University of Pretoria Yearbook 2019

MSc Environmental Ecology (Coursework) (02250404)

Minimum duration of study	2 years
Total credits	180

Programme information

The Centre for Environmental Studies is a graduate school for multidisciplinary training and research focusing on the environment. Training aims to satisfy the need for environmental professionals for implementing current environmental legislation as well as industry-driven environmental management systems.

Coordinated by the Department of Zoology and Entomology.

The purpose of this focus area is to train environmental graduates who specialised in careers in the ecology of the environment, including conservation planning, environmental management and air quality management. On completion of the training, candidates should be conversant and be able to partake in, or render advice concerning, all aspects involved in the management of the ecological consequences of human existence. This includes a thorough grounding in ecosystem structure, composition and function, ecosystem services, notions of ecosystem health, the management of declining and small populations, captive propagation, control of invasive species, species and community restoration, conservation education, local communities and conservation, as well as aspects of biogeography and macro-ecology, conservation planning and monitoring, the structure, composition and function of biological communities, population and community variability.

The MSc degree is conferred on the grounds of a dissertation and such additional postgraduate coursework as may be prescribed.

Renewal of registration
As long as progress is satisfactory, renewal of the registration of a master's student will be accepted for the second year of the study. Registration for a third and subsequent years will only take place when the Student Administration of the Faculty receives a written motivation that is supported by the relevant head of department and Postgraduate Studies Committee.

General
Candidates are required to familiarise themselves with the General Regulations regarding the maximum period of registration and the requirements on the submission of a draft article for publication.

Admission requirements

- Before application for admission to the MSc (Environmental Ecology) degree programme candidates must be in possession of a four-year degree qualification BScHons or equivalent degree status (SAQA NQF 8) which includes appropriate subjects in ecology. Admission is subject to the approval of the Director of the Centre and

the appropriate head of department outside the Centre.
- Candidates must demonstrate proficiency in the English language up to the level required by either the TOEFL test (www.ets.org/toefl) or the IELTS language proficiency test (www.ielts.org).
- Admission is additionally dependent on availability of supervisor/s and/or projects within the department.

Other programme-specific information

One of the listed specialisation modules may be substituted with an elective module subject to the approval of the Director of the Centre. Choice of an elective is based on the academic background and/or anticipated career of the student but is expected to be relevant to either conservation biology or sustainable forestry management.

Promotion to next study year

The progress of all master's candidates is monitored biannually by the supervisor and the postgraduate coordinator. A candidate's study may be terminated if the progress is unsatisfactory or if the candidate is unable to finish his/her studies during the prescribed period.

Subject to exceptions approved by the Dean, on recommendation of the relevant head of department, and where applicable, a student may not enter for the master's examination in the same module more than twice.

Pass with distinction

The MSc degree is conferred with distinction to candidates who obtain a final average mark of at least 75% and a mark of at least 75% for the dissertation/mini-dissertation from each of the members of the examination panel. Where a member of the examination panel awards a mark of less than 75% for the dissertation/mini-dissertation, that member of the examination panel must offer, in writing, support for his/her decision, or indicate in writing that he/she supports the examination committee's decision to confer the degree with distinction.

Curriculum: Year 1

Minimum credits: 180

Programme information:

Minimum credit: 180

Core credits: 120

Elective credits: 60

Core modules

Environmental paradigms 810 (ENV 810)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	5 discussion classes per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 1

Module content

Environmental philosophy and ethics, environmental ecology, environment, society and development, environmental economics, environmental management, critical resources management: water utilisation, air quality control, land-use planning: soil characteristics, biodiversity planning, critical resource management: determinism vs co-evolutionary environmental frameworks, research methodology and practice.

Environmental law 816 (ENV 816)

Module credits	15.00
Service modules	Faculty of Law
Prerequisites	No prerequisites.
Contact time	1 web-based period per week, 1 lecture per week, 2 practicals per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 1 or Semester 2

Module content

Legislation for sustainable development within the framework of international agreements, the different acts affecting water quality and water use, the SEMAs within the NEMA framework, the NEMA EIA regulations, legislation pertaining to hazardous substances, interaction between mining development and NEMA, energy law, strategic environmental legislation, marine and coastal management.

Trees in a multifunctional landscape 833 (ENV 833)

Module credits	15.00

Prerequisites	No prerequisites.
Contact time	1 web-based period per week, 5 discussion classes per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Quarter 3

Module content

Place and role of trees in multifunctional rural landscapes. Trees outside forests. Multipurpose trees. Trees and biodiversity. Trees and environmental services. Trees and sustainable development. Domesticated forests. Agroforestry (definition, classification, challenges and examples). Multiple use of forests and trees. Non-timber tree and forest products. Domestication of multipurpose trees. Forests and people. Trees and agricultural production systems (yield, interactions, synergy, competition, pests and diseases). Case-study examples from sub-Saharan Africa.

