UNIVERSITY OF
NEWCASTLE UPON TYNE

FACULTY OF
SCIENCE, AGRICULTURE & ENGINEERING

DEGREE PROGRAMME SPECIFICATION

UNIVERSITY OF NEWCASTLE

1.	**Awarding Institution**	University of Newcastle upon Tyne
2.	**Teaching Institution**	University of Newcastle upon Tyne
3.	**Final Award**	MSc
4.	**Programme Title**	Engineering Geology
5.	**Programme Accredited by:**	N/A
6.	**UCAS Code**	N/A
7.	**QAA Benchmarking Group(s)**	N/A
8.	**Date of production/revision**	Thursday, 18 November 2004

9. Programme Aims:

The primary purpose of this programme is to provide graduate geologists and engineers with the advanced conceptual understanding, detailed factual knowledge, and specialist technical skills appropriate for them to follow successful careers as professional engineering geologists in the construction, mineral extraction, environmental and associated industries.

Specifically, the programme provides opportunities for students to gain a thorough knowledge and understanding of key technical aspects of engineering geology such as: the influence of geology on site development and construction, site investigation techniques, rock and soil engineering, ground improvement technologies and the design of foundations and associated structures.

The programme also addresses the professional skills required by the engineering geologist, including project costing and reporting, and the management of safety and risk, and provides opportunities for the development of a range of other valuable skills which will assist graduates in their careers (including decision making skills, independent learning skills and the recognition of personal responsibility).

The course aims to meet the descriptors, for a qualification at Masters (M) level, published by the Framework for Higher Education Qualifications in England, Wales and Northern Ireland and is designed to meet the requirements of the relevant Chartered Professional Institutions.

10. Intended Learning Outcomes; Teaching and Learning Strategies and Methods; Assessment Strategies and Methods

A Knowledge and understanding

A successful student will have gained and be able to demonstrate:

A1. An advanced knowledge and understanding of the principles of engineering geology and their applications in a civil engineering context

A2. An advanced knowledge and understanding of the engineering properties and characteristics of soils and rocks

A3. An advanced knowledge and understanding of the application of mathematical methods in engineering

A4. A knowledge and understanding of construction practice and an awareness of requirements for safe operation.

A5. A knowledge and understanding of the application of engineering geology and geotechnical design processes in specific site developments

A6. A knowledge and understanding of the applications of IT in engineering geology

Teaching Strategy

Specialist knowledge and understanding (A1-A5) is primarily imparted through a lecture classes, supported by a combination of tutorials, example classes, laboratory activities, coursework and site visits. Increasingly, case studies, student investigations, presentations and field visits are employed, especially when addressing the civil engineering industry context of the programme (A1, A5). Outcome A6 is achieved through lectures, tutorials and, where appropriate, hands-on computer exercises. All may be developed further through the length summer dissertation project.

Learning Strategy

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. Reflection on case studies (A1, A5), observations and discussions during field trips and site visits (A1-A5), and active participation in computer exercises (A6) aid the development of understanding. Engagement in the summer dissertation project provides opportunities for students to further develop their skills in selected areas.

Assessment strategy

Formative assessment occurs through tutorial examples and coursework. For summative purposes, unseen examinations and project-based coursework are employed to assessing factual knowledge and understanding. Coursework frequently 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 and possibly (at the discretion of an External Examiner) by *viva voce* examination.

B Subject –specific/professional skills

A successful student will be able to:

B1. Select and apply appropriate mathematical methods for modelling and analysing problems in geological engineering

B2. Use scientific principles to demonstrate creative and innovative ability in the syntheses of solutions and in formulating designs for remediation of geological problems

B3. Use scientific principles in the modelling and analysis of engineering geology systems and processes

B4. Produce solutions to problems through the application of engineering knowledge and understanding

B5. Undertake technical risk evaluation

Teaching Strategy

These skills (B1-B5) are introduced in lectures, but tutorials (B1), practical classes (B2-B4), and case studies (B2-B4) are all employed to support skill development. More advanced training in some or all of skills B1-B5 is provided, on an individual basis, during the summer dissertation project in which the student usually works within one of CEG's research groups.

Learning Strategy

Students are encouraged to acquire skills B1-B5 through active participation tutorials, practical classes, and case studies and during the preparation of coursework. Learning is reinforced, and further developed, as students apply their new skills to the analysis of engineering geology problems in their dissertation projects.

