be critically reviewed and possible solutions will be discussed. These include deep aquifer water storage, CO<sub>2</sub> sequestration, and nuclear waste deposition. Thus the course will draw on the basic principles of sedimentation, erosion and weathering on the earth's surface as well as tectonic, magmatic and geochemical processes. Geo-microbiological principles are introduced as an integrative part of the soil/regolith evolution process. The course will further include up to eight one-day field visits to sites of integrated field work and site inspection in the vicinity of Adelaide.

Details of field trips communicated at start of the course.

### **GEOLOGY 3015**

#### **Environmental Geoscience Processes III**

3 units - semester 1

Up to 7 hours per week, plus field trip

Available for Non-Award Study

Assumed Knowledge: GEOLOGY 2503 or GEOLOGY 2008

Assessment: Practical & theory exams, practical reports, field reports & assignments

The aim of this course is to provide an understanding of the fundamental principles of geoscience and an appreciation of their application to practical problems. The course is composed of three interlinked strands: environmental geochemistry, landscape processes and landscape evolution. The recognition, description, origin and development of regolith materials and their relation to land form, climate, and lithology will be introduced in the laboratory and reinforced during actual field survey. The aim of this course is to provide an understanding of the fundamental physical, chemical and mineralogical properties of sediments, soils and indurated regolith.

Details of field trip communicated at start of the course.

### **GEOLOGY 3016**

#### **Igneous and Metamorphic Geology III**

3 units - semester 1

Up to 7 hours per week

Pre-Requisite(s): GEOLOGY 2502 or GEOLOGY 2006 or GEOLOGY 2000

Incompatible: GEOLOGY 3004

Assessment: Practical report, exam, practical test

This course is concerned with aspects of the long-term thermal and material history of the earth's lithosphere and mantle. The course has as its foundation the basic skills learnt at level II in Igneous and Metamorphic Geology II. Included amongst the skills learnt in this course are understanding of the governing theory describing high temperature element partitioning between fluids and melts, the thermodynamic theory that governs and predicts sub-solidus mineral growth and reaction and the principles of natural radioactive decay and the application of isotopes to geochronology. Metamorphic Geology: This examines the nature and change of sub-solidus mineral assemblages and textures in rocks. This information provides a sound basis with which to examine orogenic processes. Igneous Geology: This section examines the physical controls on the generation and differentiation of silicate melts within the earth and the contribution these processes have made to the composition of the crust and mantle through time. Part of this section of the course is devoted to case studies of magma

generation in key tectonic settings on the current earth and the extrapolation of this knowledge back through time.

### **GEOLOGY 3017**

#### **Petroleum Exploration III**

3 units - semester 1

Up to 7 hours per week

Assumed Knowledge: GEOLOGY 2500 & GEOLOGY 2501 or GEOLOGY 2007

Assessment: Exam, practical reports

This course introduces the unifying concept of a petroleum system and shows how it may be used in the exploration of sedimentary basins for their oil and gas resources. The course has three inter-related themes: sequence stratigraphy, seismic methods and applied organic geochemistry. The basic principles of sequence stratigraphy are outlined including how cyclical stratigraphic patterns reflect changes in sediment supply and accommodation. The building blocks of sedimentary sequences (facies successions, key surfaces and stacking patterns) are highlighted, and how these are displayed on seismic sections and well logs. The history of the development of modern seismic and sequence stratigraphy is discussed. Current sequence stratigraphic models for siliciclastic and carbonate depositional settings in different types of basins are introduced, but the emphasis is on the flexible and pragmatic application of stratigraphic concepts and principles.

The second module covers the seismic techniques (refraction and reflection) that play a crucial role in delineating the sub-surface architecture of basins, in particular hydrocarbon kitchens, migration pathways, reservoirs and traps. The final module examines the use of geochemistry as a tool in petroleum exploration. Specific topics include source rock evaluation; the generation and migration of hydrocarbons; and the geological controls on crude oil consumption.

### **GEOLOGY 3018**

#### **Mineral Exploration III**

3 units - semester 2

Up to 7 hours per week, plus field trip

Assumed Knowledge: GEOLOGY 2502 or GEOLOGY 2006

Incompatible: GEOLOGY 3003 & GEOLOGY 3006

Assessment: Exam, field report, practical report

This course covers genetic processes and geological setting of economic mineral deposits, and the exploration strategies employed by industry. Mineralising processes are seen in the framework of the tectonic, petrogenetic and geochemical evolution of the Earth's crust on local, regional and global geological scales. Thus, we will draw upon igneous and metamorphic petrology, geochemistry, sedimentary facies analysis, and the science of soils, weathering and diagenesis in the setting of evolving landscapes.

Mineral exploration will be examined in terms of the physical and chemical characteristics of mineral deposits, and their geophysical and geochemical detection, with an emphasis on exploration strategies in regolith-covered environments. We will also discuss the tightly interrelated issues of economics of natural resources, environmental conservation and rehabilitation, and social impacts of the mining industry. Practical work includes ore microscopy, quantitative analytical methods, thermodynamic calculations, geophysical field methods, as well as an introduction to exploration software packages. The course will include at least three days of integrated geochemical and geophysical fieldwork, with industry visits to South Australian mineral deposits, PIRSA and mineral exploration companies in Adelaide.

Details of field trip communicated at start of the course.

### **GEOLOGY 3019**

#### **Field Geoscience Program III**

3 units - semester 2

15 days fieldwork

Co-Requisite(s): GEOLOGY 3013 & GEOLOGY 3016

Assumed Knowledge: GEOLOGY 2500, GEOLOGY 2501 or GEOLOGY 2007 & GEOLOGY 2502 or GEOLOGY 2006

Assessment: Field work, mapping report, literature review

This course provides a comprehensive introduction to independent geological mapping and the construction of geological maps. You will develop the skills required to interpret and solve geological relationships at a variety of scales, and synthesise them into four-dimensional models that describe the geological evolution of terrains. These skills include hand specimen and outcrop geology, mapping and stratigraphic analysis at a range of scales, aerial photo interpretation, remote sensing and the integration of geophysical datasets into geological mapping and interpretation. Thus, the course will draw upon the principals of structural geology and combine them with an understanding of sedimentary, igneous and metamorphic rock systems. Fieldwork will focus on the Precambrian terrains of southern and central Australia, however the acquired skills will be transferable into any aged geological system.

This course will include 15 days of field work. Details will be provided at the start of the course.

### **GEOLOGY 3020**

#### **Reservoir Geoscience Project III**

3 units - semester 1

Restriction: Available to BSc(PetrolGeosc) students only

Pre-Requisite(s): GEOLOGY 2500

Co-Requisite(s): GEOLOGY 3017

Assessment: Project report based on practical exercises & field work

A detailed knowledge of the reservoir rocks is fundamental to understanding the petroleum system. This course aims to give students hands-on experience in reservoir characterisation and its application in the petroleum industry. Topics covered will include the analysis and characterisation of reservoir rocks from drill cores and wireline logs, comparison of core samples with outcrop analogues and upscaling of this data to the field scale.

### **GEOLOGY 3021**

#### **Mineral Geoscience Industry Project**

3 units - semester 1

Up to 4 hours per week

Restriction: Available to BSc(MinGeoSc) students only

Assessment: Project report based on practical exercises

This course is designed to provide students in the BSc Mineral Geoscience Program with experience of industry practice in the steps from primary exploration through to mine development. The emphasis is on the scientific processes involved in determining locations of mineral deposits, establishing resource estimates, and development of mine sites through feasibility studies. The program will be based on case studies and new exploration data, and will involve interaction with industry partners through the Industry Liaison Committee.

### **GEOLOGY 4000A/B**

#### **Honours Geology Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Coursework related, research project related

Candidates may be required to attend course programs in specialised earth science topics. Candidates will undertake supervised individual research projects. Specific research programs will be generated for each individual candidate, usually involving field and laboratory work and literature review. This will require their full time. Candidates will be required to present a series of seminars, to prepare a poster and a manuscript on their research. An interstate study tour is normally held early in the year. Intending Honours students must apply, before the end of the year preceding Honours enrolment, to the Head of Geology and Geophysics or nominee for approval of candidature. For detailed information see: [www.ees.adelaide.edu.au/prospective/honours/programs/geology.html](http://www.ees.adelaide.edu.au/prospective/honours/programs/geology.html)

## **GEOLOGY 4001A/B**

### **Honours Geophysics Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Coursework related, research project related

Students with a different background to that stipulated may be accepted at discretion of Head of Discipline or nominee. Candidates will be required to attend a core program of geophysics courses. These include some combination of signal analysis, airborne geophysics, electrical and EM techniques, seismic processing, seismic interpretation, and geophysical field work. Honours students may, after consultation with the Head or nominee, also be required to take some level III courses in Geology and Geophysics, Applied Mathematics or Physics and Mathematical Physics which they did not take in third year. In addition, candidates will undertake supervised individual projects; possible topics should be discussed with the Head or nominee before the end of the preceding year. Special programs of reading and laboratory studies will be laid down and each candidate will be required to give all the time not required for lectures or in the field to work in the laboratory. Candidates will be required to contribute to a series of seminars. Intending Honours students must apply, before the end of the year preceding that in which they wish to enrol, to the Head of Discipline of Geology and Geophysics or nominee for approval of their proposed programs of study.

## **GEOLOGY 4002A/B**

### **Honours Environmental Geoscience Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Coursework related, research project related

Candidates may be required to attend course programs in specialised Environmental Geoscience topics. Candidates will undertake supervised individual research projects. Specific research programs will be generated for each individual candidate, usually involving field and laboratory work and literature review. This will require their full time. Candidates will be required to present a series of seminars, to prepare a poster and a manuscript on their research. An interstate study tour is normally held early in the year. Intending Honours students must apply, before the end of the year preceding Honours enrolment, to the Head of Geology and Geophysics or nominee for approval of candidature. For detailed information see: [www.ees.adelaide.edu.au/prospective/honours/programs/geology.html](http://www.ees.adelaide.edu.au/prospective/honours/programs/geology.html)

## **GEOLOGY 4003A/B**

### **Honours B.Env.Sc (Geology) Part 1 & 2**

12 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research proposal, literature review, seminars, thesis 60%, average of 4 specified Level III courses 40%

Requirement: modest research project of student's choosing (on topic acceptable to Discipline) normally taken at same time as coursework (4 Level III courses - 12 units - relevant to student's Honours project and approved by Head of Discipline)

Intending candidates should consult the Head of Discipline and potential supervisors during third year and be prepared to begin studies at the beginning of February or July (mid year intake).

## **Horticulture**

### **HORTICUL 3000WT**

#### **Production Horticulture III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: ENV BIOL 2006 or equivalent

Assessment: Exam, assignments

The course examines production of commercial fruit, vegetable and nut crops including limits to production and characteristics for cultivars, management and irrigation, harvesting and marketing. Crops considered include citrus, apple and pears, grape vines, soft vines (berries), stone fruits, almond, walnut, macadamia, pecan, pistachio, and the tropical fruit, pineapple, banana, mango, lychee and avocado. Vegetables include tomato, potato, brassicas, cucurbits, lettuce and the onion group.

### **HORTICUL 3001WT**

#### **Horticulture Systems III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: ENV BIOL 2006 or equivalent

Assessment: Mid-semester exam, final exam, assignments

The importance of horticulture to the community, sustainability and economic value, horticultural production areas and environmental factors involved. Fruit crop growth and its control using cultural and chemical methods. Horticultural propagation methods. The basis of production systems which include horticulture, and systems which combine different types of horticulture. Plant improvement and breeding. The significance of pollination to horticulture.

### **HORTICUL 4003AWT**

#### **Honours in Horticulture Part 1 & 2**

12 units - semester 1 or semester 2

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Thesis, seminars, remainder as deemed appropriate to the student's program

This course comprises a substantial research project of the student's choosing on a topic acceptable to the Head of School of Agriculture, Food and Wine, two seminar on that topic and coursework, essays or other assignments deemed appropriate to the individual student's honours program.

### **HORTICUL 4003BWT**

## Honours in Horticulture Part 2

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: To be advised

This course is available under the provisions of Academic Program Rule 5.7.2

Intending candidates must consult the Honours Coordinator and potential supervisors during October of the final year of studies for the degree of Bachelor of Science, and should be prepared to commence studies on or about 1 February. After consultation, each candidate must obtain a letter of acceptance from the Head of the Discipline of Wine and Horticulture. A research project will then be assigned which will be carried out under supervision. The results will be presented in a seminar and research report at the end of the course. A candidate may also be required to prepare an essay, attend lectures and pass an exam.

## Microbiology

### MICRO 2500

#### Microbiology II

3 units - semester 1

Up to 5 hours per week

Available for Non-Award Study

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202. Alternatively a Pass or higher in ANAT SCI 1102 & ANAT SCI 1103 or equivalent

Incompatible: MICRO 2502, MICRO 2504 & MICRO 2000 or equivalent

Assessment: Exam on lecture material, tutorial & practical assessment

This course is an introduction to microbiology that provides a strong grounding in fundamental aspects of the basic biology of bacteria as well as a strong grounding in molecular biology and microbial genetics. Emphasis is placed on the study of infectious diseases of humans, other animals and plants. Topics covered include: introduction to microorganisms and their environment, microbial structure and function; microbial molecular biology and genetics; bacterial viruses; structure; an introduction to pathogen-host interactions; new and emerging pathogens of humans and other animals; infectious disease and mechanisms by which microbial pathogens interact with animals and plants; biotechnological applications of bacteria. Students enrolled in this course will attend one or more of Practicals A, B and C offered by the School of Molecular and Biomedical Science. Refer to Current Students Online Enrolment information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for further information.

### MICRO 2501

#### Immunology & Virology II

3 units - semester 2

Up to 5 hours per week

Available for Non-Award Study

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202. Alternatively a Pass or higher in ANAT SCI 1102 & ANAT SCI 1103 or equivalent

Assumed Knowledge: MICRO 2500, MICRO 2502, MICRO 2504, MICRO 2000A or MICRO 2001A

Incompatible: MICRO 2503 & MICRO 2505 or MICRO 2000B or equivalent

Assessment: Exam on lecture material, written reports, tutorial & practical assessment

This course introduces Immunology and Virology and is complementary to Microbiology II and equivalent courses. An integrated approach is used to study the mechanisms by which our immune system deals with pathogens. Topics covered in the Immunology section comprise innate and adaptive immunity, including T and B cell development, cell mediated and humoral immunity; receptors and cytokines; inflammatory responses; tolerance and autoimmunity; immunity to intra- and extra-cellular organisms such as bacteria, viruses and macroparasites. Topics covered in the Virology section include: information on structure, replication and classification of eukaryotic viruses; virus-host interactions; epidemiology of virus infections; virus vaccines, antiviral drugs and viral diagnostics. Students enrolled in this course will attend one or more of Practicals A, B and C offered by the School of Molecular and Biomedical Science. Refer to Current Students Online Enrolment information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for further information.

### MICRO 2504

#### Microbiology II (Biotechnology)

3 units - semester 1

Up to 5 hours per week

Restriction: Available to B Sc (Biotechnology) students only

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Assumed Knowledge: CHEM 1100 or CHEM 1101 & CHEM 1200 or CHEM 1201

Incompatible: MICRO 2500, MICRO 2502, MICRO 2000, MICRO 2004 & MICRO 3003

Assessment: Examination of lecture material, tutorial & practical assessment

This course is an introduction to microbiology that provides a strong grounding in fundamental aspects of the basic biology of bacteria and bacterial viruses as well as aspects of molecular biology and genetics. Emphasis is placed on biotechnological applications of bacteria such as the cloning of bacterial genes, expression of recombinant proteins for therapeutic and industrial uses and development of biological control agents. Topics covered include: introduction to microorganisms and their environment, microbial structure and function; microbial molecular biology and genetics; bacterial viruses; new and emerging pathogens of humans and other animals; mechanisms by which micro-organisms cause disease in plants and animals; biotechnological applications of bacteria. Students enrolled in this course will attend one or more of Practicals A, B and C offered by the School of Molecular and Biomedical Science. Refer to Current Students Online Enrolment information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for further information.