Mini-dissertation 891 (ENV 891)

Module credits	90.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Year

Module content

The student needs to conduct a research project under the supervision of an academic member of staff associated with the Centre for Environmental Studies. This project needs to be of a sufficient quality to be publishable in the open scientific literature. The research report is examined as a manuscript for a suitable journal.

Conservation planning and monitoring 808 (ZEN 808)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	4 discussion classes per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Year

Module content

Biodiversity survey techniques; data and information management; data assessment; principles of data extrapolation; inventories; biodiversity risk assessment (PHVA, small and declining population paradigms, prioritisation); principles of reserve selection; surrogacy; reserve design; integrated land-use planning. Landscape theories and models (hierarchy, percolation, metapopulation, source-sink); scaling patterns and processes across landscapes (patches, corridors, mosaics and flows); emerging patterns and processes; principles of landscape dynamics; principles of landscape conservation, management and design (transformation, fragmentation); methods in landscape ecology (numerical and spatial data processing, fractal geometry approach, GIS, remote sensing, GPS, spatially explicit population models).
Skills: GradSect, Access, Excel, Visual Basic, GIS (Arc View) reserve selection algorithms.

Biogeography and macro-ecology 809 (ZEN 809)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	4 discussion classes per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Year

Module content

Biogeographic consequences of plate tectonics, Pleistocene southern African climatic, geological, edaphic and geomorphological patterns. Reconstructing biogeographic histories (speciation, extinction, dispersal, vicariance, endemism, provincialism and disjunction); phytogeographical patterns, biomes, vegetation types. Methodological issues in macro-ecology; patterns of body size, abundance and energetics; geographic range sizes; species dynamics in landscapes; implications of macro-ecological patterns to ecology; biogeography and evolution; macro-ecological perspectives on conservation: species richness, hierarchical diversity, hotspots, spatial and temporal patterns in diversity (genetic, taxonomic, functional); causal mechanisms, species diversity, biodiversity and global change.

Elective modules

Environment and development 811 (ENS 811)

Module credits	15.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

The foundation of the module is the interrelations between societal and environmental dynamics. It deals with issues of social structure, culture, politics, education, migration, production, urbanisation, demographics and social institutions and how these impact upon the environment. Also dealt with is how the consequences of impacts, such as environmental change, in turn affect societies. Analysis of complex interrelationships between society and the environment, social-environmental linkages and multiplier effects are dealt with.

Strategic environmental management 822 (ENS 822)

Module credits	15.00
Service modules	Faculty of Law
Prerequisites	No prerequisites.
Contact time	2 discussion classes per week, 5 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

Strategic environmental planning: introduction, objectives and principles; levels; South African overview; guidelines: national and international; strategy and management; structure, strategy and agency; South African guidelines; diagnostic tools; RESP analysis; strategic resource planning; applications, implementation and control; development and policy implementation; South African environmental policy; evaluation frameworks; portfolio analysis; competitive forces; alliances; business benefits; intangibles, survival and catalytic contributions; South African legislation and regulations.

Environment and land reform 823 (ENS 823)

Module credits	15.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

The need and purpose of land reform in South Africa and its contribution towards sustainable social-environmental interaction. An overview of the global variety of land tenure systems, and tenure reform programmes in other countries. Overview of previous systems of land tenure in South Africa. Land reform policy in South Africa: restitution, redistribution, and tenure reform. Critical assessment of progress in terms of land reform objectives. Evaluation of the contribution of the South African land reform programme towards creating sustainable environments.

Social modelling and assessment 824 (ENS 824)

Module credits	15.00

Prerequisites	No prerequisites.
Contact time	5 discussion classes per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

In this module students will be introduced to the various methods of modelling and assessing social impacts. Specific emphasis will be placed upon modelling societal-economic-environmental interactions, formulating stochastic and dynamic models of population-development-environment interactions, conducting research to determine possible impacts of environmental changes on communities and performing social impact surveys. Students will be introduced to both quantitative as well as qualitative methods of conducting social impacts assessments.

