| PROGRAMME SPECIFICATION |  |
|---|---|

| | | |
|---|---|---|
| **1** | **Awarding Institution** | Newcastle University |
| **2** | **Teaching Institution** | Newcastle University |
| **3** | **Final Award** | BSc (Hons) |
| **4** | **Programme Title** | Surveying and Mapping Science |
| **5** | **UCAS/Programme Code** | H244 |
| **6** | **Programme Accreditation** | Royal Institution of Chartered Surveyors<br>Chartered Institution of Civil Engineering Surveyors |
| **7** | **QAA Subject Benchmark(s)** | Engineering, Building & Surveying |
| **8** | **FHEQ Level** | Honours (Level 6) |
| **9** | **Date written/revised** | May 2014 |

**10 Programme Aims**

1. to address aspects of measuring, mapping, recording and managing information about an area which may be urban or rural, mountainous, coastal or on the open sea, and may range in size from a land parcel to a continent
2. to produce graduates with a sound knowledge and understanding of spatial data collection, analysis, management and presentation
3. to equip graduates with the ability to undertake, manage and develop projects involving engineering surveying, geodesy, photogrammetry, cartography, GIS/LIS, hydrographic survey and computing
4. to provide a balance of rigorous vocational, scientific, engineering-based and professional education and training
5. to provide an in-depth research training and the opportunity to undertake an individual research project, along with an appreciation, within a research-active university School, of the nature and impact of research activity in geomatics

**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 and for Building & Surveying. The mapping of intended learning outcomes onto modules is detailed in the Annex.

**Knowledge and Understanding**

On completing the programme students should have acquired knowledge of, and demonstrated understanding of:

A1 Fundamentals of measurement and spatial data collection
A2 An appreciation of the concepts of accuracy and precision in spatial data handling
A3 Knowledge of the application of spatial data in navigation, precise measurement and deformation monitoring
A4 The role of geomatics in the broad fields of engineering, applied science and technology
A5 An understanding of the impact of information technology on geomatics
A6 A good grounding in the basic sciences of mathematics, geophysics and physics

A7 Management and business practices within geomatics
A8 Professional and ethical responsibilities
A9 The academic requirements of the partner professional institutions (The Royal Institution of Chartered Surveyors and the Chartered Institution of Civil Engineering Surveyors)

**Teaching and Learning Methods**

A variety of teaching and learning methods is necessary to achieve the intended learning outcomes. The primary mechanism for teaching knowledge and understanding is by lectures, but these are strongly supported, for most modules, by an extensive and integrated practical programme. Lectures give the students basic knowledge and understanding of all aspects from above (A1 – A9), whilst practicals strengthen understanding and application in A1 – A3, A5 and A6 in particular. Other teaching methods such as fieldwork, outside visits and lectures from visiting speakers ensure that practical applications and contemporary practice in geomatics (A4, A7 – A9) are fully covered.
Students are required to be active in their learning and not merely passive recipients of information. They are also encouraged to manage their own learning through research and project-based work. An increasing emphasis is placed on team working, both in the classroom and in fieldwork and practical work. Some modules explicitly concentrate on professional and practical aspects of applied geomatics, involving discussion and seminars. Student-centred learning forms a major component of several modules. Independent reading is encouraged by the provision of reading lists for all modules. Independent research work (dependent on choice of topic) can address many of the aspects listed above.

**Assessment Strategy**

The larger proportion of assessment is undertaken by traditional closed-book, written examinations, although some modules are assessed by multiple-choice testing. A significant proportion of assessment is, however, continuous coursework assessment and this allows for formative development of knowledge and understanding.