### MICRO 2505

#### Immunology & Virology II (Biotechnology)

3 units - semester 2

Up to 5 hours per week

Restriction: Available to B Sc (Biotechnology) students only

Pre-Requisite(s): BIOLOGY 1101 & BIOLOGY 1201 or BIOLOGY 1202

Assumed Knowledge: MICRO 2504, MICRO 2002 or MICRO 2004

Incompatible: MICRO 2501, MICRO 2503, MICRO 2003B or equivalent

Assessment: Exam on lecture material, written reports, tutorial & practical assessment

This course introduces Immunology and Virology and is complementary to Microbiology II and equivalent courses. An integrated approach is used to study the mechanisms by which our immune system deals with pathogens. Emphasis is also given to the fundamental roles of Immunology and Virology in Biotechnology. Topics covered in the Immunology section comprise innate and adaptive immunity, including T and B cell development, cell mediated and humoral immunity; receptors and cytokines; inflammatory responses; tolerance and autoimmunity; immunity to intra- and extra-cellular organisms such as bacteria, viruses and macroparasites. Topics covered in the Virology section include: information on structure, replication and classification of eukaryotic viruses; virus-host interactions; epidemiology of virus infections; virus vaccines, antiviral drugs and viral diagnostics. Students enrolled in this course will attend one or more of Practicals A, B and C offered by the School of Molecular and Biomedical Science. Refer to Current Students Online Enrolment information at [www.sciences.adelaide.edu.au](http://www.sciences.adelaide.edu.au) for further information.

### **MICRO 2506**

#### **Medical Microbiology and Immunology II**

3 units - semester 1

Up to 3.5 hours per week

Restriction: Available to Level II MBBS students only, and to Level III MBBS students as an elective for 2010 only

Pre-Requisite(s): MBBS Level I

Assumed Knowledge: BIOLOGY 1101 & BIOLOGY 1201

Incompatible: MICRO 3003

Assessment: Tutorials, Mid-Term Test and Exam

This course is an introduction to basic immunology, virology and microbiology for MBBS Level 2 students. Emphasis is first placed on understanding the fundamentals of these disciplines, with examples relevant to clinical and diagnostic medicine. Topics covered in

Immunology include: Innate immunity; specific humoral effector mechanisms; cells and tissues of the immune system; antigen recognition by T cells; cell-mediated immunity, hypersensitivity; human leukocyte antigen (HLA) polymorphism, transplantation; autoimmunity; immunodeficiency.

Virology include: virus classification, structure and replication; pathogenesis, epidemiology and control of virus infections; respirator, gastrointestinal and sexually transmitted viruses; virus diagnostic methods.

Microbiology include: bacterial structure, classification and growth; mechanisms of gene transfer; diagnostic microbiology; mechanisms of bacterial pathogenesis; sterilisation and disinfection; meningitis and encephalitis; antibiotics and resistance; medical mycology and parasitology

### **MICRO 3000**

#### **Infection and Immunity IIIA**

6 units - semester 1

Up to 19 hours per week

Available for Non-Award Study

Pre-Requisite(s): MICRO 2500 & MICRO 2501 or equivalent

Incompatible: MICRO 3102

Assessment: Exam on lecture material, practical component, performance in tutorials.

This advanced course examines the molecular basis of interactions of bacterial pathogens with their environment and various hosts, especially those which infect humans. Bacterial pathogens of global and medical significance that will be highlighted in detail include: *Streptococcus pneumoniae*, *Salmonella* sp., *Shigella* sp.,

*Escherichia coli*; *Mycobacterium*; and *Neisseria* sp. Particular emphasis is given to the use of molecular biological approaches for study of bacterial infectious disease pathogenesis, and biotechnological applications, including vaccine development will also be highlighted.

Topics to be explored include: bacterial pathogens - global significance of infectious disease; principal approaches for investigating host-pathogen interactions; virulence factors which promote colonisation and damage to the host; cell surface polysaccharides and proteins; role of antigenic and phase variation in virulence and disease; gene regulation, especially in relation to expression of virulence factors; stress responses; invasion and intracellular survival and multiplication; resistance and avoidance of innate host defences; bacterial toxins; role of bacteriophage and other genetic elements in evolution of pathogenesis; antibiotic resistance; vaccines and therapeutic interventions; genomic approaches to analysis of virulence; food safety microbiology

The lecture program is complemented by tutorials, which extend skills in exploring and critically assessing the scientific literature, and practicals which develop advanced experimental skills for the study of bacterial pathogenic mechanisms.

### **MICRO 3001**

#### **Infection and Immunity IIIB**

6 units - semester 2

Up to 19.5 hours per week

Available for Non-Award Study

Pre-Requisite(s): MICRO 2500 & MICRO 2501 or equivalent

Assumed Knowledge: MICRO 3000

Incompatible: MICRO 3202

Assessment: Exam on lecture material, written reports, practical & tutorial assessment

This is an advanced course in immunology and virology. The course includes detailed examination of the cellular and molecular biology of the immune system, immune responses to microbial pathogens and other antigenic stimuli and immunisation against infections in humans and animals. Detailed attention will be given to major virus infections and typical host immune responses, the experimental models used to study viruses and antiviral therapies including chemotherapies and vaccination. Topics to be covered include: differentiation and activation of leukocytes; functions of leukocyte subsets; cell biology of antigen processing and presentation; molecular recognition of antigen; molecular and cellular bases of inflammation; signal transduction in immune cells; characteristics and functions of cytokines; mechanisms of immunoregulation; cellular communication and leukocyte traffic through tissues; production and use of monoclonal antibodies; local immunity at mucosal surfaces; immunity to infectious agents, including bacteria, viruses and parasites; inflammatory and autoimmune diseases such as asthma and arthritis; control and prevention of infections; strategies for the design and use of vaccines and gene therapy; important diseases will be considered as specific examples. Viruses to be studied will include examples chosen from those responsible for hepatitis, human immunodeficiency, respiratory and gastrointestinal infections and diseases of the skin and nervous systems.

### **MICRO 3003**

#### **Medical Microbiology and Immunology III**

6 units - semester 1

Up to 10 hours per week

Available for Non-Award Study

Pre-Requisite(s): PATHOL 2000 or Level I MBBS

Incompatible: MICRO 2000A/B, MICRO 2001A/B & MICRO 2003A/B or MICRO 2002

Assessment: Written exams, practical exercises

The microbiology component of the course deals with the following: isolation, morphology, physiology and classification of bacteria of medical importance; the principles of action of antibiotics and chemotherapeutic agents; introduction to sterilisation and disinfection; the role of micro-organisms in human disease; an outline of infections caused by important bacterial pathogens; and principles of prophylaxis and prevention. Virology is discussed as principles of viral replication; an outline of human virus infections, epidemiology of virus infections; collection of specimens for viral diagnosis; an outline of common approaches to diagnosis in virology; and principles of treatment and prevention of infection. In immunology, there is discussion of the principles of host defences; an outline of mechanisms involved in adaptive immunity; application of these principles to vaccination and understanding sero-diagnosis; and an introduction to allergy, hypersensitivity, autoimmunity and transplantation. The course is related, whenever possible, to clinical material.

### **MICRO 3102**

#### **Infection & Immunity IIIA (Biomedical Science)**

6 units - semester 1

Up to 19 hours per week

Restriction: Available to BSc(BiomedSc) students only

Pre-Requisite(s): MICRO 2503 & MICRO 2504 or equivalent

Incompatible: MICRO 3000

Assessment: Exam on lecture material, practical component activities, performance in symposia/seminars

This advanced course examines the molecular basis of interactions of bacterial pathogens with their environment and various hosts, especially those which infect humans. Bacterial pathogens of global and medical significance that will be highlighted in detail include: *Streptococcus pneumoniae*, *Salmonella* sp., *Shigella* sp., *Escherichia coli*; *Mycobacterium*; and *Neisseria* sp. Particular emphasis is given to the use of molecular biological approaches for study of bacterial infectious disease pathogenesis, and biotechnological applications, including vaccine development will also be highlighted.

Topics to be explored include: bacterial pathogens - global significance of infectious disease; principal approaches for investigating host-pathogen interactions; virulence factors which promote colonisation and damage to the host; cell surface polysaccharides and proteins; role of antigenic and phase variation in virulence and disease; gene regulation, especially in relation to expression of virulence factors; stress responses; invasion and intracellular survival and multiplication; resistance and avoidance of innate host defences; bacterial toxins; role of bacteriophage and other genetic elements in evolution of pathogenesis; antibiotic resistance; vaccines and therapeutic interventions; genomic approaches to analysis of virulence; food safety microbiology

The lecture program is complemented by tutorials, which extend skills in exploring and critically assessing the scientific literature, and practicals which develop advanced experimental skills for the study of bacterial pathogenic mechanisms.

### **MICRO 3202**

#### **Infection and Immunity IIIB (Biomedical Science)**

6 units - semester 2

Up to 19.5 hours per week

Restriction: Available to BSc(BiomedSc) students only

Pre-Requisite(s): MICRO 2502 & MICRO 2503 or equivalent

Assumed Knowledge: MICRO 3102

Incompatible: MICRO 3001

Assessment: Exam on lecture material; written reports; practical & tutorial assessment

This is an advanced course in immunology and virology. The course includes detailed examination of the cellular and molecular biology of the immune system, immune responses to microbial pathogens and other antigenic stimuli and immunisation against infections in humans and animals. Detailed attention will be given to major virus infections and typical host immune responses, the experimental models used to study viruses and antiviral therapies including chemotherapies and vaccination. Topics to be covered include: differentiation and activation of leukocytes; functions of leukocyte subsets; cell biology of antigen processing and presentation; molecular recognition of antigen; molecular and cellular bases of inflammation; signal transduction in immune cells; characteristics and functions of cytokines; mechanisms of immunoregulation; cellular communication and leukocyte traffic through tissues; production and use of monoclonal antibodies; local immunity at mucosal surfaces; immunity to infectious agents, including bacteria, viruses and parasites; inflammatory and autoimmune diseases such as asthma and arthritis; control and prevention of infections; strategies for the design and use of vaccines and gene therapy; important diseases will be considered as specific examples. Viruses to be studied will include examples chosen from those responsible for hepatitis, human immunodeficiency, respiratory and gastrointestinal infections and diseases of the skin and nervous systems.

### **MICRO 4000A/B**

#### **Honours Microbiology and Immunology Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Candidates will normally be expected to start the program at the beginning of February, but this may be altered in special circumstances. Candidates are required to devote their full time to a special program of study in Microbiology, Immunology or Virology. This will involve theoretical studies, seminars and a research project under the direction and supervision of one or more staff members. Examination of a thesis presenting the results of the research project undertaken is an essential part of the assessment procedure. Full details of assessment procedures may be obtained from the Discipline.

Intending Honours candidates should consult the Discipline Leader of Microbiology and Immunology during the final year of the B.Sc.

## **Oenology**

### **OENOLOGY 1000EX**

#### **Introductory Grape and Wine Knowledge I**

3 units - semester 1

5 day Residential School in Mid Semester Break

Restriction: Available to B Wine Marketing, Dip Wine Marketing students only

Assessment: Semester written exams, practical tests

Grapevine morphology, growth and development; grape berry development; changes in grape berry composition during ripening; physiology of smell and taste; basic winemaking principles. Practical exercises sessions designed to train student's palate in wine sensory evaluation and to differentiate between Australian wine types and styles.

## **OENOLOGY 1000NW**

### **Introductory Grape and Wine Knowledge I**

3 units - semester 1

Up to 4 hours per week, plus 5 day residential school in mid-semester break

Restriction: Available to B Wine Marketing, Dip Wine Marketing students only

Assessment: Semester written exams, practical tests

Grapevine morphology, growth and development; grape berry development; changes in grape berry composition during ripening; physiology of smell and taste; basic winemaking principles. Practical exercises sessions designed to train student's palate in wine sensory evaluation and to differentiate between Australian wine types and styles.

## **OENOLOGY 1001EX**

### **Vineyard and Winery Operations I**

3 units - semester 2

5 day Residential School in Mid Semester Break

Restriction: Available to B Wine Marketing, Dip Wine Marketing students only

Pre-Requisite(s): OENOLOGY 1000NW or OENOLOGY 1000EX

Assessment: Semester written exams, practical tests

Climatic requirements for grapevines; vineyard design, establishment and operations including pruning, irrigation, canopy management, soil management and pest and disease management; characteristics of major white wine grape varieties; principles and practices of white and sparkling wine production; major white wine styles of the world; oak in winemaking.

Practical sessions relate to lecture topics and include viticulture exercises and wine sensory evaluation.

## **OENOLOGY 1001NW**

### **Vineyard and Winery Operations I**

3 units - semester 2

1 x 2 hour Lecture, 5 day residential school in Mid Semester Break

Restriction: Available to BWineMark and DipWineMark students only

Pre-Requisite(s): OENOLOGY 1000NW or OENOLOGY 1000EX

Assessment: Semester written exams, practical tests

Climatic requirements for grapevines; vineyard design, establishment and operations including pruning, irrigation, canopy management, soil management and pest and disease management; characteristics of major white wine grape varieties; principles and practices of white and sparkling wine production; major white wine styles of the world; oak in winemaking.

Practical sessions relate to lecture topics and include viticulture exercises and wine sensory evaluation.

## **OENOLOGY 1001WT**

### **Vineyard and Winery Operations I**

3 units - semester 2

1 x 2 hour Lecture, 5 day residential school in Mid Semester Break

Restriction: Available to B Wine Marketing, Dip Wine Marketing students only

Pre-Requisite(s): OENOLOGY 1000NW or OENOLOGY 1000EX

Assessment: Semester written exams, practical tests

Climatic requirements for grapevines; vineyard design, establishment and operations including pruning, irrigation, canopy

management, soil management and pest and disease management; characteristics of major white wine grape varieties; principles and practices of white and sparkling wine production; major white wine styles of the world; oak in winemaking.

Practical sessions relate to lecture topics and include viticulture exercises and wine sensory evaluation.

## **OENOLOGY 1018NW**

### **Foundations of Wine Science I**

3 units - semester 1

Up to 4 hours per week, plus 5 day residential school in mid-semester break

Restriction: Available to B Sc (Viticulture) & B Oenology students only

Assessment: Written exam & practical exam

Grapevine morphology, growth and development; grape berry development; changes in grape berry composition during ripening; physiology of smell and taste; basic winemaking principles. Practical exercise sessions designed to train student's palate in wine sensory evaluation and to differentiate between Australian wine types and styles. This course shares lectures and practicals with Introductory Grape and Wine Knowledge (OENOLOGY 1000NW) Extra material is provided for Viticulture and Oenology students covering some aspects in greater scientific depth

## **OENOLOGY 2500EX**

### **Vineyard and Winery Operations II**

3 units - semester 1

5 day Residential School in Mid Semester Break

Restriction: Available to B Wine Marketing, Dip Wine Marketing students only

Pre-Requisite(s): OENOLOGY 1001NW or OENOLOGY 1001EX

Assessment: Exam, practical tests, reports

Characteristics of major red wine grape varieties; principles and practices of red wine production; major red wine styles of the world; red wine faults; techniques for grapevine improvement and biotechnology, as applied to the wine industry; wine packaging, bottling operations and quality standards; sensory science. Practical sessions relate to lecture topics and will include tasting sessions.

## **OENOLOGY 2500NW**

### **Vineyard and Winery Operations II**

3 units - semester 1

Up to 2 hours per week, plus 5 day residential school in mid-semester break

Restriction: Available to BWineMark and DipWineMark students only

Pre-Requisite(s): OENOLOGY 1001NW or OENOLOGY 1001EX

Assessment: Exam, practical tests, reports

Characteristics of major red wine grape varieties; principles and practices of red wine production; major red wine styles of the world; red wine faults; techniques for grapevine improvement and biotechnology, as applied to the wine industry; wine packaging, bottling operations and quality standards; sensory science. Practical sessions relate to lecture topics and will include tasting sessions.