Assessment strategy
Subject specific and practical skills (B1-B5) are assessed through unseen examinations. Assessed coursework provides further opportunities to quantify the development of skills in these areas. Some, or all, of B1-B5 (depending on topic) are also examined by means of a dissertation and presentation and possibly (at the discretion of an External Examiner) by *viva voce* examination.

C Cognitive skills

A successful student will be able to:

C1. Evaluate the quality of engineering geological data collected through the use of testing and measurement equipment in field and laboratory environments

C2. Present and summarise such data, and to critically appraise its significance, using numerical techniques

C3. Critically assess the value and limitations of existing information on a given subject

C4. 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

C5. Critically assess the value and limitations of new data in relation existing information on a given subject, to draw logical conclusions, and to identify appropriate avenues for further study

C6. Solve problems

Teaching Strategy
Cognitive skills C1-C6 are developed during practical site investigation exercises: C3, C4, and C6 in the initial desk-based research and planning phases; C6 during data collection and analysis; and C1, C2, C5 and C6 in the subsequent interpretative phases. Elsewhere in the programme, tutorials, field exercises and attendance at School research seminars enable skills C3-C6 to be developed further. All such skills are exercised significantly during the course of the summer dissertation projects.

Learning Strategy
Students are encouraged to acquire cognitive skills during practical site investigation exercises by analysis of information during the desk-based research phase (C3); by designing an investigation strategy for the site, which addresses the issues identified (C4); by appraising the quality of any data collected or provided (C1, C2); and by reflection upon the value of these data, and upon the conclusions to which they lead (C5). Problem solving skills (C6) are employed at all stages. Students are also expected to acquire cognitive skills by simulating designs using computer models (C3-C6), by reflection on field exercises (C3-C6) and by discussion of scientific presentations following School research seminars (C3-C5). The lengthy dissertation project encourages the development of cognitive skills by similar means, but at a more advanced academic level.

Assessment strategy
Cognitive skills (C1-C6) are assessed by means of coursework, and written examinations. Some, or all, of C1-C6 (depending on topic) are also examined by means of a dissertation and presentation and possibly (at the discretion of an External Examiner) by *viva voce* examination.

D Key (transferable) skills

A successful student will 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

D6. To solve problems

Teaching Strategy
Key skills D1-D4 are formally taught in CIV702 *Research Methods*. Management of workload in order to meet deadlines (D4) is also promoted by means of coursework deadlines, whilst teamworking skills (D5) are developed by group exercises (e.g. site investigation). 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). The summer dissertation project provides students with further opportunities to develop all of these skills (D1-D6).

Learning Strategy
Students are encouraged to acquire key skills D1-D4 through reflection on the material provided in CIV702. Participation in team exercises allows students to improve their teamworking skills (D5), whilst developing solutions to problems arising during field and practical class work assists in the advancement of students' problem solving abilities (D6). Team site-investigation exercises also allow students improve their communication, library, IT, and time management skills (D1-D4) by researching the site (D2, D3), communicating their information to their colleagues (D1, D3), manipulating the data generated (D3), and reporting their findings in a timely fashion; D1, D4). The dissertation project provides similar opportunities for skill development through the construction of a research plan for the dissertation (D4), during the literature searching and data handling components (D2, D3), as the field and laboratory work is performed (D5, D6), and by participation in the dissertation workshops (D1, D3).

Assessment strategy
Key skills (D1-D4) are assessed via written examinations, the production of a research brief, and the giving of short presentation in CIV702 Research Methods. 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 dissertation and presentation, and possibly (at the discretion of an External Examiner) by *viva voce* examination.

11 Programme Features, Structure and Curriculum

A Programme Features
This is a one-year full-time modular programme. It consists of two parts: a 100-credit *taught component,* which runs from late September until Easter, and an 80-credit *research project,* for which a dissertation is submitted in mid-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 compulsory Research Methods module (CIV702) and nine technical modules addressing the scientific and engineering aspects of the programme. Eight of these technical modules are compulsory, but students also choose one optional module. An innovative feature is that the technical modules are taught in short (one-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 are often laboratory based, but may also involve field studies, desk studies, or 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. We encourage and support students who wish to publish the results of their dissertations.

B Programme Structure
Following induction, and introductory sessions, students undertake compulsory modules in Rock Engineering (CIV828, covering the engineering properties of rock, design of excavations and openings, rock support and slope stability) and Ground Engineering Techniques (CIV823, covering a range of ground improvement technologies and soil reinforcement). The latter module has a large input from industrial practitioners, providing students with information on the current state of practice and a chance to discuss potential dissertation ideas.

