	PROGRAMME SPECIFICATION	Newcastle University

1	**Awarding Institution**	Newcastle University
2	**Teaching Institutions**	Newcastle University; University of Sheffield; Imperial College, London; Cranfield University; University of Exeter
3	**Final Award**	Engineering Doctorate
4	**Programme Title**	Skills Technology Research and Management (STREAM) EngD
5	**UCAS/Programme Code**	8811F
6	**Programme Accreditation**	n/a
7	**QAA Subject Benchmark(s)**	Engineering
8	**FHEQ Level**	Level 8
9	**Last updated**	March 2011

10	**Programme Aims**

This is proposed to allow Newcastle University to participate in STREAM, an EPSRC-funded Industrial Doctoral Centre (IDC) for the Water Sector, which is collaboratively delivered by a consortium of five universities: Cranfield University; University of Exeter; Imperial College, London; Newcastle University; and University of Sheffield.

This aim of the Engineering Doctorate programme is to bring together diverse areas of expertise to train engineers and scientists with the skills, knowledge and confidence to tackle today's water sector challenges such as climate change, increasing populations, energy efficiency and pollution control.

The STREAM programme comprises three components leading to the award of Engineering Doctorate (EngD) degree; (i) acquisition of advanced technical skills through attendance at Masters level training courses; (ii) tuition in the competencies and abilities expected of senior engineers through a Transferable Skills and Engineering Leadership (TSEL) component; and (iii) doctoral level research project(s).

To meet these aims, the EngD Degree programme has the following objectives:
1. To recruit good students from a range of backgrounds.
2. To produce graduates who have vision and the ability to address the challenges posed by society through the deployment of the skills and knowledge gained during their EngD studies.
3. To equip students with the fundamental knowledge and understanding of inter-disciplinary science and engineering underpinning the water sector industry.
4. To provide opportunities for students to acquire further knowledge, both in breadth and depth, and to specialise according to their own interests as they develop over the duration of the EngD programme.
5. To equip students with appropriate practical skills in laboratory experimentation, information processing, data analysis, problem solving, teamwork, and communication skills.
6. To provide an appreciation of the value of research results and routes to their exploitation.
7. To acquaint students with professional skills in management and business, regulatory and commercial needs.
8. To provide students with the opportunities to acquire research skills and to demonstrate the application of these skills to solve novel environmental and water resources engineering research problems.

9. To encourage students to enhance public awareness of their research, to understand ethical considerations, to develop responsible attitudes towards the needs of society and the environment in the application of their engineering / science and economic knowledge.
10. To ensure that they have particular regard for the importance of safety in their working life.
11. To encourage students to develop professional attitudes towards their own future development.
12. To provide a programme of study which meets FHEQ Level 8 and which exceeds the subject benchmarks in QAA Engineering at the Masters level and UK-Spec professional standards.
13. To ensure the research component satisfies Newcastle University's QA framework for Research Degree Programmes.

11 Learning Outcomes

The programme provides opportunities for EngD students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the area of environmental engineering and science that are consistent with FHEQ Level 8 study. The programme outcomes have references to the benchmark statements for Engineering (E).

Knowledge and Understanding

On completing the programme students should have:
A1 Broad knowledge in engineering sustainability, water and wastewater treatment principles, principles of hydraulics and water distribution, process science and engineering, asset stewardship, and other concepts that are relevant to the water sector industry.
A2 Knowledge and understanding of the fundamental concepts, principles and theories of engineering relevant to the water sector industry.
A3 Specific advanced knowledge and understanding gained for the EngD research area of study.
A4 Knowledge and understanding of business and management techniques, intellectual property and regulatory issues relevant to environmental and water resources engineering.
A5 Knowledge and understanding of the role of environmental engineers in society and the constraints within which their judgement will be exercised, including the professional and ethical responsibilities of environmental engineers.
A6 Specific advanced knowledge and understanding of the environmental and safety issues that affect environmental engineering and the issues associated with sustainable environmental engineering.
A7 Specific advanced knowledge and understanding of conceptual and elemental environmental engineering design.

