

PROGRAMME SPECIFICATION



1	Awarding Institution	Newcastle University
2	Teaching Institution	Newcastle University
3	Final Award	MSc
4	Programme Title	Structural Engineering
5	Programme Code	5044
6	Programme Accreditation	JBM
7	QAA Subject Benchmark(s)	Engineering
8	FHEQ Level	7
9	Last updated	May 2011

10 Programme Aims

1 The primary purpose of this programme is to provide graduate civil engineers (or students with other suitable and appropriate backgrounds) with the advanced, up-to-date conceptual understanding, detailed factual knowledge and specialist technical skills appropriate for continuing success as a practicing structural engineer.

2 The aim of the programme is to provide both new graduates and more experienced practising engineers, with:

- (i) opportunities to enhance and update their knowledge, skills and abilities in fields of structural engineering not available to them in their previous education or careers
- (ii) an understanding of advanced numerical, computational and analytical techniques
- (iii) an understanding of new and complex material and structural behaviours
- (iv) an awareness of modern project management techniques
- (v) an awareness of the business and consultancy aspects of the structural engineering industry

3 In addition to these academic and technical skills, the programme also aims to equip its graduates with a suite of transferable skills, including 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.

4 On successful completion of the programme, you will have acquired a much deeper knowledge and understanding of Structural Engineering than would be expected at undergraduate level, together with many new skills.

Specifically, students will be able to:

- Demonstrate a comprehensive knowledge of subject-specific areas including structural analysis, structural design, structural appraisal, reliability, analytical methodologies, numerical methods, construction project management and enterprise for construction. These are defined through the degree programme regulations and the module summaries;
- Demonstrate *cognitive skills* – higher level intellectual and academic skills (e.g. analysis, synthesis, critical evaluation);
- Demonstrate *subject-specific skills* – practical or professional skills related to Structural Engineering (and Consultancy Skills), e.g. structural design, structural analysis, mathematical / numerical modelling, construction planning, etc.);
- Demonstrate *core skills* – generic skills transferable to a range of employment

settings (e.g. communication, planning & organising, independent working, teamwork, project management, etc.) • Demonstrate <i>career management skills</i> – personal skills required to manage self and career development (e.g. decision-making, self-analysis, occupational awareness, etc.) • Approach professional problems and challenges with initiative, responsiveness, decisiveness and tenacity.
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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 have references to the benchmark statements for Engineering (X).

Knowledge and Understanding

On completing the programme students should have:

A1 An advanced knowledge and understanding of subject specific-areas: including structural analysis, structural design, engineering materials, structural appraisal, reliability, numerical methods and analytical methodologies.

A2 An advanced knowledge and understanding of practical and professional skills related to structural engineering (e.g. structural design and design data, structural analysis, mathematical and numerical modelling, and construction issues)

A3 A knowledge and understanding of aspects of construction practice and project management techniques

A4 A knowledge and understanding of applications of mathematical methods and modelling appropriate in structural engineering

A5 A knowledge and understanding of applications of IT and computational techniques in structural engineering

A6 A knowledge and understanding of the business and consultancy aspects of the structural engineering industry

Teaching and Learning Methods

Specialist technical knowledge and understanding (A1-A6) are primarily imparted through lecture classes, many of which involve lecturers from industry. Key concepts (A1, A2) are introduced in subject specific modules CEG8304 (Structural Reliability), CEG8305 (Finite Element Analysis in structural Mechanics), CEG8302 (Specialist Structures), CEG8306 Engineering Mechanics and Composites, CEG8305 (Seismic Resistant Design) and CEG8307 (Structural Engineering Field Trip).

Construction management and practice (A3) are introduced through CEG8002 (Construction Project Management).

Mathematical and computational methods (A4, A5) are addressed in CEG8304 (Structural Reliability), CEG8305 (Finite Element Analysis in structural Mechanics), CEG8302 (Specialist Structures) and CEG8305 (Seismic Resistant Design) as well as CEG8205 (Soil Modelling and Numerical Methods).

Outcome A6 is taught through CEG8004 (Enterprise for Construction).

Throughout the taught component of the course, students are encouraged and expected to engage in independent reading, and are supported in this by the provision of individual module reading lists.

Assessment Strategy

Formative assessment occurs through tutorial examples and coursework. For summative purposes, unseen examinations and project-based coursework are employed to assess factual knowledge and understanding.

Coursework involves both written and oral presentations. Some, or all, of A1-A6 (depending

on topic) are also examined by means of a dissertation and presentation.

Intellectual Skills

On completing the programme students should be able to:

B1 Research information and analyse and critically evaluate the work of others.

B2 Use scientific principles in the modelling and analysis of engineering systems and structures

B3 Select and apply appropriate mathematical methods for modelling and analysing relevant problems;

B4 Select and apply appropriate computer based methods for modelling and analysing problems in structural engineering

B5 Produce solutions to problems through the application of engineering knowledge and understanding, and present these in a professional manner

B6 Deal with uncertainty and provide practical solutions to problems with incomplete data

Teaching and Learning Methods

Outcomes B1-B3 are developed in lectures and through coursework exercised studies CEG8304 (Structural Reliability), CEG8305 (Finite Element Analysis in structural Mechanics), CEG8302 (Specialist Structures), CEG8303 (Seismic Resistant Design), CEG8205 (Soil Modelling and Numerical Methods) CEG8307 (Structural Engineering Field Trip)), and are acquired primarily through the completion of the project (CEG8399 (MSc Project and Dissertation in Structural Engineering)).