**Intellectual Skills**

On completing the programme students should possess the following generic intellectual skills:

B1 Data analysis: mathematical analysis; image processing and interpretation
B2 Synthesis: appropriate data modelling and integration (including data from other disciplines)
B3 Critical analysis: appraisal of data and development of argument
B4 Research skills and independent student learning
B5 Problem solving

**Teaching and Learning Methods**

The emphases in this course on accurate data handling and rigorous data manipulation ensure that students quickly acquire general cognitive skills enabling them to correctly and effectively manage spatial data. Hands-on exercises promote effective data analysis and develop critical skills (B1, B3). The integration of data from numerous sources, and the implications of such integration, is also covered in detail (B2). Courses on research methods and practical research exercises ensure generic skills in research and problem solving are also taught in each Stage of the programme (B4, B5). There is an emphasis on teaching skills for independent learning.
Students are constantly exposed to practical work and spatial data handling. They learn through supervision, experience, discussion and consideration of case studies that data handling skills are essential for a professional geomatician. The major research project also presents an environment within which students learn a great deal about generic cognitive skills.

**Assessment Strategy**

The cognitive skills listed above are assessed particularly in the final year research project, but other coursework submissions which detail practical work undertaken also need to show evidence of cognitive skills.

**Practical Skills**

On completing the programme students should be able to demonstrate the following subject-specific skills:

C1 Field skills: planning; observation; recording and processing; application of scientific principles in the field
C2 Programming skills
C3 Experimental design: hypothesis testing; use of equipment, hardware and software; assessment of results
C4 Project management for geomatics

**Teaching and Learning Methods**

Field skills (C1) are developed through extensive outdoor practical sessions and residential fieldcourses. These also ensure that experimental and project management skills (C3, C4) are also introduced and taught. Other practical skills, including programming (C2), are taught in lectures and indoor and laboratory practical sessions.
All the skills listed above are introduced progressively throughout the three year degree programme such that considerable independence in the application of these skills is achieved by the end of the degree programme.

**Assessment Strategy**

Examinations assess many of the skills listed above, but it is the hands-on practical experience and the subsequent coursework which yields the major summative assessment of these skills. Major residential fieldcourses form two discrete modules, in Stage 1 and at the beginning of Stage 3, whose results (both individual and team) are assessed (C1). Programming skills (C2) are similarly assessed through examination and coursework submission in specific modules. Project management (C4) is assessed in the Professional Practice module.

**Transferable/Key Skills**

On completing the programme students should have attained the following core skills:

D1 Communication: written, oral and interpersonal at a level appropriate for the target audience
D2 Teamwork: coordination, leadership and resolving conflicts both in the field and in the laboratory
D3 Planning and organisation: setting objectives; allocating resources; time management
D4 Initiative and adaptability: responding to change; working independently
D5 Numeracy: understanding and using numbers and mathematics correctly
D6 Literacy: ability to read critically and with purpose
D7 IT: effective use of a wide range of computing technology

**Teaching and Learning Methods**

Many of these skills are taught, practised and assessed in a large number of modules. The 'key skills' matrix published in the student handbook demonstrates that, at every Stage in the degree programme, a significant range of core skills are taught, in formal modules and during induction week.
Written and oral presentation skills (D1) are taught explicitly in the Stage 2 Research Methods module, as well as in the tutorial module in Stage 1. Teamwork (D2) is a particular strength of this degree programme and is taught both on residential fieldcourses and in other modules where students undertake practical exercises (indoor and outdoor) in teams. Planning and organisation skills (D3) are regarded as generic and are taught specifically in research methods and professional practice modules. Techniques of initiative and adaptability (D4) are similarly addressed in the professional practice and management modules. Numeracy (D5) is specifically addressed in a range of basic and additional maths modules; Literacy (D6) is encouraged with the incorporation of reading lists into every module outline form; and IT use (D7) is taught in the vast majority of modules which rely upon digital equipment, software packages and student-written programs.
Students learn about these key skills in a number of ways: they are practised in specific modules as detailed on the 'key skills' matrix published in the student handbook, and we would particularly highlight the role of communication, problem solving, teamwork and IT skills which the students are exposed to. Good study habits are engendered from the beginning of Stage 1, as induction week programmes (including a compulsory management skills residential weekend taken during Week 1 of Stage 1) address all these elements.

