

ENVIRONMENTAL SCIENCE

Professor & Head of Department

SE Shackleton, M.Sc (Wits), PhD (Rhodes)

Professor and SARChI Chair in Interdisciplinary Science in Land & Natural Resource Use for Sustainable Livelihoods

CM Shackleton, PhD (Wits)

Associate Professor

J Gambiza, PhD (Zimbabwe)

Senior Lecturer

G Cundill, PhD (Rhodes)

Lecturers

G Thondhlana, PhD (Rhodes)

A de Vos, PhD (UCT)

Research Associates

M Powell, MSc (Rhodes)

A Palmer, PhD (Rhodes)

K Whittington-Jones, PhD (Rhodes)

Visiting Fellows

AM Avis, PhD (Rhodes)

Environmental Science (ENV) is a four-semester subject which may be taken as a major subject for the degrees of BSc, BEcon, BJourn and BA, subject to the conditions specified below.

The Department takes an inter/transdisciplinary approach to sustainable environmental management and aims to attract students from a variety of academic disciplines. Candidates who wish to major in Environmental Science should, however, structure their degrees around a specific sub-discipline of Environmental Science, for example biological resources, earth resources, water resources, environmental policy, environmental economics, or people and the environment. Their choice of additional subjects at the second and third level should thus reflect a specific focus.

To major in Environmental Science a candidate is required to obtain credit in the following first year level courses: EAR 101 and GOG 102, and one of ANT 1, BOT 1, ECO 1, GLG 1 or ZOO 1; followed by ENV 201 and ENV 202 at second year level, and then ENV 301 and ENV 302 at the third year level. An exception is made for Law students who, due to a timetable clash between Legal Theory 1 and EAR 101 and GOG 102, are permitted to enter ENV 201 and ENV 202 without having completed EAR 101 and GOG 102. Such students shall register for EAR

101 and GOG 102 concurrently with ENV201 and ENV 201. They must pass EAR 101, GOG 102, and ENV 2 in order to be eligible to register for ENV 3. See the Departmental Web Page <http://www.ru.ac.za/environmentalscience/> for further details, particularly on the content of courses.

Recommended curricula

The following are examples only. Not all the options and possible subject combinations are covered, and curricula are subject to timetable constraints. Students with particular interests are encouraged to discuss other possible course combinations with the Head of Department.

Where both semesters of a year course are recommended, the subject is indicated by its year number only, e.g. ENV 2 instead of ENV 201 and 202. GOG 1 is used instead of EAR 101 and GOG 102.

Curricula could, for example, be structured around one of the following sub-disciplines:

1. Biological resources

Year 1: CHE 1; CEL 101; BOT 102; ZOO 102; EAR 101; GOG 102; STA 101.

Year 2: ENV 2; two of BOT 2, ENT 2, ICH 2, MIC 2 or ZOO 2.

Year 3: ENV 3; and one of BOT 3, ENT 3, ICH 3, MIC 3 or ZOO 3 depending on the choice of second year subjects.

2. Earth resources

Year 1: CHE 1; CEL 101; BOT 102; EAR 101; GOG 102; GLG 102; MAN 101.

Year 2: ENV 2; GLG 2; GOG 2.

Year 3: ENV 3; GOG 3 or GLG 3.

3. Water resources

Year 1: CHE 1; CEL 101; ZOO 101 or BOT 102; EAR 101; GOG 102; GLG 102; MAN 101.

Year 2: ENV 2; one of GLG 2 or GOG 2; and one of BOT 2, ZOO 2 or ENT 2.

Year 3: ENV 3; GLG 3 or GOG 3.

4. People and the environment

Year 1: ANT 1; CEL 101; ZOO 101; BOT 102; EAR 101; GOG 102; STA 101.

Year 2: ENV 2; ANT 2; ECO 1; GOG 2.

Year 3: ENV 3; ANT 3 or ECO 3.

5. Environmental Economics

See the BEcon calendar entry under the Faculty of Commerce.

6. Environmental Law

Year 1: Legal Theory 1; ECO 1; ANT 1; BOT 1 or ZOO1

Year 2: Legal Theory 2; ENV 2; GOG 2

Year 3: Legal Theory 3; ENV 3

Note: These are illustrative curricula only and students must ensure that they have the correct number of semester credits to meet their respective faculty needs.