Outcomes B4-B6 are primarily taught in lectures and tutorials CEG8304 (Structural Reliability), CEG8305 (Finite Element Analysis in structural Mechanics), and where appropriate with hands on computer classes (CEG8205 (Soil Modelling and Numerical Methods)), but may also form a major part of the project (CEG8399 (MSc Project and Dissertation in Structural Engineering)).

Assessment Strategy

Subject specific and practical skills (B2-B6) are assessed by means of coursework exercises (e.g. calculations, design exercises, technical reports) and by unseen written examination. Outcome B1 and Some, or all, of B2-B6 (depending on topic) are also examined by means of a dissertation and presentation.

Practical Skills

On completing the programme students should be able to:

C1 Manage business practices, including the professional and ethical responsibilities of self management

C2 Critically assess the value and limitations of existing information on a given subject

C3 Formulate or recognise key hypotheses, to test hypotheses using logical and consistent quantitative or qualitative arguments, and to identify key data which allow such tests to be made

C4 Critically assess the value and limitations of new data in relation to existing information on a given subject, to draw logical conclusions, and to identify appropriate avenues for further study

C5 Where appropriate, use relevant test and measurement equipment

C6 Where appropriate, use engineering IT tools

C7 Design a structure and evaluate the design

C8 Apply engineering techniques taking account of industrial and commercial constraints

C9 Undertake technical risk assessment

C10 Solve problems

Teaching and Learning Methods

Outcomes C1 is primarily acquired through lectures, tutorials and case studies (CEG8004 (Enterprise for Construction)) and is practiced in other modules with group and individual coursework assignments.

Material taught as part of (CEG8399 (MSc Project and Dissertation in Structural Engineering))

and CEG8307 (Structural Engineering Field Trip)) addresses C2-C6,C9,C10

Acquisition of C7 & C8 is initially through lectures and is developed through coursework exercises and assignments (CEG8302 (Specialist Structures), CEG8305 (Seismic Resistant Design), CEG8307 (Structural Engineering Field Trip)).

Problem solving skills (C10) are employed at all stages of the programme. Students are also expected to acquire cognitive skills by simulating designs using computer models (C2-C4). The lengthy dissertation project (CEG8399 (MSc Project and Dissertation in Structural Engineering)) encourages the development of practical skills by similar means, but at a more advanced academic level.

Assessment Strategy

Practical skills C1 is assessed through coursework assignments and a student trade fair. Some, or all, of C2-C6, C9, C10) are assessed by means of a dissertation and presentation. C7 & C8 are assessed by means of coursework.

Transferable/Key Skills

On completing the programme students should be able to:

- D1** Communicate by means of well prepared, clear and confident presentations and concise and grammatical written documents
- D2** To use library and other information sources skilfully and appropriately
- D3** To use IT resources skilfully and appropriately
- D4** To plan, organise and prioritise work activities in order to meet deadlines
- D5** To work independently, with initiative, and also in teams as required
- D6** To solve problems

Teaching and Learning Methods

Key skills D1-D4 are formally taught in (CEG8399 (MSc Project and Dissertation in Structural Engineering)). Management of workload in order to meet deadlines (D4) is also promoted by means of coursework deadlines, whilst team working skills (D5) are developed by group exercises. These also provide opportunities for students to improve their problem-solving abilities (D6), and to extend their communication, library, IT, and time management skills (D1-D4). CEG8399 (MSc Project and Dissertation in Structural Engineering) provides students with further opportunities to develop all of these skills (D1-D6)

CEG8399 (MSc Project and Dissertation in Structural Engineering) provides similar opportunities for skill development through the construction of a research brief (D4), during the literature-search and data-handling components (D2, D3), and as the field and laboratory work is performed (D5, D6).

Assessment Strategy

Key skills (D1-D4) are assessed via written examinations, the production of a research brief, and the giving of short presentation in CEG8399 (MSc Project and Dissertation in Structural Engineering). Communication (D1), library (D2) and IT (D3) skills, and the ability to meet deadlines (D4) work independently (D5) and solve problems (D6) are indirectly assessed by other coursework items, and all key skills (D1-D6) are examined by means of a project dissertation.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

Following induction, and introductory sessions, the technical modules which make up the taught component of this programme lead the student sequentially and logically from the principles of structural engineering through to its applications.

The taught component of the course, which consists of CEG8302 Specialist Structures, CEG8303 Seismic Resistant Design, CEG8304 Structural Reliability, CEG8305 Finite Element Analysis in structural Mechanics, CEG8205 Soil Modelling and Numerical Methods, CEG8306 Engineering Mechanics and Composites and CEG8307 Structural Engineering

Field Trip plus a choice from CEG8002 Construction Project Management, CEG8004 Enterprise for Construction or CEG8505 Climate Change – Earth Systems and CEG8514 Climate Change – impacts, provide key structural engineering knowledge and understanding (A1-A5), as well as intellectual skills (B1-B6), and practice of practical and transferable skills. The optional modules provide insight into construction business and construction practice and cover specific knowledge outcomes (A3, A6) as well as practical skills (C1) and practice of transferable skills.

