MScEng in Waste and Resources Management

Credits: 192

Level: 9 – Master of Science in Engineering

Curriculum:

Core Modules

Code	Title	Credits
ENCV8RM	Research Methodology in Waste Management	16
ENCV8IWMSL	Integrated Waste Management Systems and Logistics	16
ENCV8WR	Management of Waste as a Resource	16
ENCV8ES	Environmental Sanitary Engineering	16
ENCV8WMDC	Waste Management in Developing Countries	16
	Total	80
ENCV801	Dissertation	96

Specialisation Modules/Electives – Choice of ONE

Module	Titles	Credits
ENCV8LD	Landfill Design and Management	16
ENCV8MIOW	Management of Industrial and Organic Waste	16
ENCV8WWT	Design of Water/Wastewater Treatment Plants	16

FULL TIME STUDENTS The full-time Programme must be completed in one year.
Those who do not complete on time, will have to change their registration to part-time and proceed accordingly.
Start: Jan/Feb End and Submission of Dissertation: Oct/Nov. every year.

FULL TIME OPTION	
1ST SEMESTER	**2ND SEMESTER**
• *Research methodology in Waste Management (16C)* • *Management of Waste as a Resource (16C)* • *Environmental Sanitary Engineering (16C)* • *Dissertation (96 C) (year-long module)*	• *Waste Management in Developing Countries (16 C)* • *Integrated Waste Management Systems and Logistics (16C)* • *1 x Electives (16 C)* • *Dissertation (96 C) (year-long module)*

PART-TIME STUDENTS *(Changes are subjected to the availability of the elective modules).* The part-time Programme must be completed in two years.

PART TIME OPTION	
1ST SEMESTER	**2ND SEMESTER**
• *Research methodology in Waste Management (16C)* • *Environmental Sanitary Engineering (16C)* • *Dissertation (96 C) (year-long)*	• *Waste Management in Developing Countries (16 C)* • *Integrated Waste Management Systems and Logistics (16C)* • *Dissertation (96 C) (year-long)*
2nd YEAR	
1st SEMESTER • *Management of Waste as a Resource (16C)* • *Dissertation (96C) (year-long)*	**2nd SEMESTER** • *1 x Electives (16 C)* • *Dissertation (96 C) (year-long)*

AES-M10 Combinations for MScEng by Coursework
The following lists give the programmes of study within the degree of Master of Science in Engineering by Coursework. Numbers in parentheses refer to credits.

Waste and Resource Management (Howard College):
Core Modules: ENCV801 (96C); ENCV8RM (16C); ENCV8IWMSL (16C); ENCV8WR (16C); ENCV8ES (16C); ENCV8WMDC (16C).

Elective/Specialisation Modules: ENCV8LD (16C); ENCV8MIOW (16C); ENCV8WWT (16C). Students have to pass 16 credits from the list of electives above (not previously passed).

AES-M10 MScEng Additional Requirements

The Master in Waste and Resources Management (MScEng) is a level 9 NQF qualification. It is designed to prepare Engineering and Science graduates for advanced and specialised professional employment, as well as to provide specialised continuing professional development for professionals in industry/government.

Entry requirements: BScEng (All disciplines: Civil, Agriculture, Environmental, Resource and BioResource, Construction/Building Eng, Mechanical Eng., Energy Eng, Electrical/Electronic and Conputer Eng, Industrial, Mining Eng.) and BScHons (Disciplines: Construction Management, Land Surveying, Life Science/Biology/BioTechnology, Agriculture, Hydrology, Environmental Science, Geography, Engineering Geology, Chemistry, Physics, Mathematics/Statistics/Computer Science, Social Science, Development Studies) with more than 55% - exit level: MScEng.

BScEng (Disciplines as above) and BScHons (Disciplines as above) with less than 55% - admittance granted by the School/CAAB via Rule GR7(B) of UKZN.

BCom (Hons), BArch (Hons), BAHons (Environmental Law) and BTech Eng (Civil, Environmental, Resource and Bioresource Eng., Agriculture, Chemical, Industrial, Mechanical, Mining) – admittance granted by the School/CAAB via Rule GR7(B) of UKZN.

With respect to the use of Rule GR7, we will consider skills, knowledge, values and attitudes reflected in the qualification that are building blocks for the development of candidates in this programme and field towards becoming competent in that field

Recognition of Prior Learning will be applied only for a BTech Eng.

Applicants with a BTech Eng (Civil, Environmental, Resource and Bioresource Eng., Agriculture, Chemical, Industrial, Mechanical, Mining) could also be considered under Rule GR7b but need to have a class of pass in their degree of >70% and at least 5 years of relevant experience at the level of Design Engineer. In accordance with the UKZN Decision Flow Diagram/Guidelines admission of GR7b applicants must be motivated by the Programme Coordinator to Dean and Head of School or Academic Leader Research and Higher Degree who will recommend to College Dean of Research for final admission.