## **OENOLOGY 2500WT**

### **Vineyard and Winery Operations II**

3 units - semester 1

Up to 2 hours per week, plus 5 day residential school in mid-semester break

Restriction: Available to B Wine Marketing, Dip Wine Marketing students only

Pre-Requisite(s): OENOLOGY 1001NW or OENOLOGY 1001EX

Assessment: Exam, practical tests, reports

Characteristics of major red wine grape varieties; principles and practices of red wine production; major red wine styles of the world; red wine faults; techniques for grapevine improvement and biotechnology, as applied to the wine industry; wine packaging, bottling operations and quality standards; sensory science. Practical sessions relate to lecture topics and will include tasting sessions.

### **OENOLOGY 2501WT**

#### **Microbiology for Viticulture and Oenology II**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Viticulture) & B Oenology students only

Assumed Knowledge: BIOLOGY 1202, BIOLOGY 1101 & OENOLOGY 1018NW

Assessment: Practical attendance, reports, exam, tutorial exercises

An introduction to the biology of microorganisms and invertebrates of importance in agriculture and natural ecosystems with particular emphasis on viticulture and oenology. Topics to be considered include: microbial growth, energy sources and nutritional categories; form and function of major groups of microorganisms; classification and identification; beneficial and deleterious activities of microorganisms; features of saprophytic, pathogenic, symbiotic and commensal lifestyles; determinants of pathogenicity and resistance; interactions of microorganisms and environment; nature and occurrence of Botrytis, yeasts and bacteria associated with the vineyard and winery, and their influence on grape and wine quality; interactions between wine yeast and bacteria; spoilage and selected strains of yeast in wine; nutritional requirements and wine processing parameters affecting growth and activity of wine yeast; practical skills for manipulating microorganisms and invertebrates and studying their activities.

### **OENOLOGY 2502WT**

#### **Sensory Studies II**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Oenology & BSc (Viticulture) students only

Assumed Knowledge: BIOLOGY 1202, BIOLOGY 1101, OENOLOGY 1018NW, CHEM 1100 or CHEM 1101, CHEM 1102 or CHEM 1201

Assessment: Exams, written exercises, presentations, practicals

This course provides a scientifically based introduction to sensory evaluation and its relationship to the winemaking process, and promotes the development of technically accurate wine assessment skills. The physiology of taste receptors, olfaction and the structure of oral mucosa are examined. Recent advances in knowledge including the function of signal transduction molecules and protein structure are used to explain current models of flavour, astringency and taste perception. Basic flavour chemistry of grapes and wine and wine faults is introduced. An introduction to sensory measurement theory, psychophysics, aroma and taste interactions, threshold measurement and the psychological and physiological factors affecting perception is presented. The concept of adaptation and its application to the sensory evaluation of wines, and elements of good sensory practice including data collection and statistical analysis are described. The practical program will be used to develop basic skills in sensory assessment of wines leading to the

interpretation of wine characteristics in terms of wine style and quality. This is achieved by a progressive development of sensory skills, using model solutions to depict basic tastes and their interactions, followed by detailed examination of white and red table, fortified and sparkling wines, and wine and food interactions.

### **OENOLOGY 2503WT**

#### **Introductory Winemaking II**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: BIOLOGY 1202, BIOLOGY 1101, OENOLOGY 1018NW, CHEM 1100 or CHEM 1101, CHEM 1200 or CHEM 1201

Assessment: Practical Reports, Assignments, Exam

Introduction to the Australian wine industry. Chemistry and unit processes of winemaking. Production of table wines, including dry floral fruity white, full bodied white, sweet white, rose, medium and full bodied red wines. Introduction to wine stabilization and maturation processes.

### **OENOLOGY 3001WT**

#### **Research Project: Oenology III**

3 units -

Up to 10 hours per week

Assessment: literature review, research proposal, seminar

Enrolment subject to the approval of the Head of Discipline.

The course comprises a small research project to be undertaken during the 4th year of the course under the supervision of a staff member in the Discipline. Students wishing to undertake a research project should consult the Course Coordinator before the beginning of the 4th year.

### **OENOLOGY 3003WT**

#### **Wine Packaging and Quality Management III**

3 units - semester 2

Up to 6 hours per week

Pre-Requisite(s): OENOLOGY 3007WT & OENOLOGY 3047W

Assessment: Practicals, reports, written assignments & exams

Science and technology of bottling and packaging systems including chemical and physical properties of packaging materials, principles of filling machinery, design and process control of wine filling/packaging systems.

Wine and food laws and commercial forces as quality standards. Taints and residues in grapes and wine as quality issues. Approaches and systems of quality management using the wine industry as a focus, including the development of corporate quality cultures, standards and specifications. Visits will be made to commercial plants.

### **OENOLOGY 3007WT**

#### **Stabilisation and Clarification III**

3 units - semester 1

Up to 6 hours per week

Restriction: Available BOenol students only

Assessment: Practicals, reports, written assignments, exam

Principles and practices of wine clarification and stabilisation. Protein, tartrate, metal, colour oxidative, and microbiological stability and stability testing of wine. Wine clarification by means of settling, centrifugation, filtration and fining.

### **OENOLOGY 3016WT**

#### **Cellar and Winery Waste Management III**

3 units - semester 1

Up to 6 hours per week

Restriction: Available BOenol students only

Assessment: Final exam, practical reports & tutorial papers

Vintage planning; occupational health and safety, winery record keeping; microbial control, cellular hygiene; winery waste management, environmental Management.

OENOLOGY 3033WT

Industry Exp.(Oenology) III

4 units - semester 1

10 weeks

Pre-Requisite(s): OENOLOGY 7010WT, 7047WT & 7022WT

Assessment: Written diary, written report, poster presentation

This course is largely practically orientated, based on work experience at a commercial winery during vintage. A specified level of proficiency in the following operations is expected: grape receipt and weighbridge; crushing; draining and pressing; fermentation and postfermentation operations and quality control procedures. Furthermore, an understanding of the contribution of each of the specified unit operations to the overall winemaking process is required.

### **OENOLOGY 3037WT**

#### **Distillation, Fortified & Sparkling Winemaking III**

3 units - semester 2

Up to 6 hours per week

Pre-Requisite(s): OENOLOGY 2503WT, OENOLOGY 2502WT & OENOLOGY 3016WT

Assessment: Practical reports, assignments, written exam

Distillation principles and wine distillation practices. Production of Australian and overseas grape spirits for fortified wine and brandy production. Production of potable distilled beverages other than brandy. Legal requirements of fortified wine production and distillation. Production of Australian and overseas sparkling wine styles. Sensory evaluation of spirits, fortified and sparkling wines.

### **OENOLOGY 3045WT**

#### **Advances in Oenology III**

3 units - semester 2

Up to 8 hours per week

Assumed Knowledge: OENOLOGY 2024WT

Assessment: Written exam, reports on practical exercises, industry visits

Current research and practices in oenology. Particular emphasis will be placed on grape and wine phenolics and flavour compounds; methods of analysis in wine science; yeast biochemistry including nutrition, sugar transport, nitrogen and organic acid metabolism, ethanol toxicity, sulphur dioxide production and tolerance, yeast aroma compounds; the malolactic fermentation - biochemical and molecular approaches. Wine industry visits will focus on modern practices and recent developments to increase production efficiencies and wine quality

### **OENOLOGY 3046WT**

#### **Fermentation Technology III**

3 units - semester 2

Up to 6 hours per week

Restriction: Available BOenol students only

Pre-Requisite(s): OENOLOGY 2502WT & OENOLOGY 2503WT

Assessment: Exam, written work, practical reports, group oral presentations

This practical course provides students with the opportunity to gain hands on winemaking experience that expands on areas of fermentation technology and preparation of wine for bottling post vintage. The course introduces students to the planning and managing of winemaking strategies, and importantly complements the theory covered in the other wine technology courses for table wine production. Another objective of this course is to help students make a considerable progression in the development of their wine sensory evaluation skills

### **OENOLOGY 3047WT**

#### **Winemaking at Vintage III**

3 units - semester 1

Up to 7 hours per week

Restriction: Available BOenol students only

Co-Requisite(s): OENOLOGY 3016WT

Assessment: To be advised

This practical course provides students with the opportunity to gain hands on winemaking experience over the vintage period. The course introduces students to the planning and managing of winemaking strategies. It covers all aspects of grape processing, white juice preparation and red wine fermentation and is designed to complement the theory covered in the other wine technology courses for table wine production. This course also aims to help students make a considerable progression in the developments of their wine sensory evaluation skills.

### **OENOLOGY 3500WT**

#### **Industry Experience (Viticulture & Oenology) III**

3 units - semester 1 or semester 2

10 weeks in full time employment

Restriction: Available to BOenol students only

Pre-Requisite(s): OENOLOGY 3047WT & OENOLOGY 3016WT

Assessment: Written diary, written report, oral presentation

This course is largely practically orientated, based on work experience at a commercial winery during vintage. A specified level of proficiency in the following operations is expected: grape receipt and weighbridge; crushing; draining and pressing; fermentation and post-fermentation operations and quality control procedures. Furthermore, an understanding of the contribution of each of the specified unit operations to the overall winemaking process is required. Students can undertake this course in either semester.

### **OENOLOGY 4002AWT/BWT**

#### **Honours Oenology Part 1 & 2**

12 units - full year

Up to 40 hours per week

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Thesis, seminars, remainder as deemed appropriate to the student's program

This course comprises a substantial research project of the student's choosing on a topic acceptable to the Discipline of Wine and Horticulture, two seminars on that topic, and coursework, essays or other assignments deemed appropriate to the individual student's honours program.

### **OENOLOGY 4004AWT/BWT**

## Honours Wine Science Part 1 & 2

24 units - full year

Up to 40 hours per week

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Thesis, seminars, remainder as deemed appropriate to the student's program

This course comprises a substantial research project of the student's choosing in a topic acceptable to the head of School of Agriculture, Food and Wine, two seminars on that topic, and coursework, essays or other assignments deemed appropriate to the individual student's honours program.

## Physics

### PHYSICS 1002

#### Astronomy I

3 units - semester 1 or semester 2

Up to 5.5 hours per week

Available for Non-Award Study

Assessment: Exam, practical work, essay

This course aims to present a survey of astronomical science, including highlights of modern exploration and the open questions in astronomy. Topics include the formation and characteristics of the Solar System, including the planets and minor members of the system; Telescopes; the Sun; the birth, life and death of stars; galaxies and dark matter; active galaxies and quasars; Big Bang cosmology. There are no formal prerequisites for the course, though mathematical literacy at year 10 level is assumed.

### PHYSICS 1005

#### Physics, Ideas and Society I

3 units - semester 2

Up to 3 hours per week

Available for Non-Award Study

Assessment: Essays, tutorial work

This course is non-mathematical in character and no previous knowledge of physics is assumed. It is taught in the style of the humanities and social sciences. Physics, Ideas and Society I is designed to provide an understanding of some of the principal currents of thought in physics and of the scientific background to some of the philosophical, political and social issues that confront society.

Topics to be selected from the following - physics and its laws; the fundamental constituents of matter; people, energy and the earth; space, time and relativity; the universe.

### PHYSICS 1007

#### Space Science and Astrophysics I

3 units - semester 1 or semester 2

Up to 7 hours per week

Restriction: Available to B Sc (Space Sci & Astrophysics) students only

Incompatible: PHYSICS 1002

Assessment: Exam, practical work, essay

This course aims to present a survey of astronomical science, including highlights of modern exploration and the open questions in astronomy. Topics include the formation and characteristics of the Solar System, including the planets and minor members of the system; Telescopes; the Sun; the birth, life and death of stars;

galaxies and dark matter; active galaxies and quasars; Big Bang cosmology.

### PHYSICS 1008

#### Physics Principles & Applications I

3 units - semester 1

Up to 7 hours per week

Restriction: Students without SACE Stage 2 Physics or with a Subject Achievement score of less than 13 or equivalent

Available for Non-Award Study

Incompatible: PHYSICS 1100 & PHYSICS 1101

Assessment: Written exam, tutorial work, practical work

This course provides an introduction to some of the principles of physics and their applications in agricultural and biological sciences. It is intended for students who have not studied SACE Stage 2 Physics, and who require familiarity with Physics principles and applications in their other studies. The course introduces concepts of force, energy, thermal physics, fluids and DC electricity. Introduction to practical problem solving. Students who pass this course and have completed SACE Stage 2 Mathematical Studies (or equiv.) may enrol in the semester 2 course PHYSICS 1102 Physics for the Life and Earth Sciences IB.

### PHYSICS 1100

#### Physics IA

3 units - semester 1

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): SACE Stage 2 Physics, Math.Studies, Specialist Maths - in exceptional circumstances, high achieving students without Specialist Maths may be granted exemption on application to Head of Physics

Co-Requisite(s): MATHS 1011 - students may be permitted to enrol in Physics IA concurrently with MATHS 1013 on application to Head of Physics

Incompatible: PHYSICS 1101 & PHYSICS 1008

Assessment: Written exam, tutorial preparation, practical work

This calculus-based course is the foundation for a major in physics, and also provides a quantitative understanding of physics concepts applicable in biological and geological sciences, and in Engineering.

Measurement and uncertainties. Particle mechanics: Newton's law of motion, gravitation, work, energy, conservative forces, momentum, collisions. Thermal physics: heat, temperature, internal energy, kinetic theory of gases, thermodynamic processes. Electricity and magnetism: charge and current, electric field, Ohm's Law, DC circuits, Coulomb and Gauss' laws, electrostatics, capacitance, magnetic field, Ampere and Faraday's laws, inductance, LC circuits. Practical problem solving.

### PHYSICS 1101

#### Physics for the Life and Earth Sciences IA

3 units - semester 1

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): SACE Stage 2 Physics Subject Achievement score of at least 13 (or equivalent), Mathematical Studies - other students may apply to Head of Physics for exemption

Incompatible: PHYSICS 1101 & PHYSICS 1008

Assessment: Written exam, tutorial work, practical work

This course provides an introduction to physics at university level for students who wish to major in biological or earth sciences (Physics IA/B and Mathematics IA/B are recommended for students interested in Biophysics or Geophysics). It includes significant material not in SACE Stage 2 Physics. The emphasis is on physics concepts and their application to relevant problems in the earth and biological sciences rather than on the more theoretical or mathematical development of the concepts. It includes a study of forces and equilibrium, mechanical stress, energy, fluids, heat and DC electricity. Applications to biology and physiology will be emphasised. Practical problem solving.

## **PHYSICS 1200**

### **Physics IB**

3 units - semester 2

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 1100

Co-Requisite(s): MATHS 1012 - students may be permitted to enrol in Physics IB concurrently with MATHS 1011 on application to Head of Discipline

Assumed Knowledge: MATHS 1011 or MATHS 1013 & PHYSICS 1100

Incompatible: PHYSICS 1201

Assessment: Written exam, tutorial preparation, practical work

This calculus-based course completes the Level I sequence for a major in physics, and also provides a quantitative understanding of physics concepts applicable in biological and geological sciences and in Engineering.

Rigid body mechanics: centre of mass, rotational motion, torque, angular momentum, equilibrium, oscillations  
Waves and Optics: transverse and longitudinal waves, superposition, interference, standing waves, Fourier decomposition, Fermat's principle, geometric optics, physical optics, interference, Michelson interferometers, thin film interference, diffraction, resolution of telescopes.  
Relativity and Quantum Physics: kinematics, time dilation, length contraction, Lorentz transformations, transformation of velocities, relativistic momentum and energy, X-rays as waves and photons, photoelectric and Compton effects, pair production, de Broglie waves, uncertainty principle, the quantum mechanical wave function. Practical problem solving.