International environmental management systems 822 (ENV 822)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 lectures over a period of 1 week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 2

Module content

The ISO framework, environmental risks and opportunities for companies, global environmental concerns, environmental legislation, identification of environmental impacts, environmental certification and auditing, follow-up activities, the Forestry Stewardship Council framework, chain of custody requirements, production standards, FSC reporting.
(** additional costs involved for international UK certificate)

Water quality management 810 (EWM 810)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Severity of waterborne disease, accurate risk analysis, emergence of pathogens resistant to disinfection, the use of indicator organisms, toxicity risks, viral and protozoal contamination, water borne diseases surveillance, epidemiology of water borne diseases, water quality standards and monitoring, education.

Water conservation and demand management 821 (EWM 821)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Public access to information regarding water quality, water supply sustainability and public education, demand projections, water management efficiency systems approach to water management, watershed protection, drinking water treatment and distribution, wastewater collection and treatment, effects of deforestation and treatment, and complex water system developments, destruction of wetlands, effects of recreation, agriculture and aquaculture on eutrophication.

Water supply and sanitation 822 (EWM 822)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Low technology water treatment options, sanitary engineering, high technology options, water disinfection methods, selection of treatment regimes, stormwater management.

Forest ecology and management 835 (FOR 835)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes per block, 1 web-based period per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Structure and function of natural forests, species composition and diversity, disturbance processes and regimes, recovery (succession) concepts and theory, biodiversity in forest ecosystems, energy and nutrient flux in natural forest ecosystems. Resource assessment and planning. Silvicultural systems and management of natural forests (and woodlands), natural regeneration and forest rehabilitation management for sustainability of natural forest ecosystems: multiple use for timber and non-timber forest products, forest rehabilitation (invader plants, mining, degraded forests).

Curriculum: Final year

Minimum credits: 180

Core modules

Environmental paradigms 810 (ENV 810)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	5 discussion classes per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 1

Module content

Environmental philosophy and ethics, environmental ecology, environment, society and development, environmental economics, environmental management, critical resources management: water utilisation, air quality control, land-use planning: soil characteristics, biodiversity planning, critical resource management: determinism vs co-evolutionary environmental frameworks, research methodology and practice.

Environmental law 816 (ENV 816)

Module credits	15.00
Service modules	Faculty of Law
Prerequisites	No prerequisites.
Contact time	1 web-based period per week, 1 lecture per week, 2 practicals per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 1 or Semester 2

Module content

Legislation for sustainable development within the framework of international agreements, the different acts affecting water quality and water use, the SEMAs within the NEMA framework, the NEMA EIA regulations, legislation pertaining to hazardous substances, interaction between mining development and NEMA, energy law, strategic environmental legislation, marine and coastal management.

Trees in a multifunctional landscape 833 (ENV 833)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	1 web-based period per week, 5 discussion classes per week
Language of tuition	Module is presented in English

Department	Department of Plant and Soil Sciences
Period of presentation	Quarter 3

Module content

Place and role of trees in multifunctional rural landscapes. Trees outside forests. Multipurpose trees. Trees and biodiversity. Trees and environmental services. Trees and sustainable development. Domesticated forests. Agroforestry (definition, classification, challenges and examples). Multiple use of forests and trees. Non-timber tree and forest products. Domestication of multipurpose trees. Forests and people. Trees and agricultural production systems (yield, interactions, synergy, competition, pests and diseases). Case-study examples from sub-Saharan Africa.

Mini-dissertation 891 (ENV 891)

Module credits	90.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Year

Module content

The student needs to conduct a research project under the supervision of an academic member of staff associated with the Centre for Environmental Studies. This project needs to be of a sufficient quality to be publishable in the open scientific literature. The research report is examined as a manuscript for a suitable journal.

Conservation planning and monitoring 808 (ZEN 808)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	4 discussion classes per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Year

Module content

Biodiversity survey techniques; data and information management; data assessment; principles of data extrapolation; inventories; biodiversity risk assessment (PHVA, small and declining population paradigms, prioritisation); principles of reserve selection; surrogacy; reserve design; integrated land-use planning. Landscape theories and models (hierarchy, percolation, metapopulation, source-sink); scaling patterns and processes across landscapes (patches, corridors, mosaics and flows); emerging patterns and processes; principles of landscape dynamics; principles of landscape conservation, management and design (transformation, fragmentation); methods in landscape ecology (numerical and spatial data processing, fractal geometry approach, GIS, remote sensing, GPS, spatially explicit population models).
Skills: GradSect, Access, Excel, Visual Basic, GIS (Arc View) reserve selection algorithms.