PRO-FORMA FEES 2020

University of KwaZulu-Natal - Pro-Forma Invoice 22-JAN-2020 16:08:55

Student Number :
Student Name :

Year : 2020
Qualification : MSC-WR - MScEng in Waste & Resource Mgnt
Student Type : Normal Student
Offering Type : Howard, Full-Time, Contact

Semester	Module	Description	Cost In Rands
Semester One	ENCV8RMHA1	Research Methodology in Waste	5240
	ENCV8MSHA1	Integrated Waste Mgnt Systems	5240
	ENCV8WRHA1	Management of Waste as a Resou	5240
	ENCV8ESHA1	Environmental Sanitary Engineer.	5240
	ENCV8RDHA1	Dissertation	13200
	ENCV8WMHA2	Waste Management in Developing	5240
	ENCV8LDHA2	Landfill Design and Management	5240
	ENCV8OWHA2	Management of Industrial and Organic	5240
	ENCV8WTHA2	Design of Water/Wastewater Treat.	5240 - student choose one from the highlighted modules
Total			44640

NOTE : The above fees include book charges where applicable.

This document is not proof of registration.

Syllabus

The main purposes of this Programme are: 1. To undertake multidisciplinary research in the field of Waste and Resources Management that would contribute to the development of knowledge at an advanced level, fostering innovation and technological advancement for sustainable development; and 2. To prepare Engineering/Science graduates for advanced and specialised professional employment, as well as to provide specialised continuing professional development for professionals in industry/government.
The Coursework Master of Science in Engineering in Waste and Resources Management will be offered in the Howard College Campus, on a block release mode.

Dissertation (96C)
ENCV801H2
Core/Pre Requisites: None
Aim: The candidate will be able to independently research an issue in the field of Waste and Resources Management and present their findings.
Content: Investigation in the field of Waste and Resources Management involving a literature review, experimentation and computational analysis in varying proportions, summarized in a professionally presented research document.
Assessment: The entire dissertation document (100%) will be assessed by an internal examiner (from within UKZN) and by an external examiner (external to UKZN) both of which will be appointed following the procedures of for appointment examiners for dissertations**.**
The five requirements for the masters dissertation will be tested in a formative way in the research dissertation component by means of an examination of the manuscript by one internal and one external examiner. The students will be given feedback from the internal and external examiner that will enable them to improve on their work.
Five requirements for dissertation:
1. Evidence that the student is acquainted with the relevant literature;
2. Development of an appropriate research rationale and experimental design;
3. Formulating a scientifically-sound and standard-based methodological approach;
4. The results of research projects are well presented and critically discussed; and
5. Style and language are appropriate to the level.
DP Requirements: Satisfactory completion of a research proposal and a preliminary literature review in the initial stages of the project, as set in the Research Methodology in Waste Management module.
Year-Long Module. This Module has no supplementary exam.

Research Methodology in Waste Management
ENCV8RMH1 (40L-10T-0P-0S-0G-0P-0F-44A-50H-16R-15W-16C)

Co-requisites: ENCV8IWMSL; ENCV8WR; ENCV8ES; ENCV8WMDC
Aim: The main aim of this module is to offer advanced knowledge in Research Methodology as related to Waste and Resources Management. This entails a thorough understanding of research proposals, literature review, conceptualization of research, research tools, data collection and analysis, modelling and simulation, design and construction of treatment solutions/systems, measurements and writing skills, and plagiarism, principles of research report writing and dissemination, as well as plagiarism. Students will acquire theoretical foundation of research methodology, which will support them in their own independent research projects and in particular in the Dissertation component of this Programme
Content: The aim of this module is to introduce the student to advanced research skills. Themes include: starting the dissertation, planning the research project and formulating research questions, structuring of enquiry and the ethics or politics of research, literature reviews, nature of quantitative and qualitative research, methodology, data analysis and modelling, structured conclusions.
Assessment: Class mark – 30% made of individual or group assignments or tests. Examination -70%
DP Requirement: None

Integrated Waste Management Systems and Logistics
ENCV8WMS (40L-0T-0P-5S-60H-12R-0F-20G-20A-15W-16C)

Co-requisite: ENCV8RMW; ENCV8WR; ENCV8ES; ENCV8WMDC
Aim: The objective of this module is to provide the student with an overview of managing waste from cradle-cradle through the implementation of integrated waste management systems (collection, separation, reuse, recycling, recovery, treatment and disposal)
Content: Basic components of an integrated waste management system. Systematic approach to implementing integrated waste management systems in municipalities. Financial and technological considerations to implementing IWM solutions. Scenario analysis for municipalities
Assessment: Class mark: 30% Assignment; Final exam: 70%
DP Requirement: None

Management of Waste as a Resource
ENCV8WR (40L-0T-0P-5S-60H-15R-0F-20G-20A-15W-16C)
Co-requisite: ENCV8RMW; ENCV8IWMS; ENCV8ES; ENCV8WMDC
Aim: The main aim of this module is to prepare students to acquire knowledge in waste management strategies that are focussed on approaches and technologies that ensure maximum value recovery from waste through materials recycling and energy production.
Content: Overview of biological, physical-chemical and thermal treatment technologies supporting reuse, recycling and resource/energy recovery of waste. Development and implementation of decision-making tools to select sustainable waste management scenarios and strategies for the management and valorisation of waste as a resource.
Assessment: Class mark: 30% Assignment; Final exam: 70%
DP Requirement: None

