PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MSc
4	**Programme Title**	Hydroinformatics
5	**Programme Code**	5043F/5043P
6	**Programme Accreditation**	JBM, CIWEM, RICS
7	**QAA Subject Benchmark(s)**	Engineering
8	**FHEQ Level**	7
9	**Last updated**	June 2012

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 Hydroinformatics, through theoretical, practical and computational training;

2) To provide a quantitative training very relevant to the needs of the water industry;

3) To offer experience in the planning and execution of an extended research project (this does not apply to the diploma);

4) To provide experience of dissertation writing and other presentational skills;

5) To match the QAA Frameworks for Higher Education Qualifications descriptor for masters degrees (7).

6) To provide a programme that meets the accreditation requirements of the Joint Board of Moderators (JBM www.jbm.org.uk) 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.

7) To provide an entry route into an appropriate professional institution such as the Chartered Institution of Water and Environmental Management (CIWEM www.ciwem.org.uk) and the Royal Institution of Chartered Surveyors (RICS www.rics.org/uk).

8) To provide a programme designed to achieve the EC^{UK} Output Standards for Accredited Engineering Programmes and take account of the QAA's FHEQ Qualification Descriptors, the QAA Subject Benchmark Statement for Engineering, and the University's Graduate Skills Framework.

EC^{UK} Output Standards for Accredited Engineering Programmes:
http://www.engc.org.uk/ecukdocuments/internet/document%20library/AHEP%20Brochure.pdf
QAA's FHEQ Qualification Descriptors:
http://www.qaa.ac.uk/AssuringStandardsAndQuality/Qualifications/Pages/default.aspx
QAA Subject Benchmark Statement for Engineering:
http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Subject-benchmark-statement-Engineering-.aspx
University's Graduate Skills Framework:
http://www.ncl.ac.uk/quilt/modules/gsf.htm

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 (E).

Knowledge and Understanding

On completing the programme students should have:

A1 A sound scientific understanding in key subject areas such as hydrology, hydraulics, data collection, computational techniques and information and communication technology;

A2 An advanced knowledge and understanding of selected components of the natural water environment and water infrastructure, and their management;

A3 An advanced knowledge and understanding of mathematical methods, computational modelling and hydroinformatic techniques, ensuring a quantitative training;

A4 An advanced knowledge and understanding of application of hydroinformatic techniques in water management;

A5 Knowledge of specific examples of water management schemes.

Teaching and Learning Methods

Acquisition of A.1 and A.2 is through a combination of lectures, tutorials, example classes, laboratory activities and coursework. Outcome A.3 is achieved by lectures, tutorials and, where appropriate, hands-on computer exercises. Acquisition of A.4 and A5 is partly by lecture and tutorial, but depends increasingly on case studies, student investigations and presentations. Individual studies to greater depth are frequently needed during the research project.

Assessment Strategy

The primary means of assessing factual knowledge is the closed book examination. This is supported by assessed written coursework. In-depth individual learning frequently forms part of the project, which is assessed by dissertation, poster, oral presentation and viva voce examination.

Intellectual Skills

On completing the programme students should be able to:

B1 Select and apply appropriate mathematical methods for modelling and analysing relevant problems;

B2 Use scientific principles in the development of engineering and environmental solutions to practical problems in the water environment and water infrastructure operation;

B3 Use scientific principles in the modelling and analysis of the water environment and of water infrastructure operation;

B4 Select and apply appropriate computer-based methods for modelling and analyzing problems in the water environment and in water infrastructure operation;

B5 Create new products or methodologies or research outputs through synthesis of ideas from a wide range of sources;

B6 Produce solutions to problems through the application of engineering, water environment and ICT knowledge and understanding.

Teaching and Learning Methods

Where appropriate, B1 is reinforced in lectures but learning is principally in tutorials and assignments.

Outcomes B2 – B4 are initially encountered in lectures, practical classes and coursework but are developed principally during the research project.

Acquisition of B5 occurs through lectures and may form a major part of the project. B6 is introduced in lectures and developed through tutorials, coursework and the project.

Assessment Strategy

Closed-book examinations are used to assess intellectual abilities.

Assessed coursework provides further opportunities to demonstrate intellect and ability.

The project is assessed by dissertation, poster, oral presentation and viva voce examination, and provides final evidence of the levels attained.

