



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

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## Department of Chemical Engineering

### Environmental Engineering Group (EEG)

### Postgraduate Training

2009

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

**BSc(Hons)(App Sci)**

#### 1. Programme Philosophy

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 raise awareness about the finite nature of the assimilative capacity of the environment. The programme at the Honours level provides the theoretical background in Environmental Technology and the mastery of the current regulatory framework. Broader open-ended problems are investigated at masters 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 & Utilisation, Waste Management, and Air Pollution Control.

#### 2. 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-degrees from other science fields.

Masters degree studies through research are offered to students who have achieved an average of at least 60% for their Honours studies.

This leaflet is provided as a supplement to the official yearbook.

#### 3. Programme outline

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

CEM 780 - Environmental Management (32 credits)

CAM 780/787 - Air Management (32 credits)

WQB 780/787 - Water Quality Management (32 credits), and

WAI 780/787 - Waste Management (32 credits)

For completion of a Masters degree; a candidate has to successfully complete the coursework component (Honours degree) comprising of the 4 basic modules (128 credits) and the dissertation research module (CVD 800/807) of 128 credits.

#### 4. Module descriptions

##### **Environmental Management CEM 780**

*Theme EM1:* Environmental awareness.

*Theme EM2:* South African environmental legislation.

*Theme EM3:* Environmental management models, the Blue model, Responsible Care, USEPA.

*Theme EM4:* Environmental standards, ISO 14001.

*Theme EM5:* Environmental impact assessments.

*Theme EM6:* Life cycle assessment and engineering.

*Theme EM7:* Environmental auditing.

*Theme EM8:* Environmental economics.

*Theme EM9:* Public participation.

**Handbooks:** BARNARD D, BARNARD C, FRIEND JFC and VISSER D (2003) Roadmap to environmental legislation. Available from Impact Books, Pretoria, Tel No: 012-460 8982

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

Recommended study material: FUGGLE RF and RABIE MA (1994) Environmental management in South-Africa. Juta & Co. Ltd, Cape Town. FRIEND JFC (2003) Environmental management in South Africa: the Blue model, ISBN 0-620-31258-0. Available from Ms Elmarie Otto, South Campus, Tel. No: 012 420 3824

##### **Air Management CAM 780/787**

*Theme AM1:* Air quality awareness, impacts of air pollutants and greenhouse gases.

*Theme AM2:* South African air pollution legislation.

*Theme AM3:* Meteorology and dispersion modelling.

*Theme AM4:* Measurement of air pollution - sampling and analysis.

*Theme AM5:* Equipment design of settling chambers and cyclones.

*Theme AM6:* Venturitis and other wet cleaning equipment.

Theme AM7: Bag filters.

Theme AM8: Electrostatic precipitators.

Theme AM9: Incinerators, adsorption and absorption equipment.

**Handbooks:** Engineering students: COOPER CD and ALLEY FC (2003) Air pollution control: a design approach. 3<sup>rd</sup> edition. Waveland Press, Illinois.

Applied Science students: COLLS, J (2002): Air pollution. Taylor and Francis, London

SA ACT National Environmental Management – Air Quality Act No 39 of 2004

### **Water Quality Management WQB 780**

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., and Chemistry for Environmental Engineering (2003). CN Sawyer, PL McCarthy & GF Parkin. McGraw-Hill.

### **Waste Management \* WAI 780/787**

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; Recycling and resource management; Waste prevention, minimisation and optimisation. **Handbook:** RJ Watts (1997) Hazardous Wastes: Sources, Pathways, Receptors.

\* Module presented by Prof J Schoeman at (012) 420 3569 (e-mail japie.schoeman@up.ac.za).

## **5. Enrolment**

**Admission:** All prospective postgraduate students must in the first instance obtain admission to the School of Engineering. Application forms are available at the Client Services Centre (CSC) or on the UP-web.

**Registration requirements:** Please refer to the Faculty of Engineering yearbook and the Post-graduate information on the website of the Water Utilisation Division in the Department of Chemical Engineering at the following website:

<http://www.up.ac.za/chemeng>

**Registration:** All students must register every year.

**Registration will take place on Monday 26<sup>th</sup> January 2009 10:00 – 15:00, Building 2 South Campus.**

**Other qualifications:** Students with qualifications from other South-African universities must take note of General Regulation G.62. Students with qualifications from foreign universities will be judged on merit.

## **6. Course Fees & Financial Support**

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

Honours: Mrs Mofulatsi 012-420-2142

[eunice.mofulatsi@up.ac.za](mailto:eunice.mofulatsi@up.ac.za).

Masters and doctoral: Ms Steenberg 012-420-5315

[stefanie.steenberg@up.ac.za](mailto:stefanie.steenberg@up.ac.za).

## **7. Contact Information**

For more information about the Environmental Engineering and Technology Programme, please contact Prof Evans M.N. Chirwa at 082 359 8548, e-mail [evans.chirwa@up.ac.za](mailto:evans.chirwa@up.ac.za) or visit the EEG website at:

<http://www.up.ac.za/chemeng>

## **8. Relevant Dates for 2009**

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:

<b>Environmental Engineering and Technology: Post Graduate Programme 2009 Lecture room 2-4, Building 2, South Campus</b>			
<b>SEMESTER 1</b>			
<b>Block 1</b>	Jan. 26	Orientation, registration, library session	10:00-15:00
	Feb. 2	CEM 780	8:00-16:00
	Feb. 3	CEM 780	8:00-16:00
	Jan. 29	WQB 780	8:00-16:00
	Jan. 30	WQB 780	8:00-16:00
<b>Block 2</b>	April 21	CEM 780 (Afternoon)	13:00-16:00
	April 22	CEM 780	8:00-16:00
	April 23	WQB 780	8:00-16:00
	April 24	WQB 780	8:00-16:00
<b>Exam</b>	June 24	CEM 780	8:30-12:30
	June 26	WQB 780	8:30-12:30
<b>SEMESTER 2</b>			
<b>Block 3</b>	July 21	CAM 780/7	8:00-16:00
	July 22	CAM 780/7	8:00-16:00
	July 16	WAI 780	8:00-16:00
	July 17	WAI 780	8:00-16:00
<b>Block 4</b>	Oct. 5	CAM 780/7	8:00-16:00
	Oct. 6	CAM 780/7	8:00-16:00
	Sept. 30	WAI 780	8:00-16:00
	Oct. 1	WAI 780	8:00-16:00
<b>Exam</b>	Nov. 12	WAI 780	8:30-12:30
	Nov. 16	CAM 780/7	8:30-12:30

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