PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MSc/Diploma
4	**Programme Title**	MSc/Diploma in Applied Hydrogeology
5	**UCAS/Programme Code**	3417 / 5153
6	**Programme Accreditation**	Flexible course is accredited as further learning with ICE, and accreditation is in progress for CIWEM and Geological Society. Application will be made for full-time course to be accredited with the same institutions
7	**QAA Subject Benchmark(s)**	Engineering
8	**FHEQ Level**	M
9	**Date written/revised**	March 2008

10	**Programme Aims**
1	to provide opportunities for candidates with first degrees in a range of scientific and engineering disciplines to enhance their knowledge of the nature, occurrence, characterisation and management of ground water
2	to provide a theoretical and practical quantitative training very relevant to the needs of the water and environmental engineering industries
3	to offer experience in the planning and execution of an extended research project
4	to provide experience of dissertation writing and other presentational and generic skills relevant to employer's needs
5	To satisfy the professional development needs of the individual and of his/her employers
6	To provide a programme which meets the FHEQ at Masters level

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.

Knowledge and Understanding

On completing the programme students should have:

A1	A sound scientific understanding in key subject areas such as hydrogeology, hydrogeochemistry, and hydraulics of porous media
A2	An advanced knowledge and understanding of selected components of ground water assessment, hydrostratigraphy and contaminant hydrology
A3	An understanding of the theoretical basis for methods of analysis and modelling, covering both flow and geochemical aspects of hydrogeology
A4	An understanding of the regulatory and socio-economic aspects of ground water management within an overall context covering land use, surface water and ground water
A5	Knowledge of specific examples of ground water assessment and management, drawing on experiences from developing countries, major public supply aquifers in industrialised countries, and the remediation of ground water pollution associated with post-industrial dereliction

Teaching and Learning Methods

Essential material is taught through lecture classes in Semester 1, supported by a combination of tutorials, practical classes, coursework and site visits. Most of the theoretical basis is taught using the same detailed material used for distance learning programmes, which provides a solid foundation for subsequent development. The basis concepts and understanding are applied to case studies in modules in Semester 2, helping to develop deeper understanding and the wider contexts of applied hydrogeology. Coursework exercises provide the opportunity for reflection and consolidation of learning. The dissertation project provides the opportunity to develop the depth of understanding further in one particular field.

Assessment Strategy

Formative assessment occurs through tutorial examples and coursework. The primary means of assessing knowledge and understanding is the closed book examination. This is supported by assessed written coursework.

Intellectual Skills

On completing the programme students should be able to:

B1 Plan, execute and report on a significant piece of research related to a deeper analytical understanding of a problem or application which is evaluated according to explicit and measurable criteria
B2 Search for information and develop ideas further
B3 Select and apply appropriate engineering design and environmental techniques taking account of industrial, legislative and commercial constraints
B4 Select and apply appropriate mathematical methods for modelling and analysing problems in ground water management
B5 Use scientific principles in the modelling and analysis of hydrogeological and hydrochemical aspects of ground water management
B6 Create new products or methodologies or research outputs through synthesis of ideas from a wide range of sources

Teaching and Learning Methods

Intellectual skills are developed initially through tutorials in which underpinning knowledge and understanding is translated into the ability to select and apply appropriate analysis tools. This is further developed through coursework, where the student applies analysis tools to real-world problems and data sets. Field visits help further to relate learning to real-world environments and problems. Learning is consolidated through development of individual research, including ability to identify problems and provide resolutions to these problems. Development of the key skills required to enable the individual research is through tutorial exercises focussed on specific skills in planning, research, and critical analysis.

Assessment Strategy

Closed-book examinations are used to assess intellectual abilities.

Assessed coursework provides further opportunities to demonstrate intellect and ability. All skills are necessary to complete successfully coursework and project requirements

Practical Skills

On completing the programme students should be able to:

C1 Use relevant field and laboratory measurement equipment
C2 Carry out experimental field and laboratory work
C3 Use IT tools and hydroinformatics technologies
C4 Design ground water infrastructure and schemes for ground water management
C5 Carry out practical testing of design ideas through computer simulation with technical analysis and critical evaluation of results

Teaching and Learning Methods

Learning is developed through teaching of basic skills including hydroinformatic and modelling skills and field exercises. Basic design principles are taught and practised as workshop practical exercises. These basic skills are practised in case study applications and in the dissertation project, where students are expected and encouraged to develop their own

experimental approaches to test ideas, and to apply appropriate techniques and evaluate the results.

Assessment Strategy

Assessment of basic hydroinformatic and other practical skills is mainly through coursework which requires the application of software tools and the use of data collected using equipment in the field. The assessment of the dissertation includes specific focus on the methodology, including application of practical techniques and analysis/evaluation of results.

Transferable/Key Skills

On completing the programme students should be able to:

D1 Manipulate and present data in a variety of ways
D2 Use methods based on scientific evidence in the solution of problems
D3 Use creativity and innovation in problem solving
D4 Communicate effectively
D5 Learn independently in a range of situations, preparing for lifelong learning
D6 Use general IT skills
D7 Manage time and resources effectively

Teaching and Learning Methods

Transferable skills are introduced through case study examples in tutorials, and development of individual study skills is continued in taught modules through the formative tutorial exercises and assessed coursework. Extensive use of practical examples enables the building of key skills.

Subsequently, the principal development of transferable skills occurs through the project, for which specific skills in data manipulation, communication, resources planning etc are taught, and all skills are necessary to complete the dissertation.

Assessment Strategy

Skills in data manipulation and scientific methods are essential to allow completion of examinations and assignments to a satisfactory standard. In addition, problem solving skills and effective communication are required for completion of coursework assignments. IT skills, independent learning, and time management are essential to complete all parts of the programme assessment effectively. The assessment of the dissertation covers integration of all key and transferable skills, providing an overall assessment of a student's skills which are of key relevance to employers.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The degree is available as a full time one year programme, or can be taken part time over a maximum of four years (part-time).

