

# University of Pretoria Yearbook 2022

## MSc (Water Resource Management) (Coursework) (02250406)

**Department** Genetics

**Minimum duration of study** 2 years

**Total credits** 180

**NQF level** 09

### 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.

This programme is coordinated by the Department of Microbiology and Plant Pathology.

The purpose of this focus area is to train environmental graduates who specialised in careers in the sustainable management of water resources. On completion of the training, candidates should be conversant and be able to partake in, or render advice concerning, all aspects involved in water resource management in Southern Africa. This includes principles of quality management, water conservation, water demand management, water supply and sanitation technologies.

### Admission requirements

1. Relevant BScHons degree **or** four-year bachelor's degree with subjects in water management and/or water ecology
2. A weighted average of at least 65% at final-year level
3. An admission examination may be required
4. A CV with contactable references may be required

### Additional requirements

Candidates must demonstrate proficiency in the English language up to the level required by either the TOEFL test ([www.ets.org/toefl](http://www.ets.org/toefl)) or the IELTS language proficiency test ([www.ielts.org](http://www.ielts.org)).

### Other programme-specific information

At least one additional elective module must be selected in consultation with the Director of the Centre and the Head of the Department of Microbiology and Plant Pathology. Choice of electives will be based on the academic background and/or anticipated career of the candidate.

## 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.

## Curriculum: Year 1

At least one additional elective module must be selected in consultation with the Director of the Centre and the Head of the Department of Microbiology and Plant Pathology. Choice of electives will be based on the academic background and/or anticipated career of the candidate.

### Core modules

#### Environmental paradigms 810 (ENV 810)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	5 discussion classes per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Law
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 lecture per week, 1 web-based period per week, 2 practicals per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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.

#### Mini-dissertation 891 (ENV 891)

<b>Module credits</b>	90.00
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<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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.

### Water quality management 810 (EWM 810)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 discussion classes
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Biochemistry, Genetics and Microbiology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 discussion classes
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Biochemistry, Genetics and Microbiology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 discussion classes
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Biochemistry, Genetics and Microbiology
<b>Period of presentation</b>	Semester 2

## Module content

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

## Elective modules

### Environment and development 811 (ENS 811)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09

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

### Social modelling and assessment 824 (ENS 824)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	5 discussion classes per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 lectures over a period of 1 week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	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)

## Trees in a multifunctional landscape 833 (ENV 833)

**Module credits** 15.00

**NQF Level** 09

**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.

## Forest ecology and management 835 (FOR 835)

**Module credits** 15.00

**NQF Level** 09

**Prerequisites** No prerequisites.

**Contact time** 1 web-based period per week, 20 discussion classes per block

**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).

## Environmental change 881 (OMS 881)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	Year

### Module content

This module involves the study of the causes and consequences of environmental change from multidisciplinary perspectives. A focus of this course is human environmental interactions. Past processes leading to environmental change will also be discussed. In a given period, the following will be investigated: principles of environmental change, causes and consequences of environmental change, Global warming and climate change: causes and impacts of climate change on natural resources; water, forests, biodiversity, land use and land cover change, environmental/Climate change and infectious disease, human dimensions of global change and Climate change political responses including the Kyoto protocol. Mitigation and adaptation strategies to climate change and effects of Climate change on sustainable development.



## Curriculum: Final year

### Core modules

#### Environmental paradigms 810 (ENV 810)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	5 discussion classes per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Law
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 lecture per week, 1 web-based period per week, 2 practicals per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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.

#### Mini-dissertation 891 (ENV 891)

<b>Module credits</b>	90.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.

<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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.

### Water quality management 810 (EWM 810)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 discussion classes
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Biochemistry, Genetics and Microbiology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 discussion classes
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Biochemistry, Genetics and Microbiology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 discussion classes
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Biochemistry, Genetics and Microbiology
<b>Period of presentation</b>	Semester 2

### Module content

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

## Elective modules

### Environment and development 811 (ENS 811)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Law
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	2 discussion classes per week, 5 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geography Geoinformatics and Meteorology
<b>Period of presentation</b>	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.

## Social modelling and assessment 824 (ENS 824)

**Module credits** 15.00

**NQF Level** 09

**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

**NQF Level** 09

**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)

## Trees in a multifunctional landscape 833 (ENV 833)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 web-based period per week, 5 discussion classes per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Department of Plant and Soil Sciences
<b>Period of presentation</b>	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.

## Forest ecology and management 835 (FOR 835)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 web-based period per week, 20 discussion classes per block
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Department of Plant and Soil Sciences
<b>Period of presentation</b>	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).

## Environmental change 881 (OMS 881)

<b>Module credits</b>	15.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	No prerequisites.
<b>Language of tuition</b>	Module is presented in English

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**Department** Geography Geoinformatics and Meteorology

**Period of presentation** Year

**Module content**

This module involves the study of the causes and consequences of environmental change from multidisciplinary perspectives. A focus of this course is human environmental interactions. Past processes leading to environmental change will also be discussed. In a given period, the following will be investigated: principles of environmental change, causes and consequences of environmental change, Global warming and climate change: causes and impacts of climate change on natural resources; water, forests, biodiversity, land use and land cover change, environmental/Climate change and infectious disease, human dimensions of global change and Climate change political responses including the Kyoto protocol. Mitigation and adaptation strategies to climate change and effects of Climate change on sustainable development.

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The [General Academic Regulations \(G Regulations\)](#) and [General Student Rules](#) apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of the aforementioned regulations.