Second-year level courses in Environmental Science

There are two second-year level courses in Environmental Science. ENV 201 is normally taught in the first semester and ENV 202 in the second semester. Credit may be obtained in each course separately and, in addition, an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course ENV 2, provided that a candidate obtains the required 35% sub-minimum in each component (i.e. the class mark and each exam). However, students who wish to major in Environmental Science must obtain credit in both ENV 201 and ENV 202. No supplementary examinations will be offered for either course. Practical reports, essays, seminars and class tests collectively comprise the class mark, which forms part of the final mark.

Credit in Geography (EAR 101 and GOG 102) and either Anthropology (ANT 1), Botany (CEL 101 and BOT 102), Economics (ECO 1), Geology (GLG 1) or Zoology (CEL 101 and ZOO 102) is required before a student may register for ENV 201 or ENV 202, other than for Law students. These students shall register for EAR 101 and GOG 102 concurrently with ENV201 and ENV 202. Adequate performance in ENV 201 is required before a student may register for ENV 202.

ENV 201 (Foundations of Environmental Science)

ENV 201 provides the conceptual foundation for all other courses in Environmental Science,

and covers the following topics: integrated perspectives on environmental issues; introduction to inter/transdisciplinarity and local ecological knowledge; ecosystem services and human well-being; complexity; social-ecological systems; planetary boundaries and sustainability; social systems; economic valuation of natural resources; ecological systems. Practicals: interaction between social, economic and ecological components of the environment. Students will be required to undertake compulsory field site visits during a limited number of weekends as part of their practicals. Depending on space constraints the Head of Department may exercise the right to limit entry into the course on the basis of applicants' qualifications, experience and academic background.

ENV 202 (Global Environmental Challenges and Policies)

The ENV 202 course is designed to cover a selection of current major global issues and challenges in environmental science. The purpose of the course is to apply interdisciplinary skills, systems approaches and perspectives to analyse and understand environmental issues and policies of global and local concern. Critical analysis and consideration of counter-viewpoints, from a systems perspective, is central. This will be done at different spatial and temporal scales. The skills covered in Environmental Science 201 are particularly relevant, especially those relating to systems analysis, team work, and interdisciplinarity as well as rigorous and in-depth analysis and thinking. Practicals: A variety of different ones pertaining to the issues covered in lectures.

Third-year level courses in Environmental Science

There are two third-year level courses in Environmental Science. ENV 301 is normally taught in the first semester and ENV 302 in the second semester. Credit may be obtained in each course separately and, in addition, an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course ENV 3, provided that a candidate obtains the required 35% sub-minimum in each component (i.e. the class mark and each exam). No supplementary examinations will be offered for either course. Practical reports, essays, seminars and class tests collectively comprise the class mark, which forms part of the final mark.

Students will be required to plan, execute and write up a mini-research project starting in the first term and spanning the whole academic year. There is one compulsory weekend field trip during the first semester. Credit in Environmental Science 2 (ENV 201 and ENV 202) is required before a student may register for ENV 301 or ENV 302. Concurrent registration is not allowed for second-year and third-year courses in Environmental Science. In addition, candidates must have satisfied the prerequisites for ENV 201 and ENV 202.

ENV 301 (Integrated environmental management for sustainability)

This course focuses on sustainable natural resource management in practice. The aim is to develop applied professional skills, coupled with rigorous analysis, to promote more effective environmental thinking and management. The emphasis is on conceptual and planning frameworks to pre-empt or minimise environmental impacts (such as sustainability assessment, strategic environmental assessment, environmental management programme reports, ISO 14000, environmental impact assessment, landscapes and integrated landscape management, adaptive management, participatory natural resource management, adaptive co-management, etc.) as well as to evaluate, understand and mitigate environmental impacts and land and resource use patterns. Each topic is illustrated by up to date examples. The practical application of the course will be incorporated into the year-long mini-research project. Field visits may take place over a limited number of weekends.

ENV 302 (Environmental monitoring and monitoring systems)

This course builds on the foundations laid in ENV 2 in terms of systems thinking, interdisciplinarity and the scientific analysis of environmental challenges and on the integrated management approaches covered in ENV 301. The focus is on the design and implementation of environmental monitoring systems appropriate at different spatial and temporal scales integrating across the biological, social and economic components of an environmental system. Examples will include industrial, terrestrial and aquatic systems and different types of monitoring approaches. A key component deals with collection and analysis of environmental data, which is the core of any environmental monitoring system.

The practical application of the course will be incorporated into the year-long mini-research project. Field visits may take place over a limited number of weekends.

