

Environmental science

Environmental science is the discipline of detecting and solving environmental problems. Human impacts on the natural world span geology, chemistry, and the mathematical and natural sciences. The program in environmental science is oriented towards teaching analytical and problem-solving skills that take advantage of a student's major science discipline. The subjects that lead to a major in environmental science provide the necessary training to make the graduate effective at finding solutions to a variety of environmental problems. This will provide graduates with the opportunity to make valuable contributions to industry, regulatory authorities and education.

Students enrolled in a Bachelor of Science, Bachelor of Arts and Sciences or a BSc combined course with law, commerce or arts can follow a course of study which results in the award of a major in environmental science. For students enrolled in these courses the environmental science major is only available when completed in conjunction with a second science major. Students enrolled in a BSc combined course with engineering, geomatics or forestry can follow a course of study which results in the award of a major in environmental science without a second science major.

Studies in environmental science provide training in scientific skills and disciplines that may be used to identify and solve environmental problems. The program teaches students how to make efficient use of scarce resources available for management and conservation of the environment. In particular, the skills developed by studying environmental science will enable graduates to:

- evaluate physical, chemical and ecological components of the environment;
- identify environmental problems;
- construct models of ecological processes;
- undertake risk analyses;
- assess environmental impacts;
- design experiments and monitoring programs;
- undertake quantitative analysis of environmental data; and
- provide solutions for environmental problems.

Career opportunities

Studying environmental science provides an opportunity for laboratory, outdoor and indoor careers dealing with environmental issues. Graduates work in areas such as:

- consulting in environmental impact assessment;
- the mining, agriculture, land development and forestry sectors;
- science and management of soil, water and air pollution;
- environmental education;
- parks and wildlife research and management; and
- natural resource development and management.

Potential employers include local, state and federal government, environmental and regulatory agencies, environmental groups, and resource and development departments at the state and federal level, environmental, natural resource and engineering consulting companies and a number of major chemical and mining companies.

Suggested subjects

Please note that for students in all courses (except BSc combined courses with engineering, geomatics and forest science) the environmental science major is only available when completed with another science major.

To undertake an environmental science major students should complete the environmental sciences first year package see page 10.

Suggested 200-level subjects are identified below in Table 1.

Table 1: Suggested 200-level subjects
620-270 Applied Statistics (<i>p.8</i>)
610-280 Environmental Chemistry (<i>p.5</i>)
606-204 Ecology: Communities and Ecosystems (<i>p.1</i>)
654-204 Ecology: Individuals and Populations (<i>p.2</i>)

It is also suggested that students complete social and applied science subjects to the value of at least 25 points to complement the environmental science subjects. Examples are given below in Table 4.

Table 2: Social and applied science subjects complementing the environmental science major
121-021 Environmental Politics and Management (<i>p.3</i>)
121-022 Development and Urban Environments (<i>p.3</i>)
121-028 Sustainable Development (<i>p.3</i>)

Table 2: Social and applied science subjects complementing the environmental science major

136-040 Science Technology and Society (<i>p.4</i>)
136-033 Science, Reason and Reality (<i>p.3</i>)
316-101 Introductory Macroeconomics (<i>p.1</i>)
316-208 Economics of the Environment (<i>p.2</i>)

These subjects are not available to students in some science courses.

Bachelor of Science (Degree with Honours)

There is no specific honours program in environmental science. Students are encouraged to pursue an environmental science honours project as part of the normal honours program in a science department. For further information, contact the Environmental Science Coordinator.

Subject descriptions

600-301 Problem Solving in Environmental Science

Credit points: 12.5

Coordinator: Prof M Keough

Prerequisites: 600-303 Environmental Risk Assessment. A statistics subject is strongly recommended.

Contact: 24 lectures (two per week) and 18 hours of practicals/tutorials (*Semester 2*).

Description: Students completing this subject should have an appreciation of environmental decision-making and the role of scientists in that process, and should understand the methodologies used for the assessment of human impacts on the natural environment. They should be familiar with the statistical principles underlying the design of environmental impact assessment and monitoring, and have experience in conducting and presenting the results of a multidisciplinary research project in environmental impact assessment. The subject includes methods of hypothesis development, experimental design and testing in environmental impact assessment, design and analysis of sampling and monitoring programs and their subsequent analysis, and evaluating proposed solutions for their technical feasibility and risk.

Assessment: Written essay work totalling 3000 words due during the semester (30%); two 10-minute oral presentations during the semester (10% total); a 3-hour written examination in the examination period (60%).

600-303 Environmental Risk Assessment

Credit points: 12.5

Coordinator: Dr T Walshe; Prof M Burgman

Prerequisites: One of 654-204 Ecology: Individuals and Populations (*p.2*) or 606-204 Ecology: Communities and Ecosystems (*p.1*) or 620-270 Applied Statistics (*p.8*).

Pre or Corequisites: 620-160 Experimental Design & Data Analysis (*p.5*) or equivalent statistics, mathematics or quantitative methods subject.

Contact: 24 lectures (two per week) and 24 hours of practical/tutorials (*Semester 1*).

Description: Students completing this subject should be familiar with the concept of exposure pathways; understand the ecological processes associated with contamination in aquatic and terrestrial ecosystems; and be able to develop empirical models and estimate exposures and responses in ecological systems. The course includes an outline of the framework for applying the concepts of risk assessment to achieve management goals. Students will learn how to perform fundamental exposure, hazard and ecological risk assessment procedures. The subject content includes the psychology and history of risk perception, exposure pathways, models for environmental toxicology, Australian standards for risk assessment, response surfaces, indicator species and exemplars, test endpoints, assessment endpoints and management goals, extrapolations among taxa, interval, arithmetic, empirical modelling, parameter estimation, and risk assessment.

Assessment: Practical tasks throughout the semester (20%), a written assignment of up to 3000 words due at the end of semester (20%); a 3-hour written examination in the examination period (60%). Satisfactory completion of both practical work and the examination is necessary to pass the subject.

121-030 Applied Ecology

See full subject details on page 5.

121-033 Environmental Hydrology A

See full subject details on page 6.

451-312 GIS & Remote Sensing for Enviro Science

See full subject details on page 7.

606-301 Applied Ecology (Theory)

See full subject details on page 2.

610-360 Analytical & Environmental Chemistry

See full subject details on page 7.

620-371 Linear Models

See full subject details on page 11.

654-308 Conservation Biology

See full subject details on page 4.