The taught component of CEG8399 (MSc Project and Dissertation in Structural Engineering) introduces the generic skills required in order to successfully initiate, carry out, and report on a significant research project and provides training in the use of appropriate statistics for data analysis and interpretation (C2-C6, C9, C10, D2-D6). CEG8399 commences in Semester 1 and enables students to apply the subject specific skills and understanding (intended learning outcomes A1-A6), the practical skills (intended learning outcomes B1-B4), the cognitive skills (intended learning outcomes C2-C6, C9, C10) and the key skills (intended learning outcomes D1-D6) gained during the taught component, to a geotechnical engineering research problem. Dissertations often involve a significant laboratory component, but may take the form of numerical modelling work.

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

This is a one-year full-time modular programme. It consists of two parts: a 90-credit *taught component*, which runs from late September until Easter, and a 90-credit *research project*, for which a dissertation is submitted in August. Successful completion of the taught component is required in order for a student to progress to the dissertation project.

The taught component of the course consists of the following modules: CEG8302 Specialist Structures, CEG8303 Seismic Resistant Design, CEG8304 Structural Reliability, CEG8305 Finite Element Analysis in structural Mechanics, CEG8205 Soil Modelling and Numerical Methods, CEG8306 Engineering Mechanics and Composites and CEG8307 Structural Engineering Field Trip, all of which are 10-credit modules, plus a choice from CEG8002 Construction Project Management (20 credits), CEG8004 Enterprise for Construction (20 credits) or CEG8505 Climate Change – Earth Systems and CEG8514 Climate Change – impacts, both 10 credits. Each 10-credits equates to 100 hours of learning time.

An innovative feature is that all technical modules are taught in short (generally one or two-week) blocks. These occupy students, largely full-time, until the module has been completed and students then progress to the next module. This structure enhances student learning by allowing later units to build on the concepts, knowledge and skills gained during those taught earlier.

Research projects (CEG8399) are often laboratory based, but may also involve numerical modelling work. During the project, students are usually based in the School, perhaps working in one of our established research groups, but the dissertation might entail working elsewhere, in collaboration with another industrial or academic partner. Students are encouraged and given support if they wish to seek publication of the results/findings of their dissertations.

Programme regulations (link to on-line version)

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

13 Criteria for admission

Entry qualifications

An upper-second-class Honours degree, or an international equivalent, in civil engineering is preferred; other degrees in related scientific, mathematical and engineering disciplines are considered, as is work experience.

Admissions policy/selection tools

Non-standard Entry Requirements

Applicants who hold non-standard qualifications, and/or have relevant experience, are considered on an individual basis.

Additional Requirements

Level of English Language capability

IELTS 6.5 (or equivalent) in all components

14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: <https://my.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, Learning and Student Experience Committee.

Programme reviews

The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty, Teaching, Learning and Student Experience Committee. The FTLSEC 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, Learning and Student Experience 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

This degree programme is accredited by the Joint Board of Moderators (Institution of Civil Engineers, Institution of Structural Engineers, Chartered Institution of Highways and Transportation, and the Institute of Highway Incorporated Engineers) as meeting the requirements for Further Learning for a Chartered Engineer (CEng) for candidates who have already acquired an Accredited CEng (Partial) BEng (Hons) or an Accredited IEng (Full) BEng/BSc (Hons) undergraduate first degree, for intakes up to 2011. See <http://www.jbm.org.uk/> for further information.

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 on the internal web page)

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.

Mapping of Intended Learning Outcomes onto Curriculum/Modules

Module	Type	Intended Learning Outcomes			
		A	B	C	D
CEG8002	Optional	3		1	1,2,3,4,5,6
CEG8004	Optional	6	1	1,2,3,10	1,2,3,4,5,6
CEG8205	Compulsory	1,2,4,5	1,3,4,5,6	2,6,7,10	1,2,3,4,5,6
CEG8302	Compulsory	1,2,4,5	1,3,4,5	6,7,8,10	1,2,3,4,5,6
CEG8303	Compulsory	1,2,4,5	1,3,4,5	6,7,8,10	1,2,3,4,5,6
CEG8304	Compulsory	1,2,4,5	3,4,5,6	6,7,10	1,2,3,4,5,6
CEG8305	Compulsory	1,2,4,5	1,3,4,5,6	2,6,7,10	1,2,3,4,5,6
CEG8306	Compulsory	1,2	2,3,4,	3,5,6,10	1,2,3,4,5,6
CEG8308	Compulsory	2,3	1,5	2,3,4,5,7,8	1,2,3,4,5,6
CEG8399	Compulsory	1,2,3,4,5,6	1,2,3,4,5,6	2,3,4,5,6,7,9,10	1,2,3,4,5,6
CEG8505	Optional				
CEG8514	Optional				