These modules are followed by three, linked, modules (CIV808 Investigation, Testing and Interpretation; CIV820 Geotechnical Engineering; CIV920 Integrated Geotechnical Design) designed to take students, sequentially and logically, through the site development process, from the design and implementation of geotechnical and geological site investigation, through design to costing, construction and health and safety. Again, there is a significant contribution from practicing engineers in these modules.

During the second Semester, students take a compulsory modules addressing Environmental Geology (CIV873), Groundwater Assessment (CIV710) and a residential field course in France (CIV907). The single optional module

is chosen from Embankment Dam Engineering (CIV706), Soil Modelling and Numerical Methods (CIV822) and Contaminated Land (CIV971).

The CIV998 18 week research project, commencing in mid-April, 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 C1-C6) and the key skills (intended learning outcomes D1-D6) gained during the taught component, to a geochemical research problem. Dissertations often involve a significant laboratory component, but may take the form of desk or literature studies, or modelling work.

C Programme Curriculum

12 Degree of Master of Science in Engineering Geology

Code: 5041

1. Candidates shall take compulsory and optional modules to a total value of 180 credits.

2. (a) Candidates shall take the following compulsory modules:

Code	*Credits*	*Descriptive title*
CIV702	(10)	Research Methods
CIV820	(10)	Geotechnical Engineering
CIV823	(10)	Ground Engineering Techniques
CIV828	(10)	Rock Engineering
CIV710	(10)	Groundwater Assessment
CIV873	(10)	Environmental Geology
CIV808	(10)	Investigation, Testing and Interpretation
CIV907	(10)	Field Class
CIV998	(80)	Dissertation
CIV920	(10)	Integrated Geotechnical Design

(b) Candidates shall select modules to a total value of 10 credits from the following list:

Code	*Credits*	*Descriptive title*
CIV706	(10)	Embankment Dam Engineering
CIV971	(10)	Contaminated Land
CIV822	(10)	Soil Modelling and Numerical Methods

3. Approved alternative modules to those listed above, to a total value of 10 credits, may be selected subject to the approval of the Degree Programme Director.

Note: if a candidate is a graduate of the University of Newcastle upon Tyne, the candidate is not permitted to take a module which has already been taken as part of another programme.

Development of specific Intended Learning Outcomes occurs through the following modules (compulsory modules in bold text, optional modules in normal, italic text)

A1	An advanced knowledge and understanding of the principles of engineering geology and their applications in a civil engineering context	**CIV710, CIV808, CIV823, CIV820, CIV828, CIV873, CIV907, CIV920, CIV998,**
A2	An advanced knowledge and understanding of the engineering properties and characteristics of soils and rocks	**CIV808, CIV820, CIV828, CIV873, CIV920, (CIV998)**
A3	An advanced knowledge and understanding of the application of mathematical methods in engineering	**CIV702, CIV710, CIV820, CIV920, (CIV998),** *CIV822*

A4	A knowledge and understanding of construction practice and an awareness of requirements for safe operation.	**CIV808, CIV920, (CIV998)**
A5	A knowledge and understanding of the application of engineering geology and geotechnical design processes in specific site developments	**CIV823, CIV828, CIV873, (CIV998),** *CIV706*
A6	A knowledge and understanding of the applications of IT in engineering geology	**CIV702, CIV710, (CIV998),** *CIV822, CIV971*
B1	Select and apply appropriate mathematical methods for modelling and analysing problems in geological engineering	**CIV702, CIV710, CIV820, CIV920, (CIV998),** *CIV822*,
B2	Use scientific principles to demonstrate creative and innovative ability in the syntheses of solutions and in formulating designs for remediation of geological problems	**CIV808, CIV820, CIV823, CIV828, CIV873, CIV920, (CIV998),** *CIV706, CIV822*
B3	Use scientific principles in the modelling and analysis of engineering geology systems and processes	**CIV710, CIV820, CIV920, (CIV998),** *CIV822, CIV971*
B4	Produce solutions to problems through the application of engineering knowledge and understanding	**CIV710, CIV820, CIV920, (CIV998),** *CIV822, CIV971*
B5	Undertake technical risk evaluation	**CIV808, CIV823, CIV828,CIV873, CIV907, CIV920, (CIV998),** *CIV706, CIV971*
C1	Evaluate the quality of engineering geological data collected through the use of testing and measurement equipment in field and laboratory environments	**CIV808, CIV820, CIV920, CIV998,** *CIV971*
C2	Present and summarise such data, and to critically appraise its significance, using numerical techniques	**CIV808, CIV820, CIV920, CIV998,** *CIV971*
C3	Critically assess the value and limitations of existing information on a given subject	**CIV808, CIV820, CIV920,CIV998,** *CIV971*
C4	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	**CIV808, CIV820, CIV920, CIV998,** *CIV971*
C5	Critically assess the value and limitations of new data in relation existing information on a given subject, to draw logical conclusions, and to identify appropriate avenues for further study	**CIV808, CIV820, CIV920, CIV998,** *CIV971*
C6	Solve problems	**CIV808, CIV820, CIV920, CIV998,** *CIV971*
D1	Communicate by means of well prepared, clear and confident presentations and concise and grammatical written documents	**CIV702, CIV808, CIV920, CIV998**, *CIV971*
D2	To use library and other information sources skilfully and appropriately	**CIV702, CIV808, CIV920, CIV998,** *CIV971*
D3	To use IT resources skilfully and appropriately	**CIV702, CIV710, (CIV998),** *CIV822, CIV971*
D4	To plan, organise and prioritise work activities in order to meet deadlines	**CIV702, CIV998**
D5	To work independently, with initiative, and also in teams	**CIV808, CIV820, CIV920, CIV998,** *CIV871*
D6	To solve problems	**CIV808, CIV820, CIV920, CIV998,** *CIV971*