Practical Skills

On completing the programme students should be able to:

C1 Use relevant field and laboratory measurement equipment;

C2 Competently carry out experimental laboratory work;

C3 Plan, execute and report on a research project;

C4 Use IT tools and hydroinformatics technologies;

C5 Design components of the water infrastructure and schemes for management of the water environment;

C6 Carry out practical testing of design ideas through computer simulation with technical analysis and critical evaluation of results;

C7 Search for information and develop ideas further;

C8 Apply engineering and environmental techniques taking account of industrial, legislative and commercial constraints

Teaching and Learning Methods

Outcomes C1-C3 are acquired principally through 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 coursework. It will frequently form a central part of the project.

Coursework provides initial experience of C6 and C7 but the project forms the principal vehicle for their acquisition.

Outcome C8 is introduced through lectures. Some projects may require further individual learning in this area.

Assessment Strategy

Outcomes C.1–C.8 are not explicitly assessed but are necessary for the successful completion of coursework and project requirements.

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;

D3 Be creative and innovative in problem solving;

D4 Effectively communicate with specialist and non specialist audiences;

D5 Learn independently in a range of situations, preparing for life-long learning;

D6 Efficiently use general IT skills;

D7 Work effectively as a part of a team.

Teaching and Learning Methods

Outcomes D1-D7 may be introduced through examples in lectures. D1-D5 are developed further through coursework. Subsequently, the principal development of transferable skills occurs through involvement in the project.

N.B. A generally lower level of ability will be expected of Diploma students. In particular the dissertation need not involve a strong research element (C3) or extensive problem-solving (D2 and D3).

Assessment Strategy

Skills D1–D3 are essential to complete examinations and assignments to a satisfactory standard.

Acquisition of D4 and D5 is demonstrated during assessment of coursework and of the project.

Outcomes D6 and D7 are essential for satisfactory completion of the coursework and the project. Completion of the project also requires command of outcomes D1–D5.

The above Learning Outcomes have been compared with the QAA Frameworks for Higher Education Qualifications Descriptor for a qualification at Masters (7) level. They are believed to meet or exceed the requirements of that Descriptor.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The programme of study is as defined below.

Module code	Descriptive Title	Credits	MSc	Mode of Study
CEG8501	Quantitative Methods for Engineering	10	Comp	Block
CEG8520	Hydrosystems Processes and Management	30	Comp	Block
CEG8505	Climate Change: Earth System, Future Scenarios and Threats	10	Comp	Block
CEG8506	Hydrosystems Modelling	10	Comp	Block
CEG8512	Integrated River Basin Management	10	Comp	Block
CEG8513	Hydroinformatic Systems Development	10	Comp	Block
CEG8515	Modelling of Floods	10	Comp	Block
CEG8516	Groundwater Modelling	10	Comp	Block
CEG8517	Computational Hydraulics	10	Comp	Block
CEG8705	An Introduction to GIS	10	Comp	Block
CEG8596	MSc Project and Dissertation in Water Resources	60	Comp	Block

Linear = taught course with lectures and tutorials given each week over an extended period

Block = a residential course taken full-time during a week at Newcastle, sometimes with subsequent coursework.
Comp. = compulsory; Opt = optional;
Candidates may select alternative modules to those listed above to a maximum of 20 credits and with the approval of the Degree Programme Director.
Note: If a candidate is a graduate of Newcastle University the candidate is not permitted to take a module which has already been taken as part of another programme.

The normal undergraduate year, extending from the middle of September to the middle of June, is approximately 31 weeks, arranged in three terms and currently divided into two Semesters. In contrast, the MSc year occupies nearly the full 12 month period, with the summer period (June-August) essentially constituting an additional semester.

Every MSc student studies 180 credits over the academic year. The academic courses, comprising 120 credits, are taught in Semesters 1 and 2, and the 60 credits associated with the project are notionally allocated to part of the second semester and the third semester.

Diploma students study 120 credits, of which the dissertation accounts for 30 credits. The taught courses are the same as those taken by the MSc students.

During the first two semesters, the primary aims of enhancing knowledge of the water environment and water infrastructure (A1, A2, A4, A5) are met through a range of appropriate technical modules. These include compulsory as well as optional modules with a strong IT (hydroinformatic) content. A common minimum level of mathematical skills (A3, B1) is ensured through the compulsory module in Quantitative Methods for Engineering, taken at the start of the course.

Intellectual skills (B1–B6) are developed initially in the lectured modules but are further reinforced through coursework. Coursework also develops practical skills (C7, C8) and a range of transferable skills (D1–D7).

The project, which forms a substantial part of the programme, may involve individual acquisition of knowledge and abilities (A1–A5, B1–B6).