Teaching and Learning Methods

The underpinning fundamental knowledge and understanding are primarily imparted through a combination of lectures, tutorials, seminars, example classes, case studies, experimentation, fieldwork, site visits, coursework and projects. A number of visiting lecturers and professors from the water sector industry and from other academic institutions will also contribute.

The EngD research project will build on knowledge gained in A1 and A2 and the background process understanding to deliver against the EngD research requirement while at the same time provide depth of understanding associated with A3. Throughout the EngD research project, students are required to undertake independent reading to deepen, supplement and consolidate their research findings and what is being taught/learnt to broaden their individual knowledge and understanding of the subject. During the research studies, students are required to submit bi-annual reports describing their progress. These will occur during the annual Stream Symposium, in December and annual Challenge Week (in July). They will be given guidance and direction by the supervisory team. Formal records of training will be

maintained. Feedback on reports will allow the student to assess the level of their knowledge and understanding and provide the necessary capability to write the EngD research thesis.

Assessment Strategy

Student performance on all three elements of the programme (Advanced Technical Skills - Induction Semester, Transferable Skills and Engineering Leadership (TSEL) and the research component) will be formally assessed.

Taught advanced technical courses worth 60 credits plus non credit bearing TSEL units will be formally assessed by a range of coursework and examinations as detailed in the module outline forms. The research component will be assessed by submission of a dissertation and examination by *viva voce*. In addition, students will be required to attend at least one advanced technical skills module in the second and third years for CPD purposes; should the candidate require credit for these modules they may elect to sit the normal assessment for the modules.

Mid-stage awards may be available for those students who, for whatever reason, withdraw from the programme early (see below).

Progress Reviews

Progress reviews constitute a formal evaluation of student activities and achievements. They provide an opportunity for students and supervisors to review progress and plan the coming year's priorities and actions. Student progress will be formally evaluated during the Challenge Week in July. For this July review students will make their learning logs available to their academic and industrial supervisors, produce a 5,000 word progress report, and make a presentation on their activities to date. The report should provide a reflective assessment of experiences and achievements during the past year. Student progress logs will be used to monitor achievements, record supervisor feedback and formalise plans for the following year.

The STREAM Programme Management Group (comprising the Centre Director and Centre Manager from Cranfield plus one representative from each of the other four collaborating universities) will meet shortly after the review has been conducted to consider student progress and approve progression on to the following year of the programme. In coming to a judgement about the adequacy of student progress, supervisors and the Programme Management Group will have regard to;

a.   Records of attendance at advanced technical skills and TSEL components of the programme together with completion of the Skills Perception Inventory (SKIPI) framework.
b. Exam marks achieved by the student relating to the compulsory taught elements of the programme.
c. The quality and content of the written progress report and presentation.
d. Advice from the industrial sponsor on student performance.

Attendance on and completion of assessments of the Induction Semester (i.e. semester 1) are both compulsory elements of the programme. Candidates failing any assessment for an induction semester module will be permitted to re-enter the assessment for the module or component in question on one occasion only. A candidate may only be allowed to re-enter the assessment for a maximum of two failed modules.

The courses the students elect to attend after the first year will be undertaken in support of their research objectives. Attendance on taught modules will be recorded on a Continuing Professional Development (CPD) log. Students wishing to gain credit for such modules will undertake the normal form of assessment as indicated in the module outline form, and their marks recorded on the CPD log.

Attendance on STREAM Transferable Skills and Engineering Leadership (TSEL) components and completion of associated assessments are both compulsory elements of the programme. Attendance on TSEL modules and their assessment marks will be recorded on the CPD log.

Doctoral level research will be conducted through either a single study or a portfolio of studies

to be reported on in a thesis. The EngD thesis will be required to include an element of business evaluation (e.g. marketing, finance, investment, management, cost-benefit).

Progression through the research programme will be monitored and evaluated by the EngD Supervisory Panel. The Supervisory Panel will comprise a principal supervisor from the main institution, a second academic supervisor drawn from one of the collaborating STREAM universities, and an industrial supervisor representing the candidate's sponsoring organisation. At the panel the student is required to present the current state of their research and their plans for future research and is questioned on these by the panel.

