



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Department of Chemical Engineering

Sustainable Environment and Water Utilisation Processes

Environmental Engineering Postgraduate Programme

2024

**BEng(Hons)/MEng
Environmental Engineering**

**BSc(Hons)(App Sci)
Environmental Technology**

ABOUT OUR PROGRAMME

As South Africa's economy grows towards that of an industrialised nation, environmental protection and preservation has become extremely important. The programme in Environmental Engineering and Technology at the University of Pretoria is formulated to provide human capacity for industry and the public sector and raise awareness about the finite nature of the assimilative capacity of the environment. The programme at Honours level provides the theoretical background in Environmental Technology and mastery of the current regulatory framework. Broader open-ended problems are investigated at Master's and Doctoral level in order for our graduates to provide leadership and insight into solutions for emerging environmental problems. The new curriculum recognises the integrated nature of the environmental systems. Thus, the current course offerings integrate the four main focus areas in Water and Environmental Engineering, namely: Water Quality and Utilisation, Waste Management and Air Pollution Control.

COURSE OFFERINGS

The postgraduate programme of the Environmental Engineering Group (EEG) offers the following degrees: **BEng(Hons)** and **MEng Environmental Engineering** for students with a BEng or equivalent qualification, and the **BSc(Hons)(App.Sci)** and **MSc(App.Sci)** for students with an acceptable B-degree.

The Master's degree is based on a research dissertation (CVD 800/807) (128 credits) which can only be done after successful completion of the Honours degree (128 credits). Students who have achieved an average of at least 60% in their Honours studies may be eligible to continue with a Master's degree.

This brochure is a supplement to the EBIT School of Engineering yearbook and the postgraduate brochure of the Department of Chemical Engineering.

PROGRAMME OUTLINE

A candidate who enrolls for the Honours degree must pass the following modules (128 credits):

CEM 780/787 Principles of Environmental Engineering
(32 credits) (Sem.1)
CAM 780/787 Air Quality Control (32 credits) (Sem.2)

WQB 780/787 Water Quality Management and Research (32 credits) (Sem.1).
WAI 780/787 Industrial Waste Engineering (32 credits) (Sem. 2)

MODULE DESCRIPTIONS

CEM 780/787 Principles of Environmental Engineering (32 credits) (Semester 1) Lecturer: Prof D Brink

Framework of environmental registration in SA, international standards and regulatory initiatives, impact of human and industry on global warming, environmental engineering systems, ecological aspects, environmental economics. The module includes practical applications and case studies for Environmental Impact Assessment and Environmental Audits.

Handbooks: Prescribed: Principles of Environmental Engineering and Science, 4th edition, Mackenzie L. Davis and Susan J. Masten. ISBN 9781260548020.

ISO 14001 (2004) Environmental Specification with Guidance for Use. SANS publication Management Systems, Pretoria.

WQB 780/787 Water Quality Management and Research (32 credits) (Semester 1) Lecturer: Prof E Chirwa

Water quality parameters: physical, chemical, biological, microbiological. Units of expression. Evaluation of parameters. Methods of analysis and practical laboratory analyses; Water quality interpretation, evaluation and assessment, water quality guidelines and requirements for domestic, industrial, agricultural, ecological, recreational requirements; Limnology and water quality in rivers and lakes; Surface water modelling; Ground water quality and assessment; Regulatory aspects including all relevant legislation; Integrated environmental management, integrated pollution control; Procedures to assess effluent discharge impacts; and Water quality management, policies and procedures, role of catchment management agencies, and catchment management plans.

Handbooks: Water Quality Assessments (1987). D Chapman. Chapman & Hall., Principles of Surface Water Quality Modelling and Control (1987). R.V. Thomann and J.A. Mueller. HarperCollinsPublisher, Inc.

CAM 780/787 Air Quality Control

(32 credits) (Semester 2) Lecturer: Dr S De Vos

Lectures and assignments will cover a broad introduction to air quality and design aspects for abatement technologies. The air themes include air quality awareness, impacts of air pollutants and greenhouse gases, legislation and policy framework used in South Africa, meteorology and dispersion modelling, emission inventories and quantification. The design aspects will be focused on abatement technologies and the design aspects thereof. CAM 787 students will focus on impacts of air pollution and air quality management plans whereas CAM 780 students will focus on the design element of abatement technologies.

Handbooks:

A. Prescribed:

For all students:

Fundamentals of Air pollution 4th edition by Daniel Vallero eBook 2014 5th ed.