Biogeography and macro-ecology 809 (ZEN 809)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	4 discussion classes per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Year

Module content

Biogeographic consequences of plate tectonics, Pleistocene southern African climatic, geological, edaphic and geomorphological patterns. Reconstructing biogeographic histories (speciation, extinction, dispersal, vicariance, endemism, provincialism and disjunction); phytogeographical patterns, biomes, vegetation types. Methodological issues in macro-ecology; patterns of body size, abundance and energetics; geographic range sizes; species dynamics in landscapes; implications of macro-ecological patterns to ecology; biogeography and evolution; macro-ecological perspectives on conservation: species richness, hierarchical diversity, hotspots, spatial and temporal patterns in diversity (genetic, taxonomic, functional); causal mechanisms, species diversity, biodiversity and global change.

Elective modules

Environment and development 811 (ENS 811)

Module credits	15.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

The foundation of the module is the interrelations between societal and environmental dynamics. It deals with issues of social structure, culture, politics, education, migration, production, urbanisation, demographics and social institutions and how these impact upon the environment. Also dealt with is how the consequences of impacts, such as environmental change, in turn affect societies. Analysis of complex interrelationships between society and the environment, social-environmental linkages and multiplier effects are dealt with.

Strategic environmental management 822 (ENS 822)

Module credits	15.00
Service modules	Faculty of Law
Prerequisites	No prerequisites.
Contact time	2 discussion classes per week, 5 lectures per week
Language of tuition	Module is presented in English

Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

Strategic environmental planning: introduction, objectives and principles; levels; South African overview; guidelines: national and international; strategy and management; structure, strategy and agency; South African guidelines; diagnostic tools; RESP analysis; strategic resource planning; applications, implementation and control; development and policy implementation; South African environmental policy; evaluation frameworks; portfolio analysis; competitive forces; alliances; business benefits; intangibles, survival and catalytic contributions; South African legislation and regulations.

Environment and land reform 823 (ENS 823)

Module credits	15.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

The need and purpose of land reform in South Africa and its contribution towards sustainable social-environmental interaction. An overview of the global variety of land tenure systems, and tenure reform programmes in other countries. Overview of previous systems of land tenure in South Africa. Land reform policy in South Africa: restitution, redistribution, and tenure reform. Critical assessment of progress in terms of land reform objectives. Evaluation of the contribution of the South African land reform programme towards creating sustainable environments.

Social modelling and assessment 824 (ENS 824)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	5 discussion classes per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Year

Module content

In this module students will be introduced to the various methods of modelling and assessing social impacts. Specific emphasis will be placed upon modelling societal-economic-environmental interactions, formulating stochastic and dynamic models of population-development-environment interactions, conducting research to determine possible impacts of environmental changes on communities and performing social impact surveys. Students will be introduced to both quantitative as well as qualitative methods of conducting social impacts assessments.

International environmental management systems 822 (ENV 822)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 lectures over a period of 1 week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 2

Module content

The ISO framework, environmental risks and opportunities for companies, global environmental concerns, environmental legislation, identification of environmental impacts, environmental certification and auditing, follow-up activities, the Forestry Stewardship Council framework, chain of custody requirements, production standards, FSC reporting.
(** additional costs involved for international UK certificate)

Water quality management 810 (EWM 810)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Severity of waterborne disease, accurate risk analysis, emergence of pathogens resistant to disinfection, the use of indicator organisms, toxicity risks, viral and protozoal contamination, water borne diseases surveillance, epidemiology of water borne diseases, water quality standards and monitoring, education.

Water conservation and demand management 821 (EWM 821)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Public access to information regarding water quality, water supply sustainability and public education, demand projections, water management efficiency systems approach to water management, watershed protection, drinking water treatment and distribution, wastewater collection and treatment, effects of deforestation and treatment, and complex water system developments, destruction of wetlands, effects of recreation, agriculture and aquaculture on eutrophication.

Water supply and sanitation 822 (EWM 822)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Low technology water treatment options, sanitary engineering, high technology options, water disinfection methods, selection of treatment regimes, stormwater management.

Forest ecology and management 835 (FOR 835)

Module credits	15.00
Prerequisites	No prerequisites.
Contact time	20 discussion classes per block, 1 web-based period per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Structure and function of natural forests, species composition and diversity, disturbance processes and regimes, recovery (succession) concepts and theory, biodiversity in forest ecosystems, energy and nutrient flux in natural forest ecosystems. Resource assessment and planning. Silvicultural systems and management of natural forests (and woodlands), natural regeneration and forest rehabilitation management for sustainability of natural forest ecosystems: multiple use for timber and non-timber forest products, forest rehabilitation (invader plants, mining, degraded forests).

The information published here is subject to change and may be amended after the publication of this information. The General Regulations (G Regulations) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the General Rules section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.