12 Criteria for Admission:

Entrance Criteria
A 2nd class degree from a UK University, or its overseas equivalent, is the minimum qualification for entry. Preferred first degree subjects are Earth science or civil engineering, but other allied degrees may also be acceptable.

Applicants for whom English is not a first language must provide evidence of a satisfactory command of English, preferably by means of a TOEFL score of 575 or greater, or by an IELTS score of 6.5 or greater.

Applicants with Non-Standard Qualifications
Applicants who hold non-standard qualifications, and/or have relevant experience, will be considered on an individual basis.

Admissions Policy
Upon receipt of a completed application form, UK-based applicants are invited to visit the School, to meet current students, and to attend an informal interview. Offers of places are made to suitably qualified candidates following the interview/visit and are conditional upon the applicant achieving a minimum of a 2nd class degree (if they do not hold such a degree at the time of the interview), and upon the provision of a satisfactory reference (if one has not already been provided). NERC studentships (5 awards), and any other funding, are awarded on a competitive basis, taking degree grade (actual or predicted), reference, experience and interview performance into account.

Applicants not based in the UK are not required to attend an interview.

13 Support for Students and their Learning:

Induction
An Induction Week with no formal teaching occupies the first week of the programme. During this week new students are given general information about the School, detailed information regarding their programme, their teaching timetable, and their Degree Programme Handbooks. Induction activities also include:

- An icebreaker social event to allow students to meet colleagues and staff in a social atmosphere. Students are introduced to their tutors and buddies (see below for details of roles of tutor and buddy).
- An initial meeting - students meet as a group with the DPD for welcome and introduction to the programme.
- An introduction to the facilities and services of the University Careers Service.
- An introduction to the facilities and services of the University Enterprise Centre.

The International Office offers additional induction for overseas students (see: http://www.ncl.ac.uk/international/coming_to_newcastle/orientation.phtml).

Study skills support
Students learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. CIV702 *Research Methods* is central to such training.

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.

The School also provides each student with at least one academic member of staff to personally supervise their dissertation project and to advise them on the production of their dissertation. Frequency of meetings is variable, but typically at least weekly during the dissertation write-up. As students typically work within one of the School's research groups, students also usually have contact with PhD students and PDRAs working on related research.

Pastoral support
All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. Formal meetings with tutors, for the discussion of progress, are held termly and all students have personal and email access to their tutors should problems arise. Tutors also feed back the results of end-of-module tests to students, allowing them to monitor the progress of their learning. Difficulties highlighted by

these are discussed with tutors. Details of the personal tutor system can be found at http://www.ncl.ac.uk/undergraduate/support/tutor.phtml.

In addition the University offers a range of support services, including the Student Advice Centre, the Student Counselling Service, the Mature Student Support Service, and a Childcare Support Officer, see http://www.ncl.ac.uk/undergraduate/support/welfare.phtml.