## **PHYSICS 1201**

### **Physics for the Life and Earth Sciences IB**

3 units - semester 2

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): Either SACE Stage 2 Physics Subject Achievement score of at least 13 (or equivalent) and Mathematical Studies or PHYSICS 1008 - other students may apply to Head of Physics for exemption

Assumed Knowledge: PHYSICS 1101 or PHYSICS 1008

Incompatible: PHYSICS 1200

Assessment: Written exam, tutorial work, practical work

This course provides an introduction to sensing and imaging as applied to biological systems and earth science. It is intended to provide a background in physics at university level for students who wish to major in biological sciences (Physics I and Mathematics I are recommended for students interested in Biophysics or Geophysics). The emphasis is on physics concepts and their application to relevant problems rather than on the more theoretical or mathematical development of concepts. It includes a study of oscillations, waves and sound, geometric and physics optics,

electricity and magnetism, X-rays and radioactivity. Practical problem solving.

## **PHYSICS 1501**

### **Physics for the Life & Earth Sciences I (Pre-Vet)**

3 units - semester 1

Up to 7 hours per week

Restriction: Available to B Sc (Animal Science: Pre-Vet) students only

Pre-Requisite(s): SACE Stage 2 Physics Subject Achievement score of at least 13 or equivalent, Mathematical Studies - other students may apply to Head of Physics for exemption

Incompatible: PHYSICS 1508

Assessment: Written exam, tutorial work, practical work

The emphasis is on physics concepts and their application to relevant problems in the earth and biological sciences rather than on the more theoretical or mathematical development of the concepts. It includes a study of forces and equilibrium, mechanical stress, energy, fluids, heat and DC electricity. Applications to biology and physiology will be emphasised.

## **PHYSICS 1508**

### **Physics Principles & Applications I (Pre-Vet)**

3 units - semester 1

Up to 7 hours per week

Restriction: BSc (Animal Science: Pre-Vet) without SACE Stage 2 Physics or with a Subject Achievement score of less than 13 or equiv

Incompatible: PHYSICS 1501

Assessment: Written exam, tutorial work, practical work

This course provides an introduction to some of the principles of physics and their applications in agricultural and biological sciences. It is intended for students who have not studied SACE Stage 2 Physics, and who require familiarity with Physics principles and applications in their other studies. The course introduces concepts of force, energy, thermal physics, fluids and DC electricity.

## **PHYSICS 2510**

### **Physics IIA**

3 units - semester 1

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 1100 & PHYSICS 1200 & either MATHS 1012 or MATHS 2004 - Other students may apply to Head of Physics for exemption

Co-Requisite(s): MATHS 2101 & MATHS 2102. Other students may apply to Head of Physics for exemption

Assessment: Tutorial preparation, practical work, test, written exam

This course provides an introduction to quantum mechanics and continues the development of practical problem solving using laboratory experiments. Quantum Mechanics - Wave mechanics with examples from atomic, sub-atomic and solid state physics. Photons, Compton scattering, de Broglie hypotheses, Heisenberg Uncertainty Principle, probability distributions, probability density, plane waves, expectation values, operators, commutators, Schrodinger equation, energy quantisation, particle in one- and three-dimensional box, eigenstates and degeneracy, parity, compatible observables, polarised light, measurement, probability flux, one-dimensional bound states and scattering, barrier penetration, magic numbers, Fermi gas, harmonic oscillator.

Practical work includes laboratory experiments in instrumentation, general physics and modern physics.

### **PHYSICS 2520**

#### **Physics IIB**

3 units - semester 2

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2510 & MATHS 2101 or MATHS 2201 & MATHS 2102 or MATHS 2202 - Other students may apply to Head of Physics for exemption

Incompatible: PHYSICS 2525

Assessment: Tutorial preparation, practical work, test, written exam

This course provides an introduction to condensed matter physics, progresses from the level I introduction to optical physics and continues the development of practical problem solving using laboratory experiments.

Optics - geometrical and physical optics; ray tracing, aberrations, polarisation, interference, diffraction.

Condensed Matter Physics - Introduction to crystal structures: energy bands of periodic structure: crystal growth and defects: periodic potentials, Kronig - Penney model, excitation and transport of electrons and holes: carrier generation and recombination: diodes and optoelectronics.

Practical work includes laboratory experiments in electromagnetism, optics, properties of solids and instrumentation.

### **PHYSICS 2525**

#### **Physics IIB (Optics and Photonics)**

3 units - semester 2

Up to 7 hours per week

Restriction: Available to B Sc (Optics & Photonics) students only

Pre-Requisite(s): PHYSICS 2510, MATHS 2101 & MATHS 2102 - Other students may apply to Head of Physics for exemption

Incompatible: PHYSICS 2520

Assessment: Tutorial preparation, practical work, test, written exam

This course provides an introduction to condensed matter physics, progresses from the level I introduction to optical physics and continues the development of practical problem solving using laboratory experiments.

Optics - geometrical and physical optics; ray tracing, aberrations, polarisation, interference, diffraction.

Condensed Matter Physics - Introduction to crystal structures: energy bands of periodic structure: crystal growth and defects: periodic potentials, Kronig - Penney model, excitation and transport of electrons and holes: carrier generation and recombination: diodes and optoelectronics.

Practical work includes laboratory experiments with an emphasis on optics and properties of solids.

### **PHYSICS 2530**

#### **Astrophysics II**

3 units - semester 2

Up to 7 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 1100 or PHYSICS 1101, PHYSICS 1200 or PHYSICS 1201, MATHS 1012 or MATHS 2004 - Other students may apply to Head of Physics for exemption

Incompatible: PHYSICS 2536

Assessment: Practical work, marked tutorials, essay, written exam

Protostars and star formation; stellar interiors and stellar evolution; supernovae and pulsars; introduction to the heliosphere; introduction to the local space environment.

Practical Work: astrophysics related experiments and observations.

### **PHYSICS 2532**

#### **Classical Physics II**

3 units - semester 2

Up to 4 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 1100, PHYSICS 1200, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202 - Other students may apply to Head of Physics for exemption

Assessment: Tests, tutorial presentation, written exam

This course extends the level I introduction to thermal physics and mechanics. Classical Mechanics: torque, couples, equivalent systems; static equilibrium; friction; Newtonian mechanics - motion of a particle; oscillations - damped, resonant, forced, transfer functions; central forces; gravitational systems; Keplers Laws; scattering; non-inertial reference frames.

Thermodynamics - equilibrium, 1st and 2nd laws, entropy, cyclic thermodynamic processes, applications.

### **PHYSICS 2532ELEC**

#### **Classical Physics II**

3 units - semester 2

Restriction: Available to BE(Electrical&Electronic) & BSc(HighPerfCompPhysics)(Hons) students only

Pre-Requisite(s): PHYSICS 2200, APP MTH 2000, APP MTH 2002

Incompatible: PHYSICS 2532

Assessment: Tests, Assignments, Final Examination

This course extends the level I introduction to thermal physics and mechanics. Classical Mechanics: torque, couples, equivalent systems; static equilibrium; friction; Newtonian mechanics - motion of a particle; oscillations - damped, resonant, forced, transfer functions; central forces; gravitational systems; Keplers Laws; scattering; non-inertial reference frames.

Thermodynamics - equilibrium, 1st and 2nd laws, entropy, cyclic thermodynamic processes, applications.

### **PHYSICS 2534**

#### **Electromagnetism II**

3 units - semester 2

Up to 4 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 1100, PHYSICS 1200, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202 - Other students may apply to Head of Physics for exemption

Assessment: Tests, tutorial preparation, written exam

This course extends the level I introduction to electricity and magnetism.

Circuit theory: revision of Kirchoff's laws, RLC and AC circuits; complex impedance and AC circuits; filters, transfer functions.

Vector analysis; index notation, line, surface and volume integrals; curvilinear coordinates; Gauss and Stokes theorem, Gauss's law, Dirac delta function; vector rotation and tensors.

Electrostatics and electric potential, Poisson and Laplace equations, boundary value problems and method of images, magnetostatics,

electromagnetic induction, Maxwell's equations, electromagnetaetic waves.

### **PHYSICS 2536**

#### **Space Science and Astrophysics II**

3 units - semester 2

Up to 7 hours per week

Restriction: Available to B Sc (Space Sci & Astrophysics) students only

Pre-Requisite(s): PHYSICS 1100, PHYSICS 1200 , MATHS 1012 or MATHS 2004 - Other students may apply to Head of Physics for exemption

Incompatible: PHYSICS 2530

Assessment: Tutorials, practical work, essay, written exam

Protostars and star formation; stellar interiors and stellar evolution; supernovae and pulsars; introduction to the heliosphere; introduction to the local space environment.

Protostars and star formation; stellar interiors and stellar evolution; supernovae and pulsars; introduction to the heliosphere; introduction to the local space environment.

Practical Work: astrophysics related experiments and observations.

### **PHYSICS 2550**

#### **Physics, Ideas & Society II**

3 units - semester 2

Up to 3 hours per week

Available for Non-Award Study

Pre-Requisite(s): 6 units at Level I

Incompatible: PHYSICS 1005

Assessment: Major Essay, Tutorial assessment

This course is non-mathematical in character and no previous knowledge of physics is assumed. It is intended primarily for students of the humanities and social sciences and is taught in the style of those disciplines. Physics, Ideas and Society II is designed to provide and understanding of some of the principal currents of thought in physics and of the scientific background to some of the philosophical, political and social issues that confront society. Topics will be selected from the following - physics and its laws; the fundamental constituents of matter; people, energy and the earth; space time and relativity; the universe.

### **PHYSICS 3002**

#### **Experimental Physics III**

3 units - semester 2

Up to 8 hours per week

Pre-Requisite(s): PHYSICS 2510 & PHYSICS 2520

Incompatible: PHYSICS 3537

Assessment: Laboratory work, formal report on selected experiment, open & closed book tests

Laboratory experiments in selected areas including atomic and nuclear physics, optics and electromagnetism, plus a practical analogue electronics course.

### **PHYSICS 3006**

#### **Advanced Dynamics and Relativity III**

3 units - semester 1

Up to 4 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2532, PHYSICS 2534, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202

Assessment: Tests, assignments, written exam

This course will give students a working knowledge of analytical mechanics and relativity to the standard required for further study in physics.

Content will include:

Mechanics: Lagrangian mechanics, variational techniques, conservation laws, Noether's theorem, small oscillations, Hamiltonian mechanics, Poisson brackets. Relativity: space-time vectors and tensors, relativistic mechanics, electrodynamics; field-strength tensor, Lienard-Wiechert potentials.

### **PHYSICS 3013**

#### **Astrophysics III**

2 units - semester 1

Up to 3 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2100 & PHYSICS 2200

Assessment: Written exam, tutorials, marked assignments

A survey of the universe at all scales and wave lengths/energies. Stellar astrophysics and studies of the interstellar medium and magnetic fields. Binary systems, x-ray binaries, active galactic nuclei. Gamma-ray astrophysics; radio and x-ray astronomy. Introductory cosmology.

### **PHYSICS 3014**

#### **Atmospheric & Environmental Physics III**

2 units - semester 2

Up to 3 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2100 & PHYSICS 2200

Assessment: Written exam, marked assignments

The course is an introduction to the physics of planetary atmospheres, with a focus on the earth's atmosphere including environmental and climate issues. Topics will include radiative transfer in the sun-earth system, thermodynamics of the atmosphere, cloud physics, atmospheric motions and circulation, the role of aerosols and minor constituents, such as water vapour, carbon dioxide and ozone, in determining climate, and the impact on the environment of anthropogenic actions

### **PHYSICS 3016**

#### **Education in Physics: Industrial Cooperation IIIA**

0 units - semester 2

4-5 months full-time work on a project in industry - sem 2, Yr 3

Pre-Requisite(s): Credit or above in PHYSICS 2100 or PHYSICS 2200& 12 units Level III courses

A program whereby students enrolled in third year B.Sc, B.Sc. (Optics & Photonics) or B.Sc. (Space Science & Astrophysics) who have achieved an average credit level in Levels I & II and at least credit in PHYSICS 2100 & 2200 Physics IIA/B, can apply to enrol in a cooperative program with industry.

The student receives financial support provided by the industry. The EPIC A and EPIC B projects must be different, and are jointly agreed by the Course Coordinator and the industrial partner. A written report must be prepared on each project and approved by both the industrial partner and the Course Coordinator. The performance of each student will be monitored by the Course

Coordinator. Unsatisfactory work reports or course grades may result in the student being required to leave the EPIC program.

### **PHYSICS 3017**

#### **Education in Physics: Industrial Cooperation IIIB**

0 units - semester 1

4-5 months full-time work on a project in industry - sem 1, Yr 4

Pre-Requisite(s): Credit in PHYSICS 2100 or PHYSICS 2200 & 12 units Level III courses

A program whereby students enrolled in third year B.Sc. B.Sc. (Optics & Photonics) or B.Sc. (Space Science & Astrophysics) who have achieved an average credit level in Levels I & II and at least credit in PHYSICS 2100 & 2200 Physics IIA/B, can apply to enrol in a cooperative program with industry.

The student receives financial support provided by the industry. The EPIC A and EPIC B projects must be different, and are jointly agreed by the Course Coordinator and the industrial partner. A written report must be prepared on each project and approved by both the industrial partner and the Course Coordinator. The performance of each student will be monitored by the Course Coordinator. Unsatisfactory work reports or course grades may result in the student being required to leave the EPIC program.

### **PHYSICS 3230**

#### **Photonics IIIP**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BSc(Optics&Photonics) students only

Pre-Requisite(s): PHYSICS 2100, PHYSICS 2200 & PHYSICS 2009 or PHYSICS 2510, PHYSICS 2520 & PHYSICS 2525

Assumed Knowledge: PHYSICS 3018

Incompatible: PHYSICS 3020

Assessment: Exam, marked assignments, laboratory work & formal report

Interaction of light with matter, time dependent perturbation theory, stimulated and spontaneous emission and absorption, stability of resonators, mode matching, advanced laser resonators, macroscopic description of the gain medium, rate equations, gain saturation and broadening, hole burning, MOPA's, CW lasers, frequency stabilisation, pulsed lasers, gain switching, Q-switching, injection-seeding, mode-locked lasers. Review of common lasers, optical fibres, microstructured optical fibres, fibre Bragg gratings, fibre sensors, optical materials, photonic crystals. Practical work in laser modulation, laser stabilisation, optical fibres, characteristics of semi conductors.

### **PHYSICS 3532**

#### **Atmospheric and Astrophysics III**

3 units - semester 1

Up to 4 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2510, PHYSICS 2534, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202

Incompatible: PHYSICS 3013 & PHYSICS 3014

Assessment: Examination, assignments, tutorials

This course will provide students with a knowledge of modern techniques, theory, and observational results relating to energetic processes in astrophysics and cosmology, and introduce the physics of planetary atmospheres with special emphasis on the atmosphere of the Earth. It will also provide students with

knowledge of the physical processes that govern weather and climate.

Content will include:

Introduction to planetary atmospheres and the solar system. Radioactive transfer in the sun-earth system. Thermodynamics of the atmosphere, including cloud physics, atmospheric motions and circulation. Introduction to the roles of aerosols and minor atmospheric constituents such as water vapour, carbon dioxide and ozone. The impact of anthropogenic processes. An introduction to relevant astrophysics terminology. Binary stars and accretion processes. The structure and evolution of the Milky Way and other galaxies. Active galaxies and unified models. Aspects of special and general relativity relevant to astrophysics. Cosmology, observations and theory."