Assessment of the EngD thesis will involve a *viva voce* defence of the thesis with one internal examiner and two external examiners not involved in the candidate's Supervisory Panel. The thesis is assessed against the learning objectives and satisfaction of FHEQ Level 8 criteria. Given the industrial focus of the EngD, one external examiner will be from the industrial sector and the second from an academic institution. The panel will chaired by an independent Chair person.

The award of MPhil may be made available to students who either do not wish to pursue the EngD award or who are denied permission to progress following a formal review, and who have met the criteria for award of an MPhil as laid down by the institution they are registered with.

Intellectual Skills

On completing the programme students should be able to:
B1   Independently plan, conduct and report a programme of novel investigative work.
B2   Critically analyse and solve interdisciplinary industrial engineering / scientific problems.
B3   To independently conceive, investigate and plan or, where appropriate, design a novel technical solution, policy or strategy to meet the needs of the water industry.
B4   Be creative and innovative in the solution of problems and in the development of designs.
B5   Take a holistic approach to solving problems and designing systems, applying professional judgements to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.
B6   Integrate and critically evaluate information and data from a variety of sources.
B7   Generate new and publishable material, and be able to draft scientific papers.

Teaching and Learning Methods

Intellectual skills are developed through the research, and the teaching and learning programme. Analysis and problem solving skills are further developed through example classes, tutorials, coursework and put into practice in the research project work. Experimental, research and design skills are further developed through coursework activities and the research project. Individual feedback is given to students on all work produced. Students are required, following appropriate guidance, to plan and carry out their investigative work and analyse experimental data in a critical manner. Feedback provided on all submitted work and draft sections of the EngD thesis provides opportunities for students to improve their intellectual skills. In particular, the EngD research project work will provide the opportunity to develop skills B1-B7.

Assessment Strategy

Analysis and problem solving skills are assessed through unseen written examinations, coursework and the EngD thesis *viva voce* examination. Experimental, research and design skills are assessed through coursework reports and project reports, presentations, unseen written examinations and the EngD thesis. Creative and design skills are assessed through the research reported in the EngD thesis.

Practical Skills

On completing the programme EngD students should be able to:
C1   Independently design a series of experiments to verify a hypothesis and specify experimental and data collection protocols.

C2	Critically analyse experimental or computational results and determine their strength and validity.
C3	Prepare advanced technical reports, specifications and give technical presentations.
C4	Use the latest scientific literature effectively and search for information to develop concepts and relate concepts that are in the literature to the solution requirements of the research problems.
C5	Independently produce a conceptual or elemental design or procedure to solve an industrial problem that involves novel solution approaches and generates new capability or understanding and/or to be able to draft relevant policy or strategy.
C6	Project manage tasks to deliver an Engineering Doctoral thesis in a 4 year period.

Teaching and Learning Methods

Practical skills are developed through experimentation and research project work leading to the Engineering Doctorate (C1-C6). Lectures, tutorials, case studies and seminars for specific modules will develop skills C5 (all modules that utilise computer based case studies for assignments) and C4-C6 (EngD Project). From the first year, students are required, after appropriate guidance, to search the literature for information and submit all written work in an appropriate scientific and engineering format so that C2-C4 are thoroughly integrated into all submitted work and research reports. Students are encouraged to develop appropriate professional and practical skills (C1-C3) through both the taught and research components of the EngD. All EngD students are monitored by one main academic supervisor, one industrial supervisor, and another academic supervisor providing additional support.

Assessment Strategy

Practical skills are assessed through experimentation write-ups, coursework and project reports, presentations, group oral discussions, and unseen written examinations culminating in the assessment of the EngD thesis through a *viva voce* examination. Skills C1-C6 form a major part of the assessment of the EngD research project.

Transferable/Key Skills

On completing the EngD programme students should be able to:

D1	Communicate effectively (verbally and in writing).
D2	Work as a member of an interdisciplinary team in an academic and industrial environment.
D3	Develop novel ideas and solutions to engineering and scientific problems.
D4	Use information and communications technology.
D5	Manage resources and time, plan, organise and prioritise work effectively to meet deadlines.
D6	Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.
D7	Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.

