

PROGRAMME SPECIFICATION



1	Awarding Institution	Newcastle University
2	Teaching Institution	Newcastle University
3	Final Award	MSc
4	Programme Title	Environmental Engineering
5	Programme Code	5038
6	Programme Accreditation	JBM, CIWEM
7	QAA Subject Benchmark(s)	Engineering
8	FHEQ Level	7
9	Last updated	June 2010

10 Programme Aims

- 1) To provide science and engineering graduates from a variety of backgrounds with the advanced conceptual understanding, detailed factual knowledge and specialist technical skills to enable them to follow successful careers as practicing environmental engineers and researchers in the water, waste and environmental industry.
- 2) To provide an entry route into an appropriate professional institution such as the Chartered Institution of Water and Environmental Management (CIWEM).
- 3) To ensure that the key skills of our students develop in parallel with their academic and technical abilities. These key skills include the ability to communicate effectively, the ability to employ IT and library resources appropriately, the ability to prioritise work and to meet deadlines, the ability to work alone and with others, and the ability to use initiative and to solve problems.

11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas. The programme outcomes incorporate elements of the QAA Subject Benchmark Statement for Engineering, particularly the enhanced learning outcomes expected of level 7 graduates. The learning outcomes most relevant to these are marked (E).

Knowledge and Understanding

On completing the programme students should:

- A1 Have a comprehensive understanding of mathematical and scientific analytical methods appropriate to Environmental Engineering and research investigations
- A2 Demonstrate advanced knowledge and critical awareness of Environmental Engineering theory of physical, chemical and biochemical processes and design in selected areas of study (E)
- A3 Have an understanding of applications of IT to the selected fields of study
- A4 Know the principles of Engineering Project Management and Design including awareness of design data and the development of a basis of design
- A5 Be aware of specific examples of Environmental Engineering design with consideration of principles of Integrated Pollution Prevention and Control
- A6 Be aware of management principles and business practices, including professional and ethical responsibilities and aspects of sustainability (E)
- A7 Have an understanding of design, construction and operations practice and awareness of requirements for health and safety issues (E)

Teaching and Learning Methods

Acquisition of A1 and A2 is through a combination of lectures, tutorials, example classes, group and individual presentations, laboratory activities and coursework.

Outcome A3 is achieved by lectures, tutorials and, where appropriate, hands-on computer exercises. Acquisition of A4 and A5 is partly by lecture and tutorial, but depends increasingly on case studies, student investigations and oral and poster presentations. Individual investigations to greater depth are frequently needed during the design and research projects. The broader professional outcomes, A6, are taught by lectures and tutorials supporting Environmental Engineering Design and Project Management module.

Outcome A7 is covered in lectures and developed in design tutorials, but is also central to experimental project investigations.

Assessment Strategy

Formative assessment occurs through tutorial examples, coursework and a major dissertation. The primary means of assessing factual knowledge is the closed book examination. This is supported by assessed coursework, the Design Project, and case studies, which involve oral, written and poster presentations.

Intellectual Skills

On completing the programme students should be able to:

- B1 Understand and use engineering and scientific principles in the development of solutions to practical problems (E)
- B2 Select and apply appropriate designs to solve problems in Environmental Engineering context
- B3 Use scientific principles in the modelling and analysis of Environmental Engineering systems and processes (E)
- B4 Select and develop appropriate computer based methods for modelling and analysis of problems (E)
- B5 Demonstrate an appreciation of the need for multi-disciplinary inputs where appropriate, in the creation of new design criteria and analytical methods
- B6 Produce solutions to problems through the application of engineering and scientific knowledge and understanding (E)
- B7 Demonstrate originality in the application of knowledge (E)
- B8 Evaluate critically current research (E)
- B9 Evaluate current methodologies and develop critiques of them (E)

Teaching and Learning Methods

Outcomes B1 – B4 are initially encountered in lectures, laboratory and design classes and through case studies, but are developed principally during the Environmental Engineering Design and Project Management projects. Acquisition of B5 is introduced through lectures and case studies and may form a major part of the project. B6 is introduced in lectures and developed through tutorials, case studies, the design and the project. Outcomes B7-B9 will be developed through lecture material and further developed during the dissertation module.