The MSc is made up of 180 credits. The taught modules are made up of 80 credits of compulsory modules and 20 credits of optional modules in Semesters 1 and 2. An 80-credit individual dissertation project is carried out in Semester 3, leading to submission of a dissertation in mid-August.

The PgD is a 120 credit course with an 80-credit taught component made up of 70 credits of compulsory modules and 10 credits of optional modules, and a 40-credit individual dissertation project.

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

The Applied Hydrogeology programme is now becoming established as one of only a few of its type in the UK, and with the introduction of the full-time option in 2007/8 will be the only one to be able to offer all of full-time, part-time and flexible learning modes of delivery for the same programme. The course curriculum is distinctive in that it offers a broad-based approach to hydrogeology, including aspects of socio-economic understanding, catchment science, thermogeology (ground source heat energy) etc, in addition to the more traditional engineering aspects of the subject.

Programme regulations (link to on-line version)

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

13 Criteria for admission

Entry qualifications

Proficiency in Mathematics and English is required at GCSE Grade 3 or above. Some proficiency in chemistry is required, normally at GCSE Grade 3 or above in a relevant subject.

Students wishing to be accepted on to the M.Sc. course should have a good (II.2 Honours or better) first (Bachelor) degree in a relevant science or engineering subject (or the equivalent qualification from outside the UK).

Admissions policy/selection tools

All applicants, standard or non-entry, will be considered based on their academic qualifications and their relevant technical industrial experience.

Non-standard Entry Requirements

Candidates with other equivalent qualifications and/or relevant industrial experience will be considered for entry.

Additional Requirements

None.

Level of English Language capability

Applicants for which the first language is not English must provide evidence of achieving a language level of IELTS 6.5.

14 Support for Student Learning

Induction

The first week of the first term/semester is an Induction Week with no formal teaching. During this period all students attend an induction programme in which they will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. In particular all new students will be given general information about the School and their programme, as described in the Degree Programme Handbook. The International Office offers an additional induction programme for overseas students (see http://www.ncl.ac.uk/international/coming_to_newcastle/orientation.phtml)

Additional tuition in pre-requisite mathematics may be offered, depending upon demand. Field visits to relevant sites are a part of the induction week.

Study skills support

Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Students are tutored on their approach to both group and individual projects.

Specific support is also available for pre-requisite skills, particularly in mathematics for which course-specific tutorial information is made available.

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

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

All new students who are not native speakers of English shall be tested at registration to assess their level of English language proficiency. The INTO Newcastle University Centre will administer this assessment on behalf of Newcastle University using its own English Language Proficiency Test. Where appropriate, in-sessional language training can be provided. The Open Access Centre houses a range of resources for learning other languages which may be particularly appropriate for those interested in an Erasmus exchange. See http://www.ncl.ac.uk/langcen/oac/.

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 School Teaching and Learning Committee and at the Board of Studies. 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.

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.

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, see http://www.ncl.ac.uk/aqss/qsh/internal_subject_review/index.php

Accreditation reports

The Distance Learning version of Applied Hydrogeology has been accredited as Further Learning by the Joint Board of Moderators (the accrediting board for the Institute of Civil Engineers which is directly relevant to this programme as well as other professional institutes).

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 (http://www.ncl.ac.uk/calendar/university.regs/tpmdepr.pdf) and Examination Conventions for Taught Masters Degrees (http://www.ncl.ac.uk/calendar/university.regs/tpmdeprexamconv.pdf). 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.

Weighting of stages
Not applicable

Common Marking Scheme

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

Summary description applicable to Postgraduate masters programmes		**Summary description applicable to postgraduate programmes**	
<50	Fail	<50	Fail
50-59	Pass	50 or above	Pass
60-69	Pass with Merit		
70 or above	Pass with 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 Board of Examiners
- Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:
The University Prospectus (see http://www.ncl.ac.uk/postgraduate/) The School Brochure (contact enquiries@ncl.ac.uk) The University Regulations (see http://www.ncl.ac.uk/calendar/university.regs/) The Degree Programme Handbook

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

Code	Module	Type	A Knowledge & Understanding	B Intellectual Skills	C Practical Skills	D Transferable Skills
CIV8001	Research Methods	Comp	3	1,2	3	1-7
CIV998	Dissertation	Comp (MSc)	1 – 5	1 – 6	1 – 5	1 – 7
CIV8098	Diploma Project	Comp (dip)	1 – 5	1 – 6	1 – 5	1 – 7
CIV8511	Hydrostratigraphy	Comp	1 – 3, 5	3-5	2-4	1 – 7
CIV8508	Data and Hydroinformatics	Comp	1, 3, 4	2-5	1 – 5	1 – 7
CIV8529	Hydrosystems and Hydroinformatics	Comp	1, 3 – 5	2-5	3-5	1 - 7
CIV8502	Sustainability and Water Resources	Opt	1, 3, 4	2-6	3,5	1 – 7
CIV8504	Groundwater Modelling	Comp (MSc) Opt (dip)	1 – 5	3-5	3-5	1 – 7
GSC8301	Groundwater Assessment	Comp	1 – 5	3-5	1 – 5	1 – 7
GSC8002	Aqueous Geochemistry	Comp	1 – 5	3-5	3,5	1 – 7
CIV8514	Hydroecology	Opt	3 – 5	2-6	1-3	1 – 7
GSC8302	Remediation Engineering for Polluted Groundwaters	Opt	1, 2, 5	2-6	3-5	1 – 7
GSC8201	Contaminated Land	Opt	4, 5	2-6	3-5	1 – 7