Teaching and Learning Methods

Transferable skills are developed through the research programme, the TSEL components, and through working with the industrial sponsor. Basic communication skills, D1, will acquired through individual and team projects through a number of modules and the research project. These are then developed and enhanced through feedback on written reports and presentations. Skills D1-D2 will be developed in subject-specific modules and the students will obtain feedback to enhance their learning as part of those modules. These skills will be enhanced during the research programme as the project progresses. Students will be required to find information and give oral and/or written presentations throughout their study. The research project provides the scope and opportunity to develop skills D2-D7.

Assessment Strategy

Transferable and communication skills are assessed through coursework reports, presentations and oral examinations in a number of compulsory and optional modules and progression monitoring activities. The assessment of the EngD thesis includes key skills content.

12	Programme Curriculum, Structure and Features

Basic structure of the programme

STREAM is an Industrial Doctoral Centre (IDC) for the Water Sector which is collaboratively delivered by a consortium of five universities; Cranfield University, University of Exeter, Imperial College London, Newcastle University and University of Sheffield.

The STREAM programme comprises three components leading to the award of an Engineering Doctorate degree; (i) acquisition of advanced technical skills through attendance at Masters level training courses, (ii) tuition in the competencies and abilities expected of senior engineers through a Transferable Skills and Engineering Leadership (TSEL) component, and (iii) doctoral level research project(s).

The EngD programme is full time lasting four years. The first semester is based at Cranfield University. During Semester 1 the students undertake 60 credits of advanced technical study. These modules are designed to build up the essential knowledge base that is necessary to tackle the research programme. In addition students will undertake a non credit bearing TSEL study during their first semester. They will take a further non credit bearing TSEL study during the second semester. Both TSEL's will be assessed under the Skills Perception Inventory (SKIPI) framework. The remainder of the first year is taken up with the introductory year one EngD project. At the end of the first year the students will have acquired at least 60 credits and achieved over 50 on average. Those students that fail to achieve these levels will be able to retake up to 20 credits of modules. Limited compensation of marks is permitted. Further details are contained in the Programme Regulations.

In the second and third years of study the students undertake a minimum of one CPD course and TSEL study per year. Candidates are expected to undertake their final TSEL modules in year four.

The remainder of the programme will be predominantly the industry focussed research project. The predominant location for the research will be agreed with the Engineering Doctorate Director but all students will be required to return to one of the five partner universities as appropriate to undertake their research studies and to tackle week long ten credit modules in professional skills and technical modules to support their research studies. Progression each year is subject to satisfactory performance as judged by the independent Supervisory Panel. Satisfactory progress includes effective performance as judged in the assessed modules undertaken in that year. At the end of the fourth year of study, the students will have completed a thesis that will be examined by two external examiners with awareness of Level 8 requirements.

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

The EngD Centre will deliver trained doctoral students who have the skills, confidence and motivation to facilitate the rapid and efficient development of environmental and scientific tools in the water sector, and to facilitate the sustainable development in the sector.
Particular features of the programme are:
- To provide EngD students with a well-rounded multi-disciplinary research training to promote development of skills in environmental and water resources engineering.
- Co-location in the industry and academia.
- Regular liaison with a multi-institutional cohort of students.
- Regular liaison with and assessment by industry and academia.
- To provide training to EngD students to develop both technical and professional skills to underpin personal development and future career success.

Programme regulations (link to on-line version)

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

13	Criteria for admission

Entry qualifications

All applicants are considered individually on the basis of past academic performance and potential for achievement. Applicants will be expected to have at least a 2.1 MEng or a BSc / BEng plus MSc awarded with Merit in an appropriate science or engineering discipline.

Admissions policy / selection tools
Interviews will be used as part of the selection process, which take into account contextual factors which may affect the academic performance of individual applicants. The interviews will be typically undertaken by a panel of academics and industrialists (the Proposal Approval Group). The interview will comprise of a presentation by the applicant followed by panel based questioning and will be undertaken to assess both academic ability and appropriateness for the EngD position including communication skills.