### **PHYSICS 3534**

#### **Computational Physics III**

3 units - semester 2

Up to 4 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2532, PHYSICS 2534, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202

Incompatible: PHYSICS 3000

Assessment: Written exam, project, tests

This is a hands-on course which provides an introduction to computational methods in solving problems in physics. It teaches programming tactics, numerical methods and their implementation, together with methods of linear algebra. These computational methods are applied to problems in physics, including the modelling of classical physical systems to quantum systems, as well as to data analysis such as linear and nonlinear fits to data sets. Applications of high performance computing are included where possible, such as an introduction to parallel computing and also to visualization techniques.

### **PHYSICS 3537**

#### **Experimental Physics III (Optics & Photonics)**

3 units - semester 2

Up to 8 hours per week

Restriction: Available to BSc (Optics&Photonics) students only

Pre-Requisite(s): PHYSICS 2510, PHYSICS 2520, PHYSICS 2534, Maths 2101 or MATHS 2201, MATHS 2102 or MATHS 2202

Incompatible: PHYSICS 3002

Assessment: Practical work, assignment, exam

Laboratory experiments in selected areas with an emphasis on atomic spectroscopy, modern optics and electromagnetism, and a practical analogue electronics course.

### **PHYSICS 3540**

#### **Optics and Photonics III**

3 units - semester 2

Up to 4 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2520, PHYSICS 3542, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202

Incompatible: PHYSICS 3020, PHYSICS 3230 & PHYSICS 3001

Assessment: Tests, practical work, written exam

This course provides students with a working knowledge of optical physics, including diffraction and physical optics, atomic physics and optical spectroscopy, laser physics and photonics.

Content will include:

Fresnel equations and multi-layer dielectric coatings, polarisation and birefringence. Fresnel-Kirchhoff integral and diffraction, Fourier optics, Abbe's theory of imaging, image processing. Optical fibres, microstructured optical fibres, fibre Bragg gratings, fibre sensors, optical materials, photonic crystals. Lorentz electron oscillator and dispersion.

Lasers; Einstein equations, stimulated and spontaneous emission and absorption, optical amplification, resonators and modes, rate equations, pulsed and continuous lasers, mode-locked lasers.

## **PHYSICS 3542**

### **Physics III**

6 units - semester 1

Up to 9 hours per week

Restriction: Available to BSc(Ecochem), BSc(Mol&DrugDes) & BSc(Nanosc&Mat) students only

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 2510, PHYSICS 2534, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202

Assumed Knowledge: PHYSICS 2532

Incompatible: PHYSICS 3001, PHYSICS 3018, PHYSICS 3004 & PHYSICS 3009

Assessment: Tests, assignments, written exam

This course develops concepts in electromagnetism, quantum mechanics and statistical mechanics such that the behaviour of the physical universe can be understood from a fundamental point of view.

Electromagnetism - electric field and scalar potential, magnetic field and vector potential, Maxwell's equations, electromagnetic boundary conditions, electromagnetic wave equation, waveguides, energy in electromagnetism. Electromagnetic wave propagation in vacuum, conducting and dielectric media, and at interfaces.

Quantum mechanics - review of the Schrodinger equation, operators, eigenfunctions, compatible observables, infinite well in one and three dimensions, degeneracy; Fourier methods and momentum space; Hermiticity; scalar products of wave functions, completeness relations, matrix mechanics; harmonic oscillator in one and three dimensions; sudden approximation; central potentials, quantisation of angular momentum, separation of radial and angular variables, spherical harmonics, hydrogen atom, spin.

Statistical mechanics - classical laws of thermodynamics and their application, postulates of statistical mechanics, statistical interpretation of thermodynamics, microcanonical, canonical and grand canonical ensembles; the methods of statistical mechanics are used to develop the statistics for Bose-Einstein, Fermi-Dirac and photon gases; selected topics from low temperature physics and electrical and thermal properties of matter are discussed.

## **PHYSICS 3544**

### **Quantum Mechanics III**

3 units - semester 2

Up to 4 hours per week

Available for Non-Award Study

Pre-Requisite(s): PHYSICS 3542, MATHS 2101 or MATHS 2201, MATHS 2102 or MATHS 2202

Assumed Knowledge: PHYSICS 2532

Incompatible: PHYSICS 3022

Assessment: Written exam, tests

This course will introduce Dirac's bra-ket formulation of quantum mechanics and make students familiar with various approximation

methods applied to atomic, nuclear and solid-state physics, and to scattering.

Content will include: Dirac's formulation of quantum mechanics: kets and bras, quantum oscillator, angular momentum, measurement, Bell's inequality, generalised Uncertainty Principle, connection with wave and matrix mechanics. Time-independent and time-dependent perturbation theory, Schrodinger, Heisenberg and Interaction pictures, radiative transitions. Identical particles, atoms, exchange forces, periodic systems, energy bands in solids. Symmetries, translations in space and time, parity and time reversal, rotations and angular momentum, addition of angular momenta, fine structure of Hydrogen, L-S and j-j coupling in atoms and nuclei. Hartree-Fock and Thomas-Fermi approximations, variational and WKB methods. Scattering: Born approximation, S-matrix, partial waves.

## **PHYSICS 4000A/B**

### **Honours Physics Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Project report, written exams, assignments

Potential participants are advised to see Head of Physics as soon as possible, preferably before enrolling for Level III courses. In exceptional circumstances it is possible to take honours over two years - see B.Sc. Academic Program Rule 5.7.4

It is possible to take Honours in either experimental or theoretical physics. The Honours program may include lecture programs on astrophysics, atmospheric physics, atomic and molecular physics, cosmology, differential geometry and general relativity, electrodynamics, experimental methods, gauge field theories, lasers and nonlinear optics, many-body theory, nuclear radiation physics, nuclear theory and particle physics, relativistic quantum mechanics, quantum field theory, statistical mechanics/many-body theory.

Each student also undertakes a substantial experimental or theoretical research project on which a report is prepared. Full details may be obtained by application to the Head of Physics.

## **PHYSICS 4001A/B**

### **Honours Mathematical Physics Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Exams, project

Students considering this course should see the Head of Physics as soon as possible, preferably before enrolling in third year.

The lecture program is determined from year to year. Students will be required to make a selection from courses offered by the Discipline of Physics and Pure and Applied Mathematics. Honours topics from other departments in the School of Mathematical and Computer Sciences, and from the Schools of Information Science and Technology at Flinders University of South Australia may be considered appropriate. Lectures may include the following courses: general theory of relativity, relativistic quantum mechanics, quantum field theory, many-body theory, statistical mechanics, theoretical nuclear and particle physics.

Each student will be assigned a supervisor who will advise on the choice of lecture program and give guidance in the writing of a project on some topic in mathematical physics, to be approved in advance by the Head of the Discipline of Physics.

## **Plant Science**

### **PLANT SC 1001RW**

#### **Chemistry and Introductory Biochemistry I**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: SACE Stage I Chemistry

Assessment: Exam, practicals

A study of the chemistry and biochemistry relevant to agricultural production and environmental management including: chemical calculations, pH and buffers; oxidation and reduction reactions; electrochemical series and metal activity; battery operation; corrosion; introduction to the chemistry of fertilisers and pesticides; atmospheric and ozone chemistry; chemical composition and chemical properties of plant and animal products - sugars, fats and proteins; chemistry of hydrocarbon fuels.

#### **PLANT SC 2500WT**

##### **Microbiology and Invertebrate Biology II**

3 units - semester 1

Up to 6 hours per week

Available for Non-Award Study

Assumed Knowledge: BIOLOGY 1101, BIOLOGY 1103RW & BIOLOGY 1203RW

Incompatible: OENOLOGY 2501WT

Assessment: Exam, practical reports, presentation

An introduction to the biology of microorganisms and invertebrates of importance in agriculture, food, wine and natural ecosystems. Topics to be considered include: microbial growth, energy sources and nutritional categories; form and function of major groups of microorganisms; classification and identification; features of saprophytic, pathogenic, symbiotic and commensal lifestyles; interactions of microorganisms with their environment, including plants and animals; case studies of natural and managed microbial ecosystems; basic concepts of invertebrate taxonomy, physiology and function; external and internal anatomy; reproduction, life cycles, feeding relationships; practical skills for manipulating microorganisms and invertebrates and studying their activities.

#### **PLANT SC 2510WT**

##### **Foundations in Plant Science**

3 units - semester 1

Up to 6 hours per week

Available for Non-Award Study

Pre-Requisite(s): BIOLOGY 1101 or BIOLOGY 1202

Incompatible: ENV BIOL 2500

Assessment: Exam, reports, lab quiz & project work

This course provides an introduction to the structure and function of plants with a specific focus on plants of agricultural and horticultural importance, but may also include native species when appropriate. Attention will be given to how plants respond and adapt to their environment and the consequences of these interactions to productivity and quality. The link between an understanding of plant science and the management of plants will be highlighted.

#### **PLANT SC 3004WT**

##### **Mineral Nutrition of Plants III**

3 units - semester 2

Up to 6 hours per week

Pre-Requisite(s): PLANT SC 2001WT, ENV BIOL 2006, VITICUL 2002WT or BIOLOGY 1203RW or equivalent

Assessment: Exam, practical reports, reviews, essays

An advanced course which takes its brief from the acute deficiency in minerals of most South Australian soils, and the pre-eminent role

of nutrition in successful agricultural production in this State. Topics are discussed in a context of both agricultural and horticultural industries, and include factors affecting nutrient acquisition by roots, diagnosis and correction of macro and micronutrient problems, fertiliser strategies, nutritional effects on produce quality, including nutritional quality, nutrition and disease resistance and genetic control of adaptation to nutrient limitations in soils.

#### **PLANT SC 3009WT**

##### **Plant Molecular Biology III**

6 units - semester 2

Up to 8 hours per week

Assumed Knowledge: BIOCHEM 2106, ANIML SC 2029WT, BIOCHEM 2000A/B or equivalent at credit level

Assessment: Practical, tutorial projects, research planning & review, final exam

This course provides a current review of our knowledge in plant development, environmental responses and plant-microbe interactions. There is an emphasis on the molecular mechanisms directing plant gene expression under diverse environmental and developmental stimuli. This knowledge is central to our ability to modify plant responses and properties for commercial gains in biotechnology and agriculture. Areas covered in the course include: plant genes and genomes; mechanisms that control plant gene expression; molecular-genetic analysis of important characteristics; signal transduction; molecular biology of plant development, reproduction, and responses to disease and other environmental factors. In the laboratory classes, students will perform some of the techniques currently used to generate plant molecular biology information and undertake a research project related to current research in plant molecular biology and biotechnology.

#### **PLANT SC 3022WT**

##### **Research Project Plant and Pest Science**

3 units - semester 1 or semester 2

By supervision

Pre-Requisite(s): Relevant Level II course offered by Plant and Food Science

The course comprises a small research project to be undertaken during the fourth year of the program under the supervision of a staff member in the Discipline of Plant and Food Science. Students wishing to undertake a research project should consult the Head of Discipline before beginning of the fourth year. Courses presented as prerequisites should be relevant to the area of the research project.

#### **PLANT SC 3030AEX/BEX**

##### **Integrated Weed Management III Part 1 & 2**

3 units - full year

OnlineL; plus 2 day Residential School in Mid Semester break

Pre-Requisite(s): PLANT SC 3030AEX

Assessment: As for PLANT SC 3030AEX

The impact of weeds on agricultural and natural ecosystems. Important characteristics of weed biology. Ecology of weeds. Methods of sampling and monitoring weed infestations. Biological, cultural and chemical methods for weed management. Integrating management techniques for weeds in a range of ecosystems, including: cropping enterprises, perennial pastures, national parks and recreation areas and horticultural systems.

#### **PLANT SC 3130WT**

##### **Plant Pathology III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: PLANT SC 2004WT, OENOLOGY 2025WT, PLANT SC 2003RW, MICRO 2004 & ENV BIOL 2006

Incompatible: APP ECOL 3011WT & APP ECOL 3005WT

Assessment: Written exam, practical exercises, critical review, mini-internship

A senior level course designed to provide sufficient background in plant pathology for graduates to take employment in plant disease control or to progress into postgraduate study in plant pathology or related disciplines. The course will consider the recognition of biotic plant diseases and how they are defined; evaluate economic factors; describe loss assessment; and describe the use of disease forecasting for decision making in management. The components of plant disease systems will be considered separately (pathogen, host and environment). Specifically, the course will examine the biology, taxonomy and disease cycle of plant pathogens; host resistance strategies; the physiology of the diseased plant; both inherent and introduced genetic factors; environmental factors; and the role of vectors in the spread of disease. This information will be integrated to illustrate the complex interactions required for the onset and progress of disease epidemics. Descriptors of epidemics and the strategy of using epidemiology as a basis for the management of disease by manipulating the components of epidemics will lead into an evaluation of the methods available for control of plant diseases. Case studies will be used where appropriate. Practical skills in working with fungi, bacteria, nematodes and viruses will be acquired both in the field and the laboratory. Experience in evaluation of research and report writing will be an outcome of the course.

#### **PLANT SC 3131WT**

##### **Integrated Pest Management III**

3 units - semester 1

Up to 6 hours per week

Assessment: Exam, practical exercises, assignments

This course provides an introduction to the theory and practice of pest management. Topics considered are: the development, regulation and use of pesticides; strategies and tactics for managing pests (biological, cultural, genetic and chemical control); integrated pest management; economics of pest management; the diagnosis of disease; strategies and tactics for managing disease outbreaks; integrated weed Management.

#### **PLANT SC 3200WT**

##### **Plant Breeding III**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: ANIML SC 2029WT or APP ECOL 1004RW or BIOLOGY 1103RW or GENETICS 2100 or equivalent

Incompatible: PLANT SC 3007WT & PLANT SC 3018WT

Assessment: Final exam, practical reports, essay

Generic manipulation in plants has underpinned improvements in productivity and has enhanced sustainability of farming systems worldwide. As well, plant generic diversity is fundamental to understand adaptation in natural systems. This course introduces the fundamental concepts of plant breeding and plant adaptation that are applicable to agricultural and natural systems. The topics covered include: genetic diversity in relation to adaptation, productivity, pest and disease resistance and end-use quality; strategies for setting breeding objectives and maximising selection and improvement of key traits; breeding methodologies for self or cross pollinated plants.

#### **PLANT SC 3230WT**

##### **Communication in the Agri-Food Industry III**

3 units - semester 2

Up to 6 hours per week

Assumed Knowledge: Completion of Level I and II of B.Ag.Sc, B.Sc.(Ag.Sc) or B.Food Sc.

Assessment: Written & oral presentations, poster preparation, class participation

The course provides an opportunity for students to integrate and extend their knowledge of the workplace, to incorporate scientific information effectively into practice and policy, and to develop communication skills allowing participants to enter and to play a role in local, national and international Agri-food developments.

It aims to provide instruction in information transfer techniques and principles involved in oral, written, and electronic communication of scientific knowledge; to give an opportunity to develop ability in public speaking, by interacting in a group and presenting views in public debate; to develop skills in researching, critically assessing, preparing and presenting information on selected topics relevant to the Agri-food industry; to introduce students to the use of electronic communication technologies; to expand understanding of problems and constraints to be faced in future employment; to identify career opportunities open to graduates, and to assist students in applying for positions and presentations to potential employers; to provide an insight into the approaches of decision makers in a variety of areas through appropriate guest lectures; to acknowledge the maturity of and to enhance the self-confidence of graduates.

#### **PLANT SC 3500WT**

##### **Biotechnology in the Food & Wine Industries III**

3 units - semester 1

Up to 5 hours per week

Assumed Knowledge: AGRIC 2500WT or AGRIC 2500RW or equivalent

Assessment: Practical reports, assignment, written exam

Application of biotechnology approaches to increase the nutritional composition and safety of food and beverages, for developed and developing nations. Emphasis is given to approaches that increase the sustainability of food production covering all aspects of the value chain from paddock to plate. Examples include DNA marker-assisted selection to fast track classical breeding methods for improved plants, animals and microorganisms, genetic modification (GM) approaches and enzyme engineering for efficient food processing and production, non-alcoholic and alcoholic fermentations, food additives. The role of the community, media and government in delivering safe, ethical and sustainable biotechnology solutions is investigated through current examples.