Assessment Strategy

Unseen examinations are used to assess intellectual abilities. Assessed coursework and designs provides further opportunities to demonstrate intellect and ability. The project, which is assessed by dissertation, oral and poster presentations, provides final evidence of the levels attained.

Practical Skills

On completing the programme students should be able to:

- C1 Use relevant analytical and measurement equipment
- C2 Competently carry out experimental laboratory work

C3	Plan, execute and present a research project
C4	Use engineering IT tools where appropriate
C5	Design a system, component or process in an Environmental Engineering context
C6	Test innovative ideas through laboratory work or simulation followed by technical analysis and critical evaluation of results
C7	Deal with complex issues both systematically and creatively (E)
C8	Demonstrate decision making in complex and unpredictable situations (E)
C9	Make sound judgments in the absence of complete data (E)
C10	Demonstrate self-direction and originality in tackling and solving problems (E)
C11	Act autonomously in planning and implementing tasks (E)
C12	Apply engineering techniques taking account of environmental, industrial and commercial constraints (E).

Teaching and Learning Methods

Outcomes C1-C3, and C7 are acquired principally through laboratory work and experience of the project. Acquisition of C4 is initially through lectures, developed through hands-on exercises and assignments. Further individual learning may also form a significant part of the project. C5 is introduced through lectures and developed through case studies. It will frequently form a central part of the project. Lectures and tutorials provide initial experience of C6 – C11, but the project forms the principal vehicle for their acquisition. Outcome C12 is introduced through lectures. Some projects may require further individual learning in this area.

Assessment Strategy

Outcome C1 is assessed in part through coursework from teaching laboratories, and again in the Materials and Methods section of the final Dissertation. C2 and C3 are assessed in the Project Brief presentations. C4 is not explicitly assessed, but can add to the value of the Environmental Engineering Design and Project Management projects. Outcomes C5 to C8 are assessed through coursework from individual modules, and especially through the Integrated Design and Research Projects.

Transferable/Key Skills

On completing the programme students should be able to:

D1	Retrieve information from literature/databases and manipulate and present data in a variety of ways
D2	Use scientific evidence-based methods in the solution of problems (E)
D3	Be creative and innovative in problem solving (E)
D4	Effectively communicate with specialist and non specialist audiences
D5	Learn independently in a range of situations, preparing for lifelong learning
D6	Efficiently use general IT skills
D7	Manage time and resources, plan laboratory-based programmes, assess hazards and risks and work safely (E)
D8	Exercise initiative and personal responsibility
D9	Work effectively as a part of a team

Teaching and Learning Methods

Outcomes D1-D8 may be introduced through examples in lectures. Subsequently, the principal development of transferable skills occurs through involvement in their research projects.

Assessment Strategy

Skills D1-D3 are essential to complete examination and assignments to a satisfactory standard. Acquisition of D4 and D5 is demonstrated during the assessment of both the Integrated Design and the research project. Outcomes D6 - D8 are essential to complete satisfactorily the dissertation and project, which also requires command of outcomes D1-D5.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The full time MSc Programme is a twelve month programme starting in September/October. It consists of eight compulsory taught modules and a dissertation project.

The Programme consists of 180 credits. All taught modules are worth 10 credits, except Engineering Project Management and Design, which is a 20 credit 'double' module, and the Dissertation Project, which is worth 80 credits.

Most taught modules are delivered as one week intensive short courses, followed by a week of further reading and coursework.

The Programme for part time MSc students is the same as for full time MSc students, but completed in up to 48 months. The intensive one week short course nature of most taught modules makes the Programme ideal for part time attendance. Although most modules are designed to work as 'stand-alone' short courses, some modules (particularly the Environmental Engineering Design and Project Management and the Dissertation modules) require some prior knowledge from other modules, so the order in which modules are taken needs to be planned in discussion with the Degree Programme Director.