Non-standard Entry Requirements
Students holding lower entry qualification such as applicants with Bachelors level degrees at 2.1 and above will be considered for entry if they possess significant industrial or equivalent experience.

Additional Requirements
An acceptable academic and personal reference will be required in all cases.

Level of English Language Capability
IELTS 6.5 (or equivalent) or above.

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
STREAM EngD candidates will receive their primary programme induction at Cranfield University. However, Newcastle candidates will then be able to avail themselves of the induction programmes offered through the School of Civil Engineering and Geosciences, and through the Faculty of Science, Agriculture and Engineering on arrival at Newcastle University. These students will be given a general introduction to University life and the University's principle support services and general information about the Engineering Doctoral programme, as well as School-specific induction for research students. The International Office offers an additional induction programme for international 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, as well as in the TSEL modules. Students are explicitly tutored on their approach to both group and individual projects.

Support for EngD thesis writing is provided by the Writing Development Centre with additional support opportunities coordinated by the SAgE Graduate School through the Faculty Research and Development programme.

Academic support
The initial point of contact for an EngD student is with their supervisory team. Thereafter the EngD Programme Director or SAgE Dean of Postgraduate Studies may be consulted. Issues relating to the programme may be raised at the Postgraduate Staff Student Committee, and/or at the Postgraduate Board of Studies.

Pastoral support
All students are assigned two EngD academic supervisors plus one industrial supervisor whose responsibilities are to monitor the academic performance and overall well-being of their students. 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 including stress and anxiety, student finance and budgeting and disability matter. There is specialist support available for students with dyslexia and mental health

issues. Furthermore, the Union Society operates a Student Advice Centre that can provide advocacy and support to students on a range of topics including housing, debt and legal issues.

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. For off-site support the Remote Application Server allows connection to information sources outside of the campus network.

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 that are considered by the STREAM Programme Management Group that will serve as the Board of Studies. Changes to, or the introduction of, new modules are considered by the STREAM Programme Management Group. Their recommendations are considered by, and approval is sought from, Faculty, Teaching, Learning and Student Experience Committee. Student opinion is sought at the Postgraduate Staff Student Committee and its minutes will be acted on by the STREAM Programme Management Group.

Programme reviews
The STREAM Programme Management Group will submit an Annual Monitoring and Review report to Faculty, Teaching, Learning and Student Experience Committee as appropriate. The Graduate School Committee takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Teaching and Learning Committee and/or University Research Committee as appropriate.

External Examiner reports
External Examiner reports for the taught component are considered by the STREAM Programme Management Group who will respond to these reports through Faculty, Teaching, Learning and Student Experience Committee as appropriate. The EngD Director will also receive reports of the Examiners of the thesis. External Examiner reports are shared with institutional student representatives, through the Postgraduate Staff Student Committee. The STREAM Programme Management Group will consider the reports and have the responsibility to ensure that the industrial requirements are being met and EPSRC objectives satisfied.

Student evaluations
All modules, and the EngD degree programme, are subject to review by student questionnaires, which will be collated and passed to the Postgraduate Staff Student Committee by the STREAM Programme Management Group. Informal student evaluation is also obtained at the Postgraduate Staff Student Committee. 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 Faculty / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback
Feedback is channelled via the Postgraduate Staff Student Committee and the STREAM Programme Management Group.

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 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 and/or University Research Committee on whether the programmes reviewed should be re-approved for a further five year period. For further details see *http://www.ncl.ac.uk/aqss/qsh/research_degree_programmes/PGR_QAF_Policy_and_guidance.pdf*

Additional mechanisms
All staff will be subject to periodic peer observation of their teaching. Any issues arising are dealt with by the Engineering Doctorate STREAM Programme Management Group, as agreed across the consortium.

16	Regulation of assessment

Pass mark
The pass mark is 50 with progression onto the research element being 50.