Environmental Science Honours

The Honours course in Environmental Science is designed as an interdisciplinary programme. It consists of four modules selected from a list of available options along with a short course in Statistics. Additionally candidates undertake an independent research project. The course may be done full-time over one academic year, or, rarely, part-time over two academic years with the agreement of the Head of Environmental Science. Tuition emphasis is on self-learning guided through lectures, tutorials, seminars and practical work. Students are encouraged to work in interdisciplinary teams and to address practical, "real life" issues in their projects and seminars. A limited number of students are selected annually on the basis of academic excellence, previous experience, and qualifications in environment-related fields, group diversity and staff availability. Candidates must be in possession of an appropriate Bachelors degree, majoring in at least one of the following: Anthropology, Botany, Economics, Environmental Science, Entomology, Geography, Geology, Ichthyology, Microbiology or Zoology. Preference will be given to applicants with undergraduate Environmental Science qualifications and/or with applicable practical experience. For internal (RU) applicants, adequate performance and participation in ENV 3 is necessary.

Students may be required to attend blocks of lectures and practicals before the official commencement of the first term (typically the last week of January or first week of February) and during vacations. This usually takes the form of a compulsory field trip of 5-10 days. Candidates should consult the Head of Department in this regard before registering for the course.

Students may consider registering for a joint course with other relevant Departments.

Modules

The short course in Statistics must be taken by all students, and those who are considering careers that might involve environmental impact assessment procedures are strongly encouraged to register for the environmental impact assessment module.

For the optional modules, candidates must select four from the list of available modules, with at least two Environmental Science modules. The list changes from year to year, and not all are available to part-time candidates. Some modules are offered by Departments collaborating with Environmental Science and candidates should discuss their options with the Head of Department and, where applicable, with the Head of the Department offering that module. The list includes the following modules. Modules offered by Environmental Science: community-based natural resource management; biodiversity, non-timber forest products and rural livelihoods; ecological modelling; environmental impact assessment; urban forestry; people and protected areas, and climate change adaptation. Modules offered by the Geography Department: wetland ecology and management, and GIS for students who have completed GOG 3. Modules offered by the Anthropology Department: marine anthropology. Modules offered by the Institute for Water Research: environmental water quality. Modules offered by Economics Department: environmental and resource economics. Additional suitable environmental related modules may be available in other departments at the time of registration, and prospective candidates should consult with the Head of Department and Honours Coordinator regarding the availability and choice of such modules. Students will also undertake a research project related to their selected courses.

Honours in Biodiversity and Conservation

This is a specialist Joint Honours course with the Department of Botany. It includes three compulsory modules, one optional module and a year-long project. The compulsory modules are GIS, community-based natural resource management or people and parks, and diversity, rarity and endemism. Full details are provided at: <http://www.ru.ac.za/botany/>.

Master's and Doctoral degrees

Suitably qualified students are encouraged to proceed to the research degrees of MSc, MA and PhD under the direction of the staff of the Department. Requirements for the MSc, MA and PhD degrees are given in the General Rules. An Environmental Science Masters degree is by dissertation. It has four distinguishing characteristics:

- the research and dissertation deals with integrative ecological, social and economic systems;

- it incorporates the concept of sustainability, e.g. sustainable use and management of the environment and sustainable living;
- it addresses issues affecting people's quality of life and their livelihoods;
- it is interdisciplinary, i.e. it is not confined to a single academic discipline, and is often linked to a broader programme with several related projects.

The following candidates are eligible to register:

- applicants in possession of an Honours degree in Environmental Science; if Rhodes University Honours graduates, adequate performance and participation in the Honours year is necessary;
- applicants with a good Honours degree in any other discipline which has covered either biological, physical, human or economic aspects of the environment;
- environmental practitioners with an appropriate Bachelors degree in an environmental discipline, plus a minimum of two years relevant practical experience, at the discretion of the Head of Department and Senate;
- environmental practitioners without a Bachelors degree, but with 5-10 years in-depth experience and proven achievements and skills in an environmental field, may be admitted as *Ad Eundem Gradum* students at the discretion of the Head of Department and Senate.

Students also have the option of attending appropriate undergraduate and Honours modules during their period of registration. Part-time students should aim to spend two to four months on campus at the early stage of registration and another two to four months during the final writing-up stage.

Master's in Business Administration - Environmental Electives

The Rhodes MBA is designed to enable practising and potential managers to succeed in creating, developing and directing successful organizations in a competitive business environment. The Rhodes MBA is now able to offer business the opportunity to engage with the challenges of sustainable development and environmental management through its new electives programme. Details of the six environmental electives can be found under the Faculty of Commerce.