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# University of Pretoria Yearbook 2017

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## MSc Air Quality Management (Coursework) (02250408)

**Duration of study** 2 years

**Total credits** 180

### Programme information

Coordinated by the Department of Geography, Geoinformatics and Meteorology.

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.

The extensions to the National Environmental Management Act (NEMA) promulgated after 2005 affect environmental management in South Africa in a profound way. In particular, the Air Quality Act brings South African legislation into line with international trends. The metro councils are charged with the responsibility of implementing the Act at the local level. In addition, companies need appropriate expertise to obtain licenses for their air quality management plans. This focus area serves to provide suitable expertise for the implementation of the above legislation by industry by training graduates specialised for careers in air quality management. On completion of the training, candidates should be conversant and be able to partake in, or render advice concerning the legislative requirements with respect to air quality management, modelling of and measurement of air pollution and the interpretation of pollution plumes, the measurement and interpretation of chemical air pollution as well as dust pollution, international agreements and requirements as well as the effects of air pollution on humans.

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 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.



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## Admission requirements

Candidates must be in possession of an appropriate four-year degree or equivalent degree status which includes mathematics and chemistry at first-year level. Admission is subject to the approval of the Director of the Centre and the appropriate head of department outside the Centre.

Admission is additionally dependent on availability of supervisor/s and/or projects within the department.

## 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)).

## 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 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

### Core modules

#### Boundary layer meteorology 811 (AQM 811)

|                               |                                |
|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |

#### Module content

Introduction to global circulation and South African weather and climate. Mathematical functions and atmospheric balance laws. Stability and mixing heights. The atmospheric boundary layer over urban and rural areas. Turbulence. Earth's energy budget. Transfer and exchange of energy. Introduction to atmospheric and chemical dispersion modelling. Practical modelling of air pollution: Box models, Gaussian puff or plume models, stochastic models, trajectory models.

#### Atmospheric chemistry 812 (AQM 812)

|                               |                                |
|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |

#### Module content

The history of atmospheric pollution. Cycles of matter and atmospheric transformations. Gaseous inorganic pollutants. Gas phase organic pollutants. Particulates. The chemistry of atmospheric environmental problems, including acid rain; global warming; ozone depletion; persistent organic pollutants; and photochemical smog. Atmospheric monitoring: sampling methods; sampling strategies; and analytical techniques.

#### Atmospheric thermodynamics 813 (AQM 813)

|                               |                                |
|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |



## Module content

Gas laws. Virtual temperature. The hydrostatic and hypsometric equations. Dry adiabatic processes. The first law of thermodynamics. Latent heat. Stabilities and instabilities. Dry adiabatic temperature lapse rate. Potential temperature. Inversion layers. Atmospheric moisture and saturated-adiabatic processes. Vapour pressure. Saturation and condensation. Dew and frost point. Relative humidity. Saturated adiabatic temperature lapse rate. Cloud and rain formation. The second law of thermodynamics

## Air pollution: society and environment 814 (AQM 814)

|                               |                                |
|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |

## Module content

International air quality criteria and standards. Ambient air quality and meteorological monitoring. Domestic pollution. Household fuel burning. Vehicle emissions. Toxicology and physiology. Industrial pollution. Emissions inventory and report sources. Air pollution and biomass. Air pollution control. Identification of alert air quality thresholds and associate information reporting, investigation and mitigation requirements. Renewable energy. Air pollution and climate. Practical experience.

## Environmental paradigms 810 (ENV 810)

|                               |                                |
|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <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>Academic organisation</b>  | Zoology and Entomology         |
| <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.

## Mini-dissertation 891 (ENV 891)

|                              |                                |
|------------------------------|--------------------------------|
| <b>Module credits</b>        | 90.00                          |
| <b>Prerequisites</b>         | No prerequisites.              |
| <b>Language of tuition</b>   | Module is presented in English |
| <b>Academic organisation</b> | Zoology and Entomology         |



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**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.

**Environmental law 816 (ENV 816)**

**Module credits** 15.00

**Service modules** Faculty of Law

**Prerequisites** No prerequisites.

**Contact time** 2 practicals per week, 1 web-based period per week, 1 lecture per week

**Language of tuition** Module is presented in English

**Academic organisation** 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.



## Curriculum: Final year

### Core modules

#### Boundary layer meteorology 811 (AQM 811)

|                               |                                |
|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |

#### Module content

Introduction to global circulation and South African weather and climate. Mathematical functions and atmospheric balance laws. Stability and mixing heights. The atmospheric boundary layer over urban and rural areas. Turbulence. Earth's energy budget. Transfer and exchange of energy. Introduction to atmospheric and chemical dispersion modelling. Practical modelling of air pollution: Box models, Gaussian puff or plume models, stochastic models, trajectory models.

#### Atmospheric chemistry 812 (AQM 812)

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|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |

#### Module content

The history of atmospheric pollution. Cycles of matter and atmospheric transformations. Gaseous inorganic pollutants. Gas phase organic pollutants. Particulates. The chemistry of atmospheric environmental problems, including acid rain; global warming; ozone depletion; persistent organic pollutants; and photochemical smog. Atmospheric monitoring: sampling methods; sampling strategies; and analytical techniques.

#### Atmospheric thermodynamics 813 (AQM 813)

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|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |



## Module content

Gas laws. Virtual temperature. The hydrostatic and hypsometric equations. Dry adiabatic processes. The first law of thermodynamics. Latent heat. Stabilities and instabilities. Dry adiabatic temperature lapse rate. Potential temperature. Inversion layers. Atmospheric moisture and saturated-adiabatic processes. Vapour pressure. Saturation and condensation. Dew and frost point. Relative humidity. Saturated adiabatic temperature lapse rate. Cloud and rain formation. The second law of thermodynamics

## Air pollution: society and environment 814 (AQM 814)

|                               |                                |
|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <b>Prerequisites</b>          | No prerequisites.              |
| <b>Contact time</b>           | 1 lecture per week             |
| <b>Language of tuition</b>    | Module is presented in English |
| <b>Academic organisation</b>  | Geography, Geoinf + Meteor     |
| <b>Period of presentation</b> | Year                           |

## Module content

International air quality criteria and standards. Ambient air quality and meteorological monitoring. Domestic pollution. Household fuel burning. Vehicle emissions. Toxicology and physiology. Industrial pollution. Emissions inventory and report sources. Air pollution and biomass. Air pollution control. Identification of alert air quality thresholds and associate information reporting, investigation and mitigation requirements. Renewable energy. Air pollution and climate. Practical experience.

## Environmental paradigms 810 (ENV 810)

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|-------------------------------|--------------------------------|
| <b>Module credits</b>         | 15.00                          |
| <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>Academic organisation</b>  | Zoology and Entomology         |
| <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.

## Mini-dissertation 891 (ENV 891)

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|------------------------------|--------------------------------|
| <b>Module credits</b>        | 90.00                          |
| <b>Prerequisites</b>         | No prerequisites.              |
| <b>Language of tuition</b>   | Module is presented in English |
| <b>Academic organisation</b> | Zoology and Entomology         |



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**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.

**Environmental law 816 (ENV 816)**

**Module credits** 15.00

**Service modules** Faculty of Law

**Prerequisites** No prerequisites.

**Contact time** 2 practicals per week, 1 web-based period per week, 1 lecture per week

**Language of tuition** Module is presented in English

**Academic organisation** Zoology and Entomology

**Period of presentation** Semester 1 or Semester 2

**Module content**

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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.