Course requirements
Progression is subject to the satisfying FHEQ Level 8 and which exceeds the subject benchmarks in QAA Engineering at the Masters level and UK-Spec professional standards and in addition it has to ensure that the research component satisfies Newcastle University's QA Framework for Research Degree Programmes –

http://www.ncl.ac.uk/aqss/qsh/research_degree_programmes/PGR_QAF_Policy_and_guidance.pdf

A candidate's performance on all three elements of the programme (Advanced Technical Skills, TSEL and research) will be assessed once a year for the purpose of judging the candidate's capacity to progress to the following subsequent year of the programme.

Progress reviews constitute a formal evaluation of the candidate's activities and achievements. A candidate's achievements and progress will be formally evaluated in July each year. At each yearly review, the candidate will submit their CPD log and a report to the STREAM Programme Management Group and make a presentation on their activities to date.

The purpose of each progress review is to confirm that; (a) the candidate has benefitted from the taught programme elements and is able to apply the knowledge acquired from the taught material, (b) the candidate has demonstrated capability to conduct independent research, (c) the candidate is aware of the associated literature, (d) the candidate has a realistic research plan and schedule for the next year, (e) the candidate is complying with the Code of Practice, and (f) the candidate is of EngD calibre.

Following the yearly review, the candidate's Supervisory Panel will submit a recommendation to the STREAM Exam Board on progression to the next year of the programme.

The STREAM Programme Management Group (comprising the Centre Director and Centre Manager from Cranfield University plus one representative from each of the other four collaborating universities) will meet shortly after the review has been conducted to consider the candidates' progress and approve progression on to the following year of the programme. In coming to a judgement about the adequacy of the candidates' progress, both the Supervisory Panel and the Exam Board will have regard to; (a) records of attendance at advanced technical skills and TSEL components of the programme, (b) assessment marks achieved by the student relating to attended taught elements of the programme, (c) the quality and content of the

written progress report and presentation, and (d) advice from the industrial sponsor on student performance.

If progress in any year is not deemed adequate to allow progression to the next year of the programme, the candidate will be given the opportunity to submit for a lower award if the specified conditions for that award have been met.

Common Marking Scheme
The University employs a common marking scheme for postgraduate modules, which is specified in the Taught Postgraduate Examination Conventions and applies to the taught modules in the Engineering Doctorate across the consortium, namely:

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

Role of the External Examiner for the Board of Examiners
An External Examiner, a distinguished member of the subject community, is appointed by the University on behalf of the STREAM Programme Management Group for an individual EngD. The External Examiner is expected to oversee the quality of the taught elements 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: http://www.stream-idc.net/

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

1. Compulsory modules

Module	Type	Intended Learning Outcomes			
		A	**B**	**C**	**D**
Engineering Sustainability		A1, 2, 6	B1-6	C4, 5	D1, 3, 5, 7
Water and Wastewater Treatment Principles		A1, 2, 5, 6, 7	B2, 3, 6	C2, 3, 5	D1, 3, 7
Process Science and Engineering		A1, 2	B2, 4	C2, 3, 5	D1, 3, 7
Asset Stewardship		A1, 4, 5	B3, 5, 6	C1, 3, 5	D1, 3, 4, 5, 7
Principles of Hydraulics and Water Distribution		A1, 2	B2, 3, 6	C1, 2, 3, 4, 5	D1, 3, 7
Group Design Project		A1, 2, 4, 5, 6, 7	B1-6	C1-6	D1, 2, 3, 4, 5, 7
Transferable Skills Unit I		A2, 6, 7	B1, 5, 6	C1, 2, 4	D1, 6, 7
Transferable Skills Unit II		A2, 4, 5	B1, 3, 5, 6	C1, 2, 4	D1, 4, 5, 6, 7
Transferable Skills Unit III			B1, 3, 6	C5, 6	D1, 2, 4, 5, 7
Transferable Skills Unit IV		A4	B1, 5	C1, 5, 6	D1, 2, 4, 5, 7
Transferable Skills Unit V		A4, 5	B1, 5, 7	C1, 4, 6	D1, 5, 7
EngD Research Project		A1-7	B1-7	C1-6	D1-7

2. Optional modules

The optional modules taken by the candidates will normally fulfil the intended learning outcome A3, in addition to other learning outcomes which are dependent on the modules chosen.