Key features of the programme (including what makes the programme distinctive)

Students of the Environmental Engineering MSc Programme learn how to protect, in a sustainable way, human health and the environment by being able to conceive, plan and communicate ways to collect, treat and distribute clean water, to collect, treat and reuse or dispose of wastewater and wastes, and to remediate and reclaim contaminated land. In addition to the engineering and scientific aspects, we emphasize the social, economic and institutional context, in both developed and in developing countries. Although there are other postgraduate programmes in the UK that address some of these issues, this programme is unique in its breadth while maintaining its focus on environmental engineering.

Core knowledge and skills

The core knowledge and skills required by professional Environmental Engineers are covered in the first Semester (September to January), with the following modules: Core Concepts in Environmental Engineering, Introduction to Hydraulics, Water Supply and Treatment, Air Pollution, Wastewater Engineering and Solid Waste Management.

Skills application and strengthening

The second Semester the Environmental Engineering Design and Project Management module is undertaken, where students work in teams on a practical design problem, building on the knowledge and skills learnt in the first Semester.

Specialist knowledge and skills

Students study further modules in Environmental Engineering for Developing Countries, Contaminated Land or Groundwater Contamination and Remediation.

With the approval of the Degree Programme Director, students may select alternative modules available within the School or University to a maximum of 20 credits. It is the responsibility of the student to make arrangements to incorporate any alternative module(s) into their study programme.

Dissertation project

The Dissertation Project module aims to enable students to apply and strengthen the skills learnt in other modules, and to develop specialist knowledge and skills in a chosen area of interest. From April onwards, full time students are free to work full time on these projects,

which are substantial pieces of research work carried out in our own well equipped laboratories, UK field sites, in industry or overseas. We offer a wide range of potential projects related to both taught modules and to research being carried out by staff across the School. It is also possible for students to propose their own project related to their work experience or interests, subject to approval by the Degree Programme Director.

Programme regulations (link to on-line version)

<http://www.ncl.ac.uk/regulations/programme/>

13 Criteria for admission

Entry qualifications

A minimum of a second-class Honours degree, or an international equivalent, in an engineering or science subject. Other qualifications or relevant professional experience will also be considered.

Admissions policy/selection tools

Upon receipt of a completed application form via the electronic E2R system, eligible and suitably qualified candidates are made automatic conditional or unconditional offers of places by the Graduate School. Overseas qualifications are assessed by the Graduate School using NARIC <http://www.naric.org.uk/> and the 2006 Nigerian NUC university and course accreditation ratings <http://www.nucnigeria.info/accre.htm>. Where uncertainty exists applications are referred to the Degree Programme Director (DPD). The DPD invites all UK-based applicants to visit the School for an introduction to the Programme and tour of our facilities; this is done on an individual ad hoc basis to avoid delays. Applicants not based in the UK are not required to attend an interview. Decisions are based on qualifications, references, any relevant work experience, and the applicants' personal statements.

Non-standard Entry Requirements

Candidates without the typical qualifications may be accepted for the Diploma and, subject to satisfactory performance, transferred to the MSc at the end of the first semester.

Additional Requirements

Level of English Language capability
IELTS 6.5 (or equivalent)

14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: <http://www.ncl.ac.uk/students/>

Induction

During the first week of the first semester students attend an induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. The International Office offers an additional induction programme for overseas students.

Study skills support

Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to

both group and individual projects.

Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Centre (further information is available from the Robinson Library).

Academic support

The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Staff-Student Committee, and/or at the Board of Studies.

Pastoral support

All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Union Society operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

Support for students with disabilities

The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

Learning resources

The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-session language training can be provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

15 Methods for evaluating and improving the quality and standards of teaching and learning

Module reviews

All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Staff-Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and Learning Committee.

Programme reviews

The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching and Learning Committee. The FTLC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Teaching and Learning Committee.

