University of Pretoria Yearbook 2021

MSc Air Quality Management (Coursework) (02250408)

Department	Geography, Geoinformatics and Meteorology
Minimum duration of study	2 years
Total credits	180
NQF level	09

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 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

1. Relevant BScHons degree with mathematics and chemistry passed at first-year level **or** relevant four-year BSc degree with mathematics and chemistry passed at first-year level
2. A weighted average of at least 65% at honours or final-year level
3. An admission examination may be required
4. A CV with contactable references may be required

Note: Additional modules may be required in order to reach the desired standard

Additional requirements

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).

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

Core modules

Boundary layer meteorology 811 (AQM 811)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.
Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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, Gausian puff or plume models, stochastic models, trajectory models.

Atmospheric chemistry 812 (AQM 812)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.
Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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; persistant organic pollutants; and photochemical smog. Atmospheric monitoring: sampling methods; sampling strategies; and analytical techniques.

Atmospheric thermodynamics 813 (AQM 813)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.

Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.
Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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)

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

Mini-dissertation 891 (ENV 891)

Module credits	90.00
NQF Level	09
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
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.

Curriculum: Final year

Minimum credits: 180

Core modules

Boundary layer meteorology 811 (AQM 811)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.
Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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, Gausian puff or plume models, stochastic models, trajectory models.

Atmospheric chemistry 812 (AQM 812)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.
Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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; persistant organic pollutants; and photochemical smog. Atmospheric monitoring: sampling methods; sampling strategies; and analytical techniques.

Atmospheric thermodynamics 813 (AQM 813)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.

Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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)

Module credits	15.00
NQF Level	09
Prerequisites	No prerequisites.
Contact time	1 lecture per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	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)

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

Mini-dissertation 891 (ENV 891)

Module credits	90.00
NQF Level	09
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
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.

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.