Project planning and execution (C3) is practised throughout the summer period. Experience is also gained of practical skills (C1–C8). Satisfactory completion of the dissertation and examinations requires strong command of transferable skills (D1–D7).

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

The course recognizes the importance of modern Hydroinformatic tools in management of natural water environment as well as in wider water sector. Within this context course educates future developers and users of Hydroinformatics systems that are underpinning management the water environment in a sustainable manner.

It retains direct relevance to the water sector through reference to such context as the EU Water Framework Directive and modelling of floods.

It has a solid foundation on the development of numerical, hydroinformatics and problem-solving skills which is attractive to industry. In addition, graduates are well-versed in the socio-economic and environmental disciplines which provide the context for development decisions.

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, science or related subject.

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 PG Admissions team in Kings Gate. Overseas qualifications are assessed by the PG Admissions team in Kings Gate using the database set up by the international office, supported also by NARIC http://www.naric.org.uk/. 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. 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 will be considered, especially those with relevant professional experience, but there is no Diploma entry route.

Additional Requirements

Level of English Language capability
IELTS 6.5 (or equivalent) with at least 6 in each component.

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-sessional 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 (BoS). Changes to, or the introduction of new, modules are considered at the BoS and/or the School Learning, Teaching and Student Experience Committee (SLTSEC). Student opinion is sought at the Staff-Student Committee (SSC) and/or the BoS. New modules and major changes to existing modules are subject to approval by the Faculty Learning, Teaching and Student Experience Committee (FLTSEC).

Programme reviews
The BoS conducts an Annual Monitoring and Review of the degree programme and reports to FLTSEC. The FLTSEC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Learning, Teaching and Student Experience Committee (ULTSEC).

External Examiner reports
External Examiner reports are considered by the BoS. The Board responds to these reports through FLTSEC. External Examiner reports are shared with institutional student representatives, through the SSC.

Student evaluations
All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the SSC, and the BoS. 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 SSC and the BoS.

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 ULTSEC on whether the programmes reviewed should be re-approved for a further five year period.

Accreditation reports
At the date of publication, the continuation of accreditation 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, is pending final approval (July2012). See www.jbm.org.uk for further information.

The programme is accredited by the Chartered Institution of Water and Environmental Management (CIWEM, www.ciwem.org.uk) as contributing to the academic requirements for the appropriate CIWEM membership grade for students that graduate from the Programme.

The programme is also accredited by the Royal Institution of Chartered Surveyors (RICS, www.rics.org.uk).

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 20 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		**Summary description applicable to postgraduate Certificate and Diploma 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 FLTSEC, following recommendation from the BoS. 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 Website: http://www.ncl.ac.uk/ceg/study/postgraduate/taught/index.htm

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

The School Handbook: https://ce-gs14.ncl.ac.uk/CeG.Internal/teaching/handbooks/2011-2012/CeG%20School%20Handbook.PDF

The Degree Programme Handbook: https://ce-gs14.ncl.ac.uk/CeG.Internal/teaching/handbooks/2011-2012/EE%20Handbook.pdf

The Module Catalogue: http://www.ncl.ac.uk/module-catalogue/

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
CEG8501	Quantitative Methods for Engineering	Compulsory	1, 3	1, 4	4	1, 4, 6, 7
CEG8520	Hydrosystems Processes & Management	Compulsory	1, 3	1 – 6	1, 2, 4 – 8	1 – 7
CEG8505	Climate Change: Earth System	Compulsory	1, 4	1 – 6	4 – 8	1 – 7
CEG8506	Hydrosystems Modelling	Compulsory	1, 3	1 – 6	4 - 7	1 – 7
CEG8512	Integrated River Basin Management	Compulsory	1 – 5	1 – 6	4 – 8	1 – 7
CEG8513	Hydroinformatics Systems Development	Compulsory	1, 3	1 – 5	4 – 7	1 - 7
CEG8515	Modelling of Floods	Compulsory	1 – 3	1 – 6	4 – 7	1 - 7
CEG8516	Groundwater Modelling	Compulsory	1 – 3	1 – 6	4 – 8	1 – 7
CEG8517	Computational Hydraulics	Compulsory	1,3	1 – 6	4 - 7	1 - 6
CEG8705	An Introduction to GIS	Compulsory	1, 3	1, 4	4	1, 4, 6, 7
CEG8596	MSc and Project Dissertation (MSc)	Compulsory	2, 3	1 – 6	1 – 8	1 – 7