<https://UnivofPretoria.on.worldcat.org/oclc/885123508> (print book)

National Environmental Management – Air Quality Act (Act 39/2004) and regulations (downloadable from www.saaqis.org.za)

B. Recommended:

Air Pollution Control Engineering for Environmental Engineers, 1st Edition, Edited by Jeff Kuo. ISBN 9781138032040

WAI 780/787 Industrial Waste Engineering

(32 credits) (2nd semester) Lecturer: Dr R Albertus

Identify source materials, physical and chemical properties of waste; Release and transport mechanisms from source to air, groundwater, soil; Primary pathways of contaminants including sorption, volatilisation, biotic and abiotic transformations; Toxicology: absorption, distribution, biochemical transformation, and secretion of chemicals; Acute and chronic toxicity quantification and evaluation of risk; Hazard identification, exposure assessment, toxicity assessment, risk assessment and approaches to hazardous waste minimisation, treatment and disposal; The handling, classification and disposal of hazardous waste; Disposal of waste by landfill; Water monitoring at waste management facilities; The circular economy: Recycling and resource management; Waste prevention, minimisation and optimisation; Waste policy and legislation; National Waste

Management Strategy of South Africa; and Landfill design and Monitoring.

Handbook: Hazardous Wastes: Sources, Pathways, Receptors (1997). R.J. Watts (1997). Chemistry for Environmental Engineering (2003). C.N. Sawyer, P.L. McCarthy & G.F. Parkin. McGraw-Hill. Handbook of Solid Waste Management (2nd Edition) by George Tchobanoglous and Frank Keith (2002).

ENROLMENT

Admission: All prospective postgraduate students must first obtain admission to the Faculty of Engineering. Application forms are available at Engineering Administration or can be downloaded from the UP Website.

Registration requirements: Please refer to the Faculty of Engineering yearbook and the post-graduate information on the website of the Department of Chemical Engineering at: <http://www.up.ac.za/chemeng>

Registration: All students must register every year. Registration will be on line at www.up.ac.za, click on "My UP LOGIN" to access the portal and then click on the registration link to register.

Other qualifications: Students with qualifications from other South-African universities must take note of General Regulation G.54. Students with qualifications from foreign universities will be judged on merit.

COURSE FEES AND FINANCIAL SUPPORT

Information on course fees should be obtained from faculty administration. Please contact student administration:

Ms Olga Shokane (+27 (0)12 420 4130)

(olga.shokane@up.ac.za)

Ms Elmarie Otto (+27 (0)12 420-3824)

(elmarie.otto@up.ac.za)

Honours: Mr Roy Mashiloane (+27 (0)12 420 3656)

(roy.mashiloane@up.ac.za)

CONTACT INFORMATION

For more information about the Environmental Engineering and Technology Programme, please contact Mrs. Elmarie Otto, elmarie.otto@up.ac.za or visit the website at: <http://www.up.ac.za/chemeng>

RELEVANT DATES FOR 2024

The basic modules are presented during block lectures throughout the year. Each module consists of study themes and the following table presents the relevant venue, lecture and examination dates:

Environmental Engineering and Technology: Post Graduate Programme 2024 Lecture room 2-4, Building 2, South Campus			
SEMESTER 1			
Block 1	Feb. 15	WQB 780/7	8:00-16:00
	Feb. 16	WQB 780/7	8:00-16:00
	Feb. 19	CEM 780/7	8:00-16:00
	Feb. 20	CEM 780/7	8:00-16:00
Block 2	April 8	CEM 780/7	8:00-16:00
	April 9	CEM 780/7	8:00-16:00
	April 11	WQB 780/7	8:00-16:00
	April 12	WQB 780/7	8:00-16:00
Exam	June 5	WQB 780/7	8:30-12:30
	June 7	CEM 780/7	8:30-12:30
SEMESTER 2			
Block 3	July 4	WAI 780/7	8:00-16:00
	July 5	WAI 780/7	8:00-16:00
	July 3	Site visit – Depending on availability	8:00-16:00
	July 8	CAM 780/7	8:00-16:00
	July 9	CAM 780/7	8:00-16:00
Block 4	Sept 12	WAI 780/7	8:00-16:00
	Sept 13	WAI 780/7	8:00-16:00
	Sept 16	CAM 780/7	8:00-16:00
	Sept 17	CAM 780/7	8:00-16:00
Exam	Nov. 20	WAI 780/7	8:30-12:30
	Nov. 22	CAM 780/7	8:30-12:30

Lectures start at 08:00 and examinations at 08:30.