Support for Special Needs

Support for students with special needs is provided as required and the University's Disability Support Service can be consulted where appropriate. Supportive resources include:

- Dyslexia Tutor
- Co-ordinator for Deaf and Hearing-impaired Students
- Technical Support Advisor

The Disability Unit can:

- Discuss individual particular needs
- Advise on physical accessibility
- Arrange an early visit to the campus for assessment of needs
- Advise on special allowances, including the Disabled Students Allowance
- Advise on special equipment

For further details see http://www.ncl.ac.uk/undergraduate/support/disability.phtml.

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, see http://www.ncl.ac.uk/undergraduate/support/acfacilities.phtml.

Within the School, MSc students are provided with a dedicated MSc Resource Centre in the Drummond Building. This is equipped with PCs and wireless networking for laptops. The Resource Centre also provides seating, tables and storage space for students engaged in group and project work.

Dedicated engineering laboratories and workshops are available to support the MSc programme and these are equipped for both soil and rock testing. The School provides access to an extensive range of testing facilities together with the high level of technical expertise necessary to maintain these facilities efficiently.

All new students whose first language is not English are required to take an English Language test in the Language Centre. Where appropriate, in-sessional language training can be provided. The Language Centre houses a range of resources for learning other languages which may be particularly appropriate for those interested in an Erasmus exchanges. See http://www.ncl.ac.uk/undergraduate/support/langcen.phtml.

14 Methods for Evaluating and Improving the Quality and standards of Teaching and Learning:

Module reviews

On completion of each module in the taught component of the course, student opinion is gathered by means of two module evaluation questionnaires. The first of these addresses issues related to the module, whilst the second assesses the performance of the individual lecturers responsible for its delivery. Module feedback data are considered by the Board of Studies.

Changes to, or the introduction of new, modules are considered at the Board of Studies and at the School Teaching and Learning Committee. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and learning Committee.

Student opinion is also sought/may be given at the Staff/Student Committee and/or the Board of Studies.

Programme reviews

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

External examiner reports
External Examiner reports are considered by the Board of Studies under Reserved Business, in the absence of the student representatives. The Board responds to these reports through Faculty Teaching and Learning Committee.

Accreditation reports
There is no professional body appropriate for accreditation purposes and so the programme is not accredited. However, but was reviewed by the Natural Environment Research Council (NERC) for funding purposes in 1996 and 2000

Feedback mechanisms
Feedback to students is effected 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 programme, see http://www.ncl.ac.uk/internal/academic-quality/qualityhome.htm#2.

15 Regulation of Assessment:

Pass Marks
The pass mark, as defined in the University's Postgraduate Examination Conventions (http://www.ncl.ac.uk/calendar/university.regs/tpmdeprexamconv.pdf), is 50.

Course Requirements
Progression is subject to the University's Postgraduate Entrance and Progress Regulations (http://www.ncl.ac.uk/calendar/university.regs/tpmdepr.pdf) and Postgraduate Examination Conventions (http://www.ncl.ac.uk/calendar/university.regs/tpmdeprexamconv.pdf). In summary, students must pass 180 credits for the MSc. Limited compensation down to 40 is possible and there are resit opportunities, with certain restrictions.

Common Marking Scheme
The University employs a common marking scheme, which is specified in the Postgraduate Examination Conventions (http://www.ncl.ac.uk/calendar/university.regs/tpmdeprexamconv.pdf), namely

	Classification
<50	Fail
50-60	Pass
60-70	Merit
>70	Distinction

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

See and approve examination papers
Moderate examination and coursework marking
Attend the September Board of Examiners
Report to the University on the standards of the programme

16 Indicators of Quality and Standards:

Professional Accreditation Reports
The course is not accredited by a specific professional body, but was reviewed by the Natural Environment Research Council (NERC) for funding purposes in 1996 and 2000, NERC being committed to providing five studentships per year, for the academic years 2001-2005.

Internal Review Reports
The programme is due for Internal Subject Review in November 2004 (See the timetable at http://www.ncl.ac.uk/internal/academic-quality/schdlisr.doc)

Previous QAA Reports
This programme received a QAA Subject Review in October 1997 and achieved a score of 20/24.

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.

17 Other Sources of Information:

The University Postgraduate Prospectus (see http://www.ncl.ac.uk/postgraduate/)

The School Prospectus (see http://www.ncl.ac.uk/postgraduate/subjects/civileng)

The University and Degree Programme Regulations (see http://www.ncl.ac.uk/calendar/pdf/uniregs.pdf and http://www.ncl.ac.uk/regulations/regulations.html?id=317)

The Degree Programme Handbook for the MSc in Engineering Geology 2004-2005

HEFCE Quality Assessment Report 1997