Environmental Sanitary Engineering
ENCV8ES (40L-0T-0P-5S-60H-12R-0F-20G-20A-15W-16C)

Co-requisite: ENCV8RMW; ENCV8IWMS; ENCV8WR; ENCV8WMDC
Aim: The main aim of this module is to prepare students to acquire knowledge on fundamentals of environmental sanitary engineering and solid/liquid waste management. The students will achieve an appreciation of the extent of the problem related to environmental pollution, and most of all, they will receive the tools to design and manage appropriate treatment/disposal facilities.
Content: This course will give to the students an overview of the basic characteristics of polluted and potable effluents; dynamics of contamination of water systems; the fundamentals in the design and management of wastewater/leachate treatment plants; the fundamentals of solid waste management and emissions control.
Assessment: Class mark: 30% Assignment; Final exam: 70%
DP Requirement: None

Waste Management in Developing Countries
ENCV8WMDC (40L-0T-0P-5S-60H-12R-0F-20G-20A-15W-16C)
Co-requisite: ENCV8RMW; ENCV8IMWS; ENCV8WR; ENCV8ES
Aim: The aim of this module is to develop student with capabilities to identify appropriate management strategies and will contribute in the development of a proper waste economy, with particular focus on the problematic of developing countries.
Content: This module will provide the students an overview on waste management concept, waste legislation, landfill design, recycling technology and advanced technologies for the conversion of waste into energy and materials, with particular focus on the problematics/opportunities of waste management strategies in developing countries and people awareness.
Assessment: Class mark: 30% Assignment; Final exam: 70%
DP Requirement: None

Electives/Specialisations Modules

Landfill Design and Management

ENCV8LD (30L-0T-0P-0S-20G-0F-3A-47H-10R-50A-15W-16C)

Prerequisite: ENCV8RMW; ENCV8IMWS; ENCV8WR; ENCV8ES; ENCV8WMDC

Aim: The main aim of this module is to prepare students to develop landfill design and management strategies and to integrate landfilling into the overall solid waste management concept by acquiring a basic understanding of the biological, chemical and physical processes in the landfill, the processes for the treatment and utilization of landfill gas and the leachate treatment processes as well as the effect of potential emissions on the environment.

Content: Students completing the module will be able to site and design a landfill and to describe the operation in order to minimize emissions. Specific aspects are liner selection and performance as well as drainage systems, re-cultivation of closed landfills and emission control monitoring. Landfill gas modelling as well as landfill gas extraction and utilization strategies will be presented and discussed as well as the different leachate treatment options. Different concepts and scenarios will be presented and validated. An overall environmental assessment of the landfill management is an important subject of this module. Public perception and cost minimization are introduced.

Assessment: Class mark 30% made of: Case study review (made of a short paper and a presentation) 10% Project 20% Examination 70%

DP Requirement: None

Management of Industrial and Organic Waste

ENCV8MIOW (40L-0T-0P-5S-60H-15R-0F-20G-20A-15W-16C)

Prerequisite: ENCV8RMW; ENCV8IMWS; ENCV8WR; ENCV8ES; ENCV8WMDC

Aim: The main aim of this module is to prepare students to analyse and develop/design industrial waste management strategies by acquiring a basic understanding of typical industrial wastes and both traditional and innovative management and treatment strategies.

Another aim of this module is to give technology solutions for organic waste management and to provide specialist understanding of resource recovery technologies as energy production and/or alternative valuable products.

Content: Students completing the module will be able to identify appropriate industrial and organic waste management and treatment strategies based on the properties of waste materials; develop/design integrated industrial and organic waste management strategies that incorporate reuse, recycle, reduction, treatment, and disposal; apply waste management tools and metrics to industrial processes; and work collaboratively to solve a particular industrial process/ waste management challenge. Overview of biological processes used for the management of organic waste of different derivation (industrial, agricultural and domestic) with strong emphasis to anaerobic digestion process and composting process.

Assessment: Class mark – 30% made of: Case study review - paper and presentation10% Project 20% Examination 70%

DP Requirement: None

Design of Water/Wastewater Treatment Plants

ENCV8WWT (40L-20T-0P-0S-0G-4P-0F-44A-40H-12R-15W-16C)

Prerequisite: ENCV8RMW; ENCV8IMWS; ENCV8WR; ENCV8ES; ENCV8EI

Aim: The main aim of this module is to prepare students to understand of the principles for designing and managing wastewater and potable water treatment plants.

Content: Students completing the module will be able to design components of water and wastewater treatment facilities; and to evaluate appropriate treatment options on the basis of final water quality objectives, regulatory requirements, economics, and available resources.

Assessment: Class mark 30% - Examination 70%
DP Requirement: None