#### **PLANT SC 4003AWT/BWT**

##### **Hons Plant Sc (BAGSc) Part 1 & 2**

12 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Average of four Level III courses, research project - research proposal, seminar, thesis and viva voce

Candidates will be required to undertake a research project under the supervision of one or more members of academic staff and present seminars and a thesis on their research work. Intending candidates should consult the Head of the Discipline of Plant and Food Science and potential supervisors during the third year and be prepared to begin studies in the discipline at the beginning of February or July.

## **PLANT SC 4012AWT/BWT**

### **Honours Plant Science Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research proposal, seminar, thesis, viva voce - minor component, e.g. 10-20% may comprise coursework, essays or other assignments not part of research project as deemed appropriate to each student's program

This course is available under the provisions of Specific Academic Program Rule 5.7.2.

Candidates will be required to undertake a research project under the supervision of one or more members of academic staff and present seminars and a thesis on the research work undertaken. A candidate may also be required to attend lectures and pass exams in related courses.

Intending candidates should consult the Head of the Discipline of Plant and Food Science and potential supervisors during the final year of the degree and be prepared to begin studies in the discipline at the beginning of February or July (for mid-year intake).

## **Soil and Water**

### **SOIL&WAT 1000WT**

#### **Soils and Landscapes I**

3 units - semester 2

Up to 6 hours per week, plus field trip

Restriction: Available to B Agricultural Sciences, B Viticulture & Oenology students only

Assumed Knowledge: SACE Science subjects

Incompatible: GEOLOGY 1103 & GEOLOGY 1200

Assessment: Exam, tutorials, practical assignments, report, quizzes

This course describes how agricultural and ecological systems are linked to soils and the Australian environment, and provides a basis from which sustainability issues can be addressed. Agroecosystems face increasing pressure in Australia to become more productive, profitable and efficient, yet sustainable. You will learn about the importance of soils in the landscape in relation to management of fertility, water use efficiency, and land degradation. You will learn about important ecological processes that are based in soils, and consider a 'whole-system' approach to land management. This will include interpretation of soil maps in relation to land evaluation and suitability for different purposes.

This course will include a field camp up to 4 days duration and details will be provided at the start of the course.

### **SOIL&WAT 2500**

#### **Soil and Water Resources II**

3 units - semester 1

Up to 6 hours per week

Assumed Knowledge: SOIL&WAT 1000RW or GEOLOGY 1200 or GEOLOGY 1103

Assessment: Practicals, quizzes, essay, theory examination

Soil and water are fundamental resources in the environment. This course aims to provide an understanding of important soil physical, chemical and biological properties and of water quality. Topics include: soil water retention, storage and movement, salinity, chemical fertility, the role of biology in soil processes, soil conservation and management, water quality factors and the impact of land management on these factors.

### **SOIL&WAT 2500WT**

#### **Soil and Water Resources II**

3 units - semester 1

Up to 6 hours per week

Available for Non-Award Study

Assumed Knowledge: SOIL&WAT 1000RW or GEOLOGY 1200 or GEOLOGY 1103

Assessment: Practicals, quizzes, essay, theory exam

Soil and water are fundamental resources in the environment. This course aims to provide an understanding of important soil physical, chemical and biological properties and of water quality. Topics include: soil water retention, storage and movement, salinity, chemical fertility, the role of biology in soil processes, soil conservation and management, water quality factors and the impact of land management on these factors.

### **SOIL&WAT 2501**

#### **Spatial Information and Land Evaluation II**

3 units - semester 1

Up to 5 hours per week, plus field trip

Available for Non-Award Study

Assessment: Practical reports, theory examination

Spatial information is fundamental to decision making in all environmental disciplines. It is widely used in natural sciences areas from agriculture, environmental management to mining industries. The breadth of applications of spatial information is increasing rapidly due to a vastly improved availability of spatial data and the recently accelerated development of geographic information systems and remote sensing tools. The subject introduces theory, history and current methods of spatial information presentation, generation, and analysis. It gives an overview of major Australian and South Australian mapping programs and spatial information in government agencies. Students are introduced to factors that shape the landscape and learn how to interpret land surface features. In field exercises students are introduced to surveying, the use of Global Positioning Systems, field navigation and safety.

### **SOIL&WAT 3004WT**

#### **Environmental Toxicology and Remediation III**

3 units - summer semester

Up to 3.5 hours per week, plus field trips

Incompatible: SOIL&WAT 3004WT

Assessment: Theory, practicals/assignments

The goals of this course are to provide students with an understanding of the monitoring, fate and risk assessment of contaminants in environmental and biological systems. Classes of contaminants discussed include heavy metals, pesticides, and other water-, soil- and food-borne toxicants. The properties of contaminants which influence their environmental distribution and transformations and the characteristics of the environment which influence contaminant toxicity to organisms are discussed. Students are introduced to the principles of toxicology necessary for an understanding of the environmental consequences of contaminants.

### **SOIL&WAT 3005WT**

#### **Research Project: Soil and Land Systems III**

3 units - semester 1 or semester 2

Up to 10 hours per week

Co-Requisite(s): 2 Level III courses offered by Discipline other than those serving as prerequisites, or equivalents acceptable to Head

Assessment: Oral exam, seminar, written project report

The course consists of a small research project of the student's choosing on a topic acceptable to the Discipline of Soil and Land Systems. It will be undertaken during the 3rd year of the program.

### **SOIL&WAT 3007WT**

#### **GIS for Environmental Management III**

3 units - summer semester

15 days during the Summer vacation

Available for Non-Award Study

Incompatible: SOIL&WAT 3014WT

Assessment: Practical exercises, case study, written exam

This course involves teaching sessions that may be attended by both Undergraduate and Postgraduate students.

The course deals with concepts and theory of geographic information systems and their use for environmental mapping, spatial modelling and analysis. Topics covered include the relationship of GIS models to real world perception and map representation, vector and raster systems; spatial modelling; translation of problems into GIS procedures; attribute manipulation and recoding, operations including arithmetic and Boolean overlay, reclassification, proximity and neighbourhood analyses; input of data to GIS; database structures; interpolation of surfaces from point and vector data; applications and case studies. Practical work uses PC-based software to teach basic skills in GIS data entry, analysis and output, emphasising a problem-solving approach through environmental and agricultural GIS case studies.

### **SOIL&WAT 3010**

#### **Remote Sensing III**

3 units - semester 2

Up to 5 hours per week

Incompatible: GEOLOGY 3010, SOIL&WAT 3008WT & GEOG 3008

Assessment: Exam, practical exercises

Remote sensing interprets image-based information gathered by space and airborne platforms using various scanning systems. This course examines the principles and applications of remote sensing to a range of disciplines. Principles include the interaction of electromagnetic radiation with the Earth's atmosphere and surface, spectral characteristics of earth surface materials, and the nature of imagery collected by a variety of earth-observation sensors. We will discuss the use of spectral data to identify and characterise objects (rocks, soils, vegetation, water), produce thematic maps and monitor changes over time. The nature and application of specialised forms of remote sensing including radiometric data, hyperspectral, radar and thermal imagery are also considered. These data are relevant to a wide range of applications including geology, environmental and agricultural science. Information is extracted using digital image processing: correction, enhancement and classification of the digital data and its integration with geographic information systems. Practicals are used to give 'hands-on' experience with the basics of digital image interpretation and processing and application to specific projects.

### **SOIL&WAT 3014WT**

#### **GIS for Agricultural Sciences III**

3 units - semester 2

Up to hours per week, plus 48 hours practical work during the Mid Semester break

Available for Non-Award Study

Incompatible: SOIL&WAT 3007WT & SOIL&WAT 7025WT

Assessment: Case study, practical assessments, written exam

Geographic information systems have become an important tool far beyond the geographic disciplines. Applications in the agricultural sciences range from simple cartographic tools to precision fertiliser applications and growth models. This course gives an overview of the history and the rapid recent development of this technology and gives examples of commercially available state-of-the-art equipment. Hands on computer exercises involve data capture, processing and presentation of results. Special emphasis is placed on precision agriculture and the optimal and timely treatment of spatial variability in agricultural production systems. Students will learn what can be seen from space and airborne remote sensing and how this information can be combined with other sources of information in order to minimise effort and optimise production.

### **SOIL&WAT 3016WT**

#### **Soil Ecology and Nutrient Cycling III**

3 units - semester 1

Up to 6 hours per week

Pre-Requisite(s): SOIL&WAT 2005WT or SOIL&WAT 2012WT

Assessment: Exam, practical reports, research proposal

"The course will provide students with a comprehensive view of ecological interactions in soils. It deals with the interactions between plants, soil and soil organisms, the roles played by soil organisms in decomposition of organic material, nutrient cycling (C, N, P) and stability of agricultural and natural ecosystems. Other topics include the importance of soil organisms for soil fertility, mycorrhizas and their effects on plant productivity and plant communities, soil microbial ecology, root growth, the biology of the rhizosphere and the impact of climate change on nutrient cycling."

### **SOIL&WAT 3017WT**

#### **Soil & Water: Management & Conservation**

3 units - semester 1

Up to 6 hours per week

Pre-Requisite(s): SOIL&WAT 2500 or SOIL&WAT 2500WT

Incompatible: SOIL&WAT3002WT & SOIL&WAT 3012WT

Assessment: Practical reports, quizzes, exam

This course covers topics in soil and water management and conservation important to students of agricultural, viticultural, and environmental sciences. Processes that degrade the soil- and water-resources of Australia (e.g. erosion, salinity, alkalinity and sodicity, as well as acidification, water repellence, and degradation of soil structure) are examined, and their measurement, avoidance and management discussed. There is a strong focus on quantitative theory and practice of measuring and managing soil water using commercially available technology, particularly in relation to interception, storage and movement of water in dryland and irrigated agro-ecosystems. Broader issues in soil and water conservation (e.g. State and Commonwealth legislation) are also covered. Practical classes consist of laboratory, computer and field exercises designed to illustrate the concepts covered in lectures.

### **SOIL&WAT 4001AWT/BWT**

#### **Honours Soil & Land Systems Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research proposal, final seminar, research paper, viva voce, weighted average of non-research component

Requirement: substantial research project of student's choosing (on topic acceptable to Discipline) under supervision of an examining committee (including academic staff members) approved by Head of Discipline, non-research component, including coursework, essays

or other assignments relevant to student's Honours project and approved by Head of Discipline

Intending candidates should consult the Head of Discipline, Honours Coordinator and potential supervisors during third year and be prepared to begin studies at the beginning of February or July.

#### **SOIL&WAT 4002AWT/BWT**

##### **Honours Soil & Land Systems (B.Ag.) Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research proposal, seminars, research paper, viva voce, weighted average of non-research component

Requirement: substantial research project of student's choosing (on topic acceptable to Discipline) under supervision of an examining committee (including academic staff members) approved by Head of Discipline, non-research component, including coursework, essays or other assignments relevant to student's Honours project and approved by Head of Discipline

Intending candidates should consult the Head of Discipline, Honours Coordinator and potential supervisors during third year and be prepared to begin studies at the beginning of February or July

#### **SOIL&WAT 4005AWT/BWT**

##### **Honours Soil Science (B.Sc.) Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research proposal, seminars, research paper, viva voce, weighted average of non-research component

Requirement: substantial research project of student's choosing (on topic acceptable to Discipline) under supervision of an examining committee (including academic staff members) approved by Head of Discipline, non-research component, including coursework, essays or other assignments relevant to student's Honours project and approved by Head of Discipline.

Intending candidates should consult the Head of Discipline, Honours Coordinator and potential supervisors during third year and be prepared to begin studies at the beginning of February or the end of July.

#### **SOIL&WAT 4007AWT/BWT**

##### **Honours Soil Science (B.Ag.) Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research proposal, seminars, research paper, viva voce, weighted average of non-research component

Requirement: substantial research project of student's choosing (on topic acceptable to Discipline) under supervision of an examining committee (including academic staff members) approved by Head of Discipline, non-research component, including coursework, essays or other assignments relevant to student's Honours project and approved by Head of Discipline.

Intending candidates should consult the Head of Discipline, Honours Coordinator and potential supervisors during third year and be prepared to begin studies at the beginning of February or the end of July.

#### **SOIL&WAT 4009AWT/BWT**

##### **Honours Soil & Land Systems (B.Ag.Sc.) Part 1 & 2**

12 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research proposal, seminars, research paper, viva voce, average of four level III courses referred to above

Requirement: modest research project of student's choosing (on topic acceptable to Discipline) normally taken at same time as coursework (4 Level III courses relevant to student's Honours project and approved by Head of Discipline).

Intending candidates should consult the Head of Discipline, Honours Coordinator and potential supervisors during the third year and be prepared to begin studies at the beginning of February or July.

## **Veterinary Science**

#### **VET SC 2500RW**

##### **Veterinary Skills II**

3 units - semester 1

Up to 6 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): ANIML SC 1017RW & ANIML SC 1018RW

Assessment: Written exam, practical exam, oral presentation, group work, formative tests.

The course will discuss the history of the veterinary profession in Australia and around the world, and the responsibilities of the veterinarian in society. It will also include the graduate attributes needed for veterinary students; legislation relating to veterinary science; data management and professional ethics. Students will learn communication skills relevant to their future work, including taking case histories and dealing with difficult client relationships.

In practical classes students will practice how to perform a clinical examination, participate in role plays relating to animal euthanasia, and take part in group work presenting various veterinary case scenarios highlighting specific areas covered in lectures e.g. professional ethics.

#### **VET SC 2510ARW**

##### **Animal Form and Function II**

6 units - semester 1

Up to 13.5 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): BIOLOGY 1510, BIOLOGY 1520 & PHYSICS 1501 or PHYSICS 1508

Assessment: Written exam, summative tests, practical reports

The course will introduce anatomic and physiological terminology, principles and comparative aspects amongst species. The course will provide concepts of structure and function of the various body systems and highlight species variations. In practical classes students will develop practical skills in dissection and learn to appreciate variations in structure due to age, sex, species and physiological status.

#### **VET SC 2510BRW**

##### **Animal Form and Function II**

12 units - full year

Up to 13.5 hours per week

Restriction: Available to B Sc (Pre-Veterinary) students only

Pre-Requisite(s): BIOLOGY 1510, BIOLOGY 1520 & PHYSICS 1501 or PHYSICS 1508

Assessment: Written exam, summative tests, practical reports

The course will introduce anatomic and physiological terminology, principles and comparative aspects amongst species. The course is a continuation of animal form and function IIB and is complementary to it. It will provide concepts of structure and function of the various body systems (not already covered in IIA) and will highlight species variations. In practical classes students will develop practical skills in dissection and learn to appreciate variations in structure due to age, sex, species and physiological status.

#### **VET SC 3510ARW**

##### **Animal Form and Function III**

6 units - semester 1

Up to 15 hours per week

Restriction: Available to BSc (AnimalScPre-Vet) students only

Pre-Requisite(s): ANIML SC 2508RW

Assessment: Written examinations, Summative tests, Major Project, Case study participation

The course will introduce anatomical and physiological terminology, principles and comparative aspects amongst species, building on the concepts and areas covered at level II. The course will provide concepts of structure and function of the various body systems and highlight species variations. In practical classes students will develop practical skills in dissection and learn to appreciate variations in structure due to age, sex, species and physiological status. The course content will include the following body systems: urogenital, endocrine, nervous and special sensory organs (eyes, ears, nose), and will revisit integrating themes from level II (e.g. homeostasis) in the context of these systems. Students will also be presented with case studies that will highlight aspects of these systems from a veterinary practice perspective.