External Examiner reports

External Examiner reports are considered by the Board of Studies. The Board responds to these reports through Faculty Teaching and Learning Committee. External Examiner reports are shared with institutional student representatives, through the Staff-Student Committee.

Student evaluations

All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff-Student Committee, and the Board of Studies. The results from student surveys are considered as part of the Annual Monitoring and Review of the programme and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback

Feedback is channelled via the Staff-Student Committee and the Board of Studies.

Faculty and University Review Mechanisms

The programme is subject to the University's Internal Subject Review process. Every five years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a two-day review visit by a review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by University Teaching and Learning Committee on whether the programmes reviewed should be re-approved for a further five year period.

Accreditation reports

Programme approved as a period of further learning by the Joint Board of Moderators (JBM, <http://www.jbm.org.uk/>) for intakes up to 2011.

Programme accredited by the Chartered Institution of Water and Environmental Management (CIWEM, <http://www.ciwem.org/education/accreditation>) as contributing to the academic requirements for the appropriate CIWEM membership grade for students that graduate from the Programme from 2006-7 to 2012-13.

Additional mechanisms

16 Regulation of assessment

Pass mark

The pass mark is 50%

Course requirements

Progression is subject to the University's Masters Degree Progress Regulations, Taught and Research and Examination Conventions for Taught Masters Degrees. Limited compensation up to 40 credits of the taught element and down to a mark of 40% is possible and there are reassessment opportunities, with certain restrictions.

The University employs a common marking scheme, which is specified in the Taught Postgraduate Examination Conventions, namely:

Summary description applicable to postgraduate Masters programmes

<50	Fail
50-59	Pass
60-69	Pass with Merit
70 or above	Pass with Distinction

Summary description applicable to postgraduate Certificate and Diploma programmes

<50	Fail
50 or above	Pass

Role of the External Examiner

An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, following recommendation from the Board of Studies. The External Examiner is expected to:

- i. See and approve assessment papers
- ii. Moderate examination and coursework marking
- iii. Attend the Board of Examiners
- iv. Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:

The University Prospectus: <http://www.ncl.ac.uk/postgraduate/>

The School Brochure <http://www.ncl.ac.uk/marketing/services/print/publications/ordering/>

Degree Programme and University Regulations: <http://www.ncl.ac.uk/regulations/docs/>

The Degree Programme Handbook (available via the internal website)

Please note. This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Annex

Mapping of Intended Learning Outcomes onto Curriculum/Modules

Module	Type	Intended Learning Outcomes			
		A	B	C	D
CEG8101	Compulsory	1	1, 9	1,2,8,9	1, 4,5,6,7,8
CEG8102	Compulsory	1,2,3	1,2,3,4,6	4,5	1,2,4,5,6,7,8
CEG8103	Compulsory	1,2,5	1,2,3,6	1,2,5,8,9,	1,2,4,5,6,7,8
CEG8104	Compulsory	1, 2,5	1,2,3,6	1,2,5,8,9,	1,2,4,5,6,7,8
CEG8105	Compulsory	1,2,3,5,6	1,2,3,5,6	4,5,8,9,	1,2,3,4,5,6,7,8
CEG8106	Optional	1,2,3,5,	1,2,3,4,6	4,5,8,9,	1,2,4,5,6,7,8
CEG8107	Compulsory	1,2,3,5,6,7	1,2,5,6,7,8,9	3,5,7,8,9,10,11,12	1,2,3,4,5,6,7,8,9
CEG8108	Compulsory	1,2,3,4,5,6,7	1,2,3,5,6,7,8,9	3,5,7,8,9,10,11,12	1,2,3,4,5,6,7,8,9
CEG8405	Compulsory	1,2,3,5	1,2,3,4,6	4,5,6,7,9	1,2,4,5,6,7,8
CEG8608	Optional	1,2,5	1,2,3,6	3,4,7,8,9,10,11	1,2,3,4,5,6,7,8,9
CEG8199	Compulsory	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8,9	1,2,3,4,6,7,8,9,10,11,12	1,2,3,4,5,6,7,8