#### **VET SC 3510BRW**

##### **Animal Form and Function III**

12 units - full year

Up to 15 hours per week

Restriction: Available to BSc (AnimalScPre-Vet) students only

Pre-Requisite(s): ANIML SC 2508RW

Assessment: Written examinations, Summative tests, Major Project, Case study participation

The course will introduce anatomical and physiological terminology, principles and comparative aspects amongst species, building on the concepts and areas covered at level II. The course will provide concepts of structure and function of the various body systems and highlight species variations. In practical classes students will develop practical skills in dissection and learn to appreciate variations in structure due to age, sex, species and physiological status. The course content will include the following body systems: urogenital, endocrine, nervous and special sensory organs (eyes, ears, nose), and will revisit integrating themes from level II (e.g. homeostasis) in the context of these systems. Students will also be presented with case studies that will highlight aspects of these systems from a veterinary practice perspective.

#### **VET SC 3512RW**

##### **Veterinary Immunology, Micro & Public Health III**

6 units - semester 1

Up to 15 hours per week

Restriction: Available to BSc(Pre-Vet) students only

Pre-Requisite(s): VET SC 2510RW

Assessment: Mid-semester exams, end semester exams, assignments

This course will incorporate the pre-clinical scientific disciplines of immunology and microbiology, and highlight the relationship between pathogens and disease at the tissue and animal level in various body systems. The course will introduce the concepts of zoonoses and infectious disease implications for veterinary public health.

#### **VET SC 3513RW**

##### **Veterinary Parasitology & Epidemiology III**

3 units - semester 2

Up to 7 hours per week

Restriction: Available to BSc (Pre-Vet) students only

Pre-Requisite(s): VET SC 3512RW

Assessment: Mid-semester exams, end semester exams, assignments

This course will highlight the pre-clinical scientific discipline of parasitology, and the relationship between parasites and disease at the tissue and animal level in various body systems. The course will introduce the concepts of epidemiology, and expand upon the elements of Veterinary Public Health introduced in an earlier course.

#### **VET SC 3514RW**

##### **Veterinary Skills III**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BSc(Pre-Vet) students only

Pre-Requisite(s): VET SC 2500RW

Assessment: Mid-semester exams, end semester exams, assignments

This course will build on concepts studied in Veterinary Skills II with an emphasis on clinical research skill development and population-based health protocols. At the end of this course, students will be able to perform a clinical audit of a production facility. Students will also begin developing communication styles for dealing with clients and staff.

## **Viticulture**

#### **VITICULT 2500WT**

##### **Viticultural Science II**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to B Sc (Viticulture) & B Oenology students only

Assumed Knowledge: OENOLOGY 1018NW & BIOLOGY 1101 & 1202

Assessment: Exams and assignments

Viticultural Science covers the entire life cycle of the cultivated grapevine with an emphasis from bud burst through to the onset of veraison. The practical component of the course takes advantage of the vine growth phases that occur from bud burst, flowering and fruit-set leading up to harvest. Topics covered include: The growth cycle of the grapevine and the biology that underpins the different phenological stages. Grapevine physiology as it is relevant to growth and vine form, flowering, water use, mineral nutrition, and berry development. Grapevine anatomy of the vegetative and reproductive parts. Taxonomy of grapevines and vegetative variety identification. Practical sessions will focus in more depth on the following topics: pruning techniques, vine and bud anatomy, shoot based variety identification, shoot morphology and development, yield estimation, and mineral nutrition.

### **VITICULT 3021WT**

#### **Viticultural Science III**

3 units - semester 1

Up to 6 hours per week, plus 5 days in orientation week

Restriction: Available to BSc (Viticult), BOenol and Bviti&Oenol students only

Pre-Requisite(s): VITICULT 2500WT

Assessment: Midterm and Final exam, Practical reports, Essays

Viticultural Science III follows on from concepts acquired in Viticultural Science II covering the entire life cycle of the cultivated grapevine. Topics covered in this course include climate change and its impact on viticulture. Berry development and harvesting post veraison. Principles behind the establishment of a viticultural enterprise comprising site selection, choice of planting material and the design and establishment of the vineyard. Trellising design. The relationship between production aspects and the physiology of the vine including phenology and shoot development, effect of node position on fruitfulness, interaction with climate response to pruning, trellising and canopy management. Vineyard management practices including: pests and diseases of grapevines, their recognition and control; soil management comprising weed control by chemical and non-chemical methods; harvesting and handling methods used for wine grapes; cultural practices employed to produce wine grapes of particular end-use specification.

### **VITICULT 3043WT**

#### **Industry Experience (Viticulture) III**

3 units - semester 1 or semester 2

10 weeks

Pre-Requisite(s): VITICULT 2500WT or VITICULT 2002WT

Assessment: Logbook, research & other projects, employers report

This course provides an opportunity for students majoring in Viticulture to experience, observe and acquire an understanding of the major activities undertaken in a typical vineyard operation. Further, this course will enable students to gain a working understanding of a vineyard, its management systems and structures. Students undertake 10 weeks work experience in approved viticultural enterprises gaining experience in a range of operations, e.g. pest and disease management, irrigation system management, yield estimation, and harvest activities, the emphasis and expectation being on gaining hands-on experience. A detailed logbook of work activities, networking exercise, vineyard benchmarking and a significant research project provide a broad perspective of the viticultural industry.

### **VITICULT 3044WT**

#### **Viticultural Methods and Procedures III**

3 units - semester 2

Up to 6 hours per week

Restriction: Available to BSc (Viticult) students only

Pre-Requisite(s): VITICULT 2500WT or VITICULT 2002WT

Incompatible: VITICULT 3004 & VITICULT 3018

Assessment: Assignments, practical reports, exam

The practices associated with the development and operation of a viticultural enterprise. This includes training in the monitoring of pests and diseases, soil and plant water and nutritional status; yield estimation; experimentation. Lecture topics include: biotechnology in viticulture, organic viticulture, advanced propagation techniques, use of growth regulators in viticulture, control of bird pests. Tutorial/practical sessions include: climatic assessment for vineyard site selection; principles and practices of vineyard operations

including spray equipment calibration and spray application; pruning, training, trellis erection and repair, propagation, canopy management and other activities, vineyard monitoring - phenological stages, bud fruitfulness, physiological pruning, yield estimation, pests and diseases, soil and plant water status; computer-aided decision-making systems such as VineLogic and precision viticulture. This course includes visits to commercial vineyards and equipment suppliers.

### **VITICULT 3500WT**

#### **Grape Industry Prac, Policy and Communication III**

3 units - semester 1

Up to 5 hours per week

Restriction: Available to BSc (Viticult), BOenol and Bviti&Oenol students only

Assumed Knowledge: OENOLOGY 2502WT, OENOLOGY 3033WT or VITICULT 3043WT

Assessment: Written assessment, oral presentation & literature review

This course examines through selected industry experts and student seminars, some of the current policies and issues confronting the Australian wine industry. The numerous industry organisations are examined from both a national and international perspective and how these critical industry organisations comprise the infrastructure of the Australian wine industry. How this operating environment affects both grapegrowers and wine producers will also be explored.

### **VITICULT 3501WT**

#### **Engineering for Viticulture and Oenology III**

3 units - semester 2

Up to 6 hours per week

Available for Non-Award Study

Pre-Requisite(s): VITICULT 2500WT & OENOLOGY 2503WT

Assessment: Exam, written reports, project work

This course provides an overview of the concepts and techniques used in the engineering aspects of viticulture (irrigation systems, water management, vine water relations) and winemaking (process calculations (mass and energy balances), process utilities (refrigeration, process heating and cooling), steam systems, electrical power systems, heat transfer and heat exchangers, must, juice and wine transfer methods, centrifugation and filtration, process control and instrumentation) processes.

### **VITICULT 4006AWT/BWT**

#### **Honours Viticulture Part 1 & 2**

24 units - full year

Up to 40 hours per week

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Thesis, seminars, remainder as deemed appropriate to the student's program

This course comprises a substantial research project of the student's choosing on a topic acceptable to the Discipline of Wine and Horticulture, two seminars on that topic, and coursework, essays or other assignments deemed appropriate to the individual student's honours program.

## **Wine Marketing**

### **WINEMKTG 1003EX**

#### **Legal Issues in Wine Marketing I**

3 units - semester 2

None: External

Assessment: Exam, assignments

This course provides a general introduction to the Australian legal system and institutions, and to Australian commercial law. Emphasis will be placed on those parts of the law that have particular relevance to marketing, such as contract, sale of goods, consumer protection, trace practices and intellectual property law. The legal principles discussed have general commercial applicability, but where possible will be illustrated by topical examples drawn from wine and food marketing.

### **WINEMKTG 1008EX**

#### **Introduction to Managerial Financial Accounting I**

3 units - semester 1 or semester 2

None: External

Assessment: Written exams (open book), assignments

This course provides an introduction to the principles of accounting appropriate to the wine industry. The course deals with those accounting principles from the perspective of a winery business manager. The course does not seek to teach the detailed techniques of accounting, but rather to equip students with sufficient knowledge and skills of accounting to be better managers in the wine industry. The first half of the course deals with financial accounting matters, with a special emphasis on equipping students to be able to analyse financial statements, and to understand the techniques of managing cash flows in wine businesses. In the second half of the course, management accounting techniques such as product costing, budgeting, cost-volume-profit analysis and project evaluation are covered. At the end of the course, students will be able to deal with financial statements, management reports, and be able to make more effective decisions where financial implications are involved.

### **WINEMKTG 1013EX**

#### **Wine and Food Marketing Principles I**

3 units - semester 1

None: External

The aim of this course is to give students an understanding of the role of the marketing manager through an introduction to the basic concepts and practices in marketing with particular emphasis on wine and food products. The topics covered include the marketing environment and marketing strategy formulation. There will be particular examination of product, price, place and promotion strategies.

### **WINEMKTG 1013WT**

#### **Wine and Food Marketing Principles I**

3 units - semester 1

Up to 3 hours per week

The aim of this course is to give students an understanding of the role of the marketing manager through an introduction to the basic concepts and practices in marketing with particular emphasis on wine and food products. The topics covered include the marketing environment and marketing strategy formulation. There will be particular examination of product, price, place and promotion strategies.

### **WINEMKTG 1015EX**

#### **Data Analysis for Wine and Food Business I**

3 units - semester 1

None: External

Assessment: Exams, assignments

This course introduces a body of principles and methods concerned with extracting useful information from data for business decision making in the face of uncertainty, with emphasis on applications in the wine and food business area. Topics covered include visual presentation of data; summarising data numerically by measures of central tendency and dispersion; reasoning with probabilities; representing uncertainty by random variables and probability distributions; drawing and using samples to make estimates; assessing connections between variables by correlation and simple regression; tracking economic changes with index numbers; forecasting with time series and trend analysis; and drawing conclusion for data with statistical hypothesis testing.

### **WINEMKTG 1026EX**

#### **Microeconomic Principles I**

3 units - semester 1

None: External

Assessment: Assessment: assignments, final exam

The course provides an introduction to the essential elements of microeconomics, with emphasis on demonstrating how the understanding of microeconomic principles can lead to better analysis of management and marketing of wine and food products, and government microeconomic policies. Broadly, the course covers how production and consumption decisions of individual economic units are made and coordinated. Specific topics include fundamentals of supply and demand analysis, production economics, analysis of short and long-run costs of production, market structure, pricing policies and methods, market failure, welfare and public policy issues and the markets for factors of production.

### **WINEMKTG 1063EX**

#### **Macroeconomic Essentials: Wine & Food Business I**

3 units - semester 2

None: External

Assessment: Assignments, final exam

This course develops understanding of the macroeconomic environment in which wine and food businesses operate; and the ability to analyse the implications of specific macroeconomic events (eg. change in the interest rate, tax cut, or increasing unemployment) to success and profitability, and marketing strategies of wine and food businesses. Emphasis is on applications and policies, not formal economic theory. Coverage include: measurements of national income, cost of living, and unemployment; productivity and economic growth; the monetary system; the causes and effects of inflation and unemployment; impacts of monetary and fiscal policies; factors influencing the international flows of goods and capital; and current debates over macroeconomic policies.

### **WINEMKTG 2500WT**

#### **Applied Management Science II**

3 units - semester 1

Up to 4 hours per week

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX and ECON 1008 or WINEMKTG 1015EX

Assessment: Exam, practical, case studies, assignments

The aim of this course is to introduce a collection of management science techniques that helps business managers make better

decisions and to foster a logical, consistent and systematic approach to problem formulation, problem solving and decision making. Emphasis is placed on model formulation and interpretation rather than algorithms. Topics to be covered include mathematical programming, network modelling, Monte Carlo simulation, decision analysis under risk, and time series forecasting.

#### **WINEMKTG 2501EX**

##### **Applied Marketing Research II**

3 units - semester 2

None: External

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assumed Knowledge: ECON 1008 or WINEMKTG 1015EX

Assessment: Assignments, exam

The aim of this course is to study quantitative and qualitative marketing research for pro-active and reactive marketing intelligence systems as it applies to food and agricultural marketers. Topics included are problem analysis, types of data collection systems, steps in research projects, controls of a research project, questionnaire design, statistical methodology for data reduction, sampling theory and the industry and operative organisations. Dealing with a market research organisation will be a significant aspect of the course which is not aimed at producing researchers but clients who understand the intricacies of the process - and the limitations. The focus will be the application of the theory for use in the new wine/food product evaluation, advertising measurement, corporate/product/range analysis, attitudinal research, as primary sources. Secondary sources such as trade, governmental or syndicated data will be explored and assessed.

#### **WINEMKTG 2501WT**

##### **Applied Marketing Research II**

3 units - semester 2

Up to 3 hours per week

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assumed Knowledge: ECON 1008 or WINEMKTG 1015EX

Assessment: Assignments, exam

The aim of this course is to study quantitative and qualitative marketing research for pro-active and reactive marketing intelligence systems as it applies to food and agricultural marketers. Topics included are problem analysis, types of data collection systems, steps in research projects, controls of a research project, questionnaire design, statistical methodology for data reduction, sampling theory and the industry and operative organisations. Dealing with a market research organisation will be a significant aspect of the course which is not aimed at producing researchers but clients who understand the intricacies of the process - and the limitations. The focus will be the application of the theory for use in the new wine/food product evaluation, advertising measurement, corporate/product/range analysis, attitudinal research, as primary sources. Secondary sources such as trade, governmental or syndicated data will be explored and assessed.

#### **WINEMKTG 2502EX**

##### **Consumer Behavioural Analysis II**

3 units - semester 1

None: External

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, exam

The aim of this course is to alert students to the many variables that impact upon the purchase and consumption of goods and services,

especially wine. Within this multi-disciplinary course are the studies of perception, attitudes, human motivation, consumer information processing and decision making, the sociology of people, cultural and sub-cultural variables, group influences and the segmentation of consumers into manageable communicable target groups for wine markets. Knowledge of consumer behaviour provides direction and the basis for wine marketing efforts such as advertising, promotion, public relations, wine packaging, pricing, distribution and the nature of the wine product.

#### **WINEMKTG 2503EX**

##### **International Marketing of Wine & Agri Products II**

3 units - semester 2

None: External

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, exam

This course aims to provide a comprehensive review of the theory and practice of international marketing in relation to wine and agricultural products. Topics include: environmental factors affecting global wine marketing, especially the socio-cultural implications of international trade and wine export, strategic planning and organising for international marketing, market research for wine and agricultural products, decisions on segmentation, wine product policy, pricing, channels of distribution, international wine advertising, and coordinating and controlling global wine marketing operations.

#### **WINEMKTG 2503WT**

##### **International Marketing of Wine & Agri Products II**

3 units - semester 2

Up to 3 hours per week

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, exam

This course aims to provide a comprehensive review of the theory and practice of international marketing in relation to wine and agricultural products. Topics include: environmental factors affecting global wine marketing, especially the socio-cultural implications of international trade and wine export, strategic planning and organising for international marketing, market research for wine and agricultural products, decisions on segmentation, wine product policy, pricing, channels of distribution, international wine advertising, and coordinating and controlling global wine marketing operations.

#### **WINEMKTG 2504EX**

##### **International Wine Law II**

3 units - semester 1

None: External

Assumed Knowledge: WINEMKTG 1003EX or COMMLAW 1004

Assessment: Assignments, Research Essay

The course will cover import and export licensing, labelling and standards requirements, appellation and place names requirements and restrictions, contracts for international sale and financing of sale and for transport, conflict of laws, the role of the OIV and other international agencies, treaties and trade agreements, and tax laws as related to the international wine trade.

#### **WINEMKTG 2504WT**

##### **International Wine Law II**

3 units - semester 1

Up to 3 hours per week

Assumed Knowledge: WINEMKTG 1003EX or COMMLAW 1004

Assessment: Assignments, Research Essay

The course will cover import and export licensing, labelling and standards requirements, appellation and place names requirements and restrictions, contracts for international sale and financing of sale and for transport, conflict of laws, the role of the OIV and other international agencies, treaties and trade agreements, and tax laws as related to the international wine trade.

### **WINEMKTG 2505EX**

#### **Strategic Marketing Management II**

3 units - semester 2

None: External

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

The critical role of strategic marketing in meeting the challenges facing organisations in complex markets will be the primary focus of this course, and will seek to explore how formulating and implementing unique strategic marketing moves serve not only to ensure survival, but also to yield significant and sustainable competitive advantage. Drawing on current and emerging perspectives on strategic marketing, the material covered will be structured in terms of a basic strategic marketing model, which deals with company, competition, customer, environment, strengths and weaknesses, objectives and goals, strategy formulations and implementation.

In order to contextualise this material students will be encouraged to develop an understanding of the practical necessity for interdependency and synergy between an organisation's corporate, business, and functional levels of strategy.

### **WINEMKTG 2506EX**

#### **Wine and Society II**

3 units - semester 1

None: External

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

The student will be exposed to studies that cover the history and future of the Australian wine industry, presented in the wider context of European and other New World wine industries. Topics covered include: the origins of grape and wine production, the religious and cultural symbolism of wine, the development of an international wine trade in the 20th Century, the role of fashion in wine markets, and examination of wine and other forms of alcohol and health issues. Also covered are: alcohol and wine consumption habits and attitudes, education and awareness programs, communication of wine information, food and wine complementarity, labelling and product laws.

### **WINEMKTG 2506WT**

#### **Wine and Society II**

3 units - semester 1

Up to 3 hours per week

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

The student will be exposed to studies that cover the history and future of the Australian wine industry, presented in the wider context

of European and other New World wine industries. Topics covered include: the origins of grape and wine production, the religious and cultural symbolism of wine, the development of an international wine trade in the 20th Century, the role of fashion in wine markets, and examination of wine and other forms of alcohol and health issues. Also covered are: alcohol and wine consumption habits and attitudes, education and awareness programs, communication of wine information, food and wine complementarity, labelling and product laws.

### **WINEMKTG 3068NW**

#### **The Australian Wine Industry: Rise of an Icon III**

3 units - winter semester

Intensive

Restriction: Not available to Wine Marketing/Business, Oenology or Viticulture students

Available for Non-Award Study

Incompatible: All other WINEMKTG, OENOLOGY & VITICULT courses

Assessment: Exam, sensory tests, group oral presentation, field work report.

The Australian wine industry is internationally renowned for the innovative approaches that have made it a leading instigator of many 'best-practices' across the entire wine value chain, from grape growing, wine making to consumer satisfaction. This course will provide a broad understanding of the Australian wine industry by embracing a 'whole-of-wine-chain' approach that reflects the industry's core strengths. Students will be introduced to the industry's fascinating history, especially how it grew to become a formidable force in international wine markets and made Australia the leading New World wine-producing country. It will provide knowledge of the principles and practices that underpin successful Australian wine production by covering topics such as grape growing, vineyard management and operation, making of table, sparkling, fortified and dessert wines, sensory evaluation of wines, regional wine styles, and basic flavour chemistry of grapes and wine; emphasising aspects distinctive to the Australian wine industry. The course will comprise lectures and practical sessions, including a full day visit to one of Australia's famous wine regions. The course is aimed at students with an interest in wine but does not require in-depth scientific knowledge.

This course involves teaching sessions that may be attended by both Undergraduate and Postgraduate students.

### **WINEMKTG 3068WT**

#### **The Australian Wine Industry: Rise of an Icon III**

3 units - winter semester

Intensive

Restriction: Not available to Wine Marketing/Business, Oenology or Viticulture students

Incompatible: All other WINEMKTG, OENOLOGY & VITICULT courses

Assessment: Exam, sensory tests, group oral presentation, field work report.

The Australian wine industry is internationally renowned for the innovative approaches that have made it a leading instigator of many 'best-practices' across the entire wine value chain, from grape growing, wine making to consumer satisfaction. This course will provide a broad understanding of the Australian wine industry by embracing a 'whole-of-wine-chain' approach that reflects the industry's core strengths. Students will be introduced to the industry's fascinating history, especially how it grew to become a formidable force in international wine markets and made Australia the leading New World wine-producing country. It will provide

knowledge of the principles and practices that underpin successful Australian wine production by covering topics such as grape growing, vineyard management and operation, making of table, sparkling, fortified and dessert wines, sensory evaluation of wines, regional wine styles, and basic flavour chemistry of grapes and wine; emphasising aspects distinctive to the Australian wine industry. The course will comprise lectures and practical sessions, including a full day visit to one of Australia's famous wine regions. The course is aimed at students with an interest in wine but does not require in-depth scientific knowledge.

This course involves teaching sessions that may be attended by both Undergraduate and Postgraduate students.

### **WINEMKTG 3500EX**

#### **Global Wine Market III**

3 units - semester 1

External

Restriction: Available to BWineMark students only

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This capstone course provides students with insights into the nature, structure, functional mechanisms, and the complexities of the world's wine market. A typology of open, government-regulated and emerging wine markets is used as a framework within which to present this. In the process, the focus is across-the-board on specific countries' wine markets: large, medium, and small including markets that are of strategic importance. In addition, it examines key drivers in the world wine market and their impact on wine export dynamics and characteristics. There is an emphasis throughout on wine consumer behavioural aspects and successful marketing strategies employed in the wine consuming markets. The key factor of wine industry competitiveness is examined throughout as it manifests itself through the export performance of specific wine-producing country.

### **WINEMKTG 3500WT**

#### **Global Wine Market III**

3 units - semester 1

Up to 3 hours per week

Restriction: Available to BWineMark students only

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This capstone course provides students with insights into the nature, structure, functional mechanisms, and the complexities of the world's wine market. A typology of open, government-regulated and emerging wine markets is used as a framework within which to present this. In the process, the focus is across-the-board on specific countries' wine markets: large, medium, and small including markets that are of strategic importance. In addition, it examines key drivers in the world wine market and their impact on wine export dynamics and characteristics. There is an emphasis throughout on wine consumer behavioural aspects and successful marketing strategies employed in the wine consuming markets. The key factor of wine industry competitiveness is examined throughout as it manifests itself through the export performance of specific wine-producing country.

### **WINEMKTG 3501EX**

#### **Winery Business Management III**

6 units - semester 2

External

Restriction: Available to BWineMark students only

Pre-Requisite(s): ACCTING 1002 or WINEMKTG 1008EX & WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, major project

This capstone course integrates all of the interfacing elements between wine, business and marketing management as these relate to the 'real-world' side of the wine industry of today. In the process wine marketing (with a strong emphasis on brand building to differentiate the wine(ry) business), winery cost and management accounting and financial management, strategic winery business management, and organisation development are all examined as these relate to an actual winery. Key focus areas are wine(ry) brand building and management, understanding costs of production, strategic management issues, and financing growth strategies for a wine(ry) business.

Students are required to conduct extensive research of both the winery organisation's internal and external environments, including all its operational and financial issues.

The key activity performed in this course is the analysis and application of decision-making to winery operations and their application to an actual (operating) winery. The primary course outcome is a major project in the form of a realistic and fully-integrated 5-year strategic business plan for this operating winery including profit and cash budgets and supporting materials.

### **WINEMKTG 3501WT**

#### **Winery Business Management III**

6 units - semester 2

Up to 3 hours per week

Restriction: Available to BWineMark students only

Pre-Requisite(s): ACCTING 1002 or WINEMKTG 1008EX & WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, major project

This capstone course integrates all of the interfacing elements between wine, business and marketing management as these relate to the 'real-world' side of the wine industry of today. In the process wine marketing (with a strong emphasis on brand building to differentiate the wine(ry) business), winery cost and management accounting and financial management, strategic winery business management, and organisation development are all examined as these relate to an actual winery. Key focus areas are wine(ry) brand building and management, understanding costs of production, strategic management issues, and financing growth strategies for a wine(ry) business.

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The key activity performed in this course is the analysis and application of decision-making to winery operations and their application to an actual (operating) winery. The primary course outcome is a major project in the form of a realistic and fully-integrated 5-year strategic business plan for this operating winery including profit and cash budgets and supporting materials.

### **WINEMKTG 3502EX**

#### **Advertising and Promotion III**

3 units - semester 1

External

Restriction: Available to DipWineMark & BWineMark students only

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course will provide the student with an overview of the Integrated Marketing Communications process. Students will learn

to manage the formal communications process in the context of wine and agricultural businesses. Attention will be paid to developing communication plans and understanding strategic applications of advertising, sales promotion and public relations tools. Students should expect to gain knowledge of communications theory as well as practical application through study of texts and real world cases.

#### **WINEMKTG 3502WT**

##### **Advertising and Promotion III**

3 units - semester 1

Up to 3 hours per week

Restriction: Available to DipWineMark & BWineMark students only

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course will provide the student with an overview of the Integrated Marketing Communications process. Students will learn to manage the formal communications process in the context of wine and agricultural businesses. Attention will be paid to developing communication plans and understanding strategic applications of advertising, sales promotion and public relations tools. Students should expect to gain knowledge of communications theory as well as practical application through study of texts and real world cases.

#### **WINEMKTG 3503EX**

##### **Food Marketing III**

3 units - semester 1

External

This course examines key issues in the development and marketing of primary and processed food and beverages products. Emphasis is placed on such areas as supply chain management, managing product development, exporting Australian food and beverage products, market research, packaging and labelling, consumer food consumption trends, food marketing strategies, and value-adding in Australian food and beverage industries.

#### **WINEMKTG 3503WT**

##### **Food Marketing III**

3 units - semester 1

Up to 3 hours per week

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course examines key issues in the development and marketing of primary and processed food and beverages products. Emphasis is placed on such areas as supply chain management, managing product development, exporting Australian food and beverage products, market research, packaging and labelling, consumer food consumption trends, food marketing strategies, and value-adding in Australian food and beverage industries.

#### **WINEMKTG 3504EX**

##### **Internet Marketing and E-Commerce III**

3 units - semester 1

External

Restriction: Available to DipWineMark & BWineMark students only

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

The course examines issues concerning the process, development and impact of e-commerce, and the use of Internet marketing in wine and food business from a managerial viewpoint, and within the context of creating consumer value. Topics include the underlying technology of e-commerce, conceptual foundations of marketing in an electronic environment; e-commerce business models; consumer attitudes and behaviour on the Internet; Internet marketing research; e-commerce and supply chain management, and advertising and promotional strategies in e-commerce. Coverage also includes issues associated with developing strategy, planning, designing, implementing, out-sourcing, securing and managing e-commerce systems and technologies. Emphasis will be on establishing a framework to keep abreast of the technology in a relatively new but fast moving field.

#### **WINEMKTG 3505EX**

##### **Wine and Food Tourism and Festivals III**

3 units - semester 1

External

Restriction: Available to DipWineMark & BWineMark students only

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course explores the basics of tourism and the structure of the tourism industry as it relates to both wine and food. It addresses the basics concepts of wine tourism and hospitality, wine and food festivals in the broad context of tourism and hospitality, and wine tourism as a vehicle to build a brand image for the wine(ry) business and/or wine region. Specific focus areas include wine tourism visitor (consumer) behaviour, the role of the winery cellar-door in wine marketing/distribution, the functions of wine routes/roads, wine region brand building, and wine and/or food festival event fundamentals and Management.

#### **WINEMKTG 3505WT**

##### **Wine and Food Tourism and Festivals III**

3 units - semester 1

Up to 3 hours per week

Restriction: Available to DipWineMark & BWineMark students only

Assumed Knowledge: WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course explores the basics of tourism and the structure of the tourism industry as it relates to both wine and food. It addresses the basics concepts of wine tourism and hospitality, wine and food festivals in the broad context of tourism and hospitality, and wine tourism as a vehicle to build a brand image for the wine(ry) business and/or wine region. Specific focus areas include wine tourism visitor (consumer) behaviour, the role of the winery cellar-door in wine marketing/distribution, the functions of wine routes/roads, wine region brand building, and wine and/or food festival event fundamentals and Management.

#### **WINEMKTG 3506EX**

##### **Database Marketing for Food and Wine Business III**

3 units - semester 2

External

Restriction: Available to DipWineMark & BWineMark students only

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course presents the evolving field of database marketing, broadly defined as the use of customer databases and information

technology to promote one-to-one relationships with customers and to create precisely targeted marketing strategies; and its uses in food and wine businesses, especially for small to medium sized firms. Coverage includes the theories and practices of customer database design, implementation and maintenance; customer relationship management, and acquisition, retention and win-back strategies; applying customer lifetime value techniques; customer segmentation; and database marketing communication. More complex database marketing concepts including geodemographic applications, automatic cluster detection, and market basket analysis will be introduced.

#### **WINEMKTG 3506WT**

##### **Database Marketing for Food and Wine Business III**

3 units - semester 2

Up to 3 hours per week

Restriction: Available to DipWineMark & BWineMark students only

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course presents the evolving field of database marketing, broadly defined as the use of customer databases and information technology to promote one-to-one relationships with customers and to create precisely targeted marketing strategies; and its uses in food and wine businesses, especially for small to medium sized firms. Coverage includes the theories and practices of customer database design, implementation and maintenance; customer relationship management, and acquisition, retention and win-back strategies; applying customer lifetime value techniques; customer segmentation; and database marketing communication. More complex database marketing concepts including geodemographic applications, automatic cluster detection, and market basket analysis will be introduced.

#### **WINEMKTG 3507EX**

##### **Wine Retail and Distribution Management III**

3 units - semester 2

External

Restriction: Available to DipWineMark & BWineMark students only

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course focuses on the principles of establishing and managing a retail concern. It will expose the student to the theoretical and practical aspects of selling and retail practices. Some of the areas this course will cover include: distribution and information systems, selling and marketing technology and trends, retail and wholesale operations, negotiation skills. The course can involve some fieldwork and practical case studies.

#### **WINEMKTG 3507WT**

##### **Wine Retail and Distribution Management III**

3 units - semester 2

Up to 3 hours per week

Restriction: Available to DipWineMark & BWineMark students only

Pre-Requisite(s): WINEMKTG 1013WT or WINEMKTG 1013EX

Assessment: Assignments, Exam

This course focuses on the principles of establishing and managing a retail concern. It will expose the student to the theoretical and practical aspects of selling and retail practices. Some of the areas this course will cover include: distribution and information systems, selling and marketing technology and trends, retail and wholesale operations, negotiation skills. The course can involve some fieldwork and practical case studies.

#### **WINEMKTG 4007AWT/BWT**

##### **Hons Wine Marketing Part 1 & 2**

24 units - full year

Restriction: Available only to students admitted to the relevant Honours program

Assessment: Research project/thesis

Candidates are expected to acquire a more detailed knowledge in a selected area of wine marketing or wine business than is required for the degree.

Candidates are required to carry out research in the field, to present seminar/s, and to present the results of the research in a written thesis. The student and the Honours Coordinator may decide to substitute some coursework for part of the research, however, a single mark based on 24 units will be assessed.

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