**Assessment Strategy**

Key skills are assessed through the summative marking of a range of pieces of work, including fieldcourse reports, oral presentations, major research project submission, abstracting exercises, library and information search coursework, presentations on professional issues. The 'key skills' matrix published in the student handbook indicates the modules where these skills are explicitly assessed, but it should be noted that all coursework submission, and a significant amount of formal examination assessment, will take competence in key skills into account.

**12 Programme Curriculum, Structure and Features**

**Basic structure of the programme**

This is a three year full-time modular programme consisting of 120 credits per year for three years. Using university conventions, 10 credits are equivalent to 100 hours of study time (all contact hours plus private study). Students are expected to take 60 credits in each semester (half teaching year), although imbalances are permitted. Modules offered by the School can be worth 10, 20 or 30 credits, although it is possible for students on this degree programme to take some modules from outside the School: these may have credit weights which vary from this.

The compulsory and optional modules at Stage 1 give a firm foundation across the subject matter of geomatics: the content of the study programme is shared overwhelmingly with the degree course in Geographic Information Science (F862). Students receive a full appreciation of the broad nature of the discipline and receive supporting material in areas of mathematics, computing science, with some possibilities of taking modules in geography instead. A full understanding of the integration of mathematics and computing science with the tasks of precise spatial data recording and presentation, map and image handling and accurate measurement is achieved. Practical work, seminars, a residential management skills course (immediately after Induction Week), an Easter vacation residential fieldcourse, and the introduction of IT into most modules give students an in-depth appreciation of the nature of the subject and the methods by which it is taught. The professional awareness event held during October helps Stage 1 students (and re-iterates for Stages 2 and 3 students) to understand the nature of the discipline in practice.

Progress from Stage 1 to Stage 2 is dependent on passing all modules: modules can be re-sat and can be passed by compensation up to a maximum of 40 credits (although 'core' modules cannot be compensated). University regulations govern issues such as number of attempts at re-sit assessment and the time period within which degree courses can be taken. It is possible, although not encouraged, for students to 'carry' failed modules (maximum of 20 credits) from Stage 1 to Stage 2.

Stages 2 and 3 offer a range of compulsory and some optional modules which allow for specialisation in the areas of measurement and spatial data handling. There are opportunities to follow modules which deal with other aspects of geomatics in an integrated manner: modules in areas such as mapping, GIS, image handling and computer programming can be taken thus ensuring a wide view of the whole discipline. Through optional module choice, students have an opportunity to expand their knowledge of non-geomatics subjects.

Many Stage 3 modules have Stage 2 pre-requisites, but it is possible to take some optional modules from the Stage 2 programme during Stage 3. Both Stages are equally weighted in the determination of the final degree classification. Progress from Stage 2 to Stage 3 requires all modules taken in the second year to be passed. However, at the end of Stage 2 re-sits for failed modules are possible and further failure of any module can be 'compensated' up to a maximum of 30 credits. As with progression from Stage 1 to Stage 2, it is possible for students to 'carry' failed modules (maximum of 20 credits) from Stage 2 to Stage 3.

Stage 3 also includes a substantial 30 credit compulsory research project, to which students have been introduced through the compulsory research methods module in Stage 2. The project requires advanced knowledge and understanding and promotes the acquisition, use and assessment of many cognitive and key skills. In addition, further residential field trips are organised, for Stage 2 students during the Easter vacation, and for Stage 3 students during and immediately after Induction Week.

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

Particular features of the degree programme include:

- Choice of some modules at Stage 1 (dependent on mathematics ability)
- Almost completely common Stage 1 programme with the degree course in Geographic Information Science (allowing for transfer to this degree course at the end of Stage 1)
- A balance of vocational, scientific and professional education and training
- Significant fieldwork opportunities
- Considerable exposure to advanced contemporary digital technology
- An in-depth research training and the opportunity to undertake an individual research project
- An appreciation, within a research-active university School, of the nature and impact of research activity in geomatics
- A full range of professional and management modules
- The fostering of an *esprit de corps* through team-building exercises, group work in practicals, the small and friendly nature of the geomatics part of the School and the existence of social (student CEG Society) and formal (Staff Student Committee) avenues of interaction; in addition to the operation of a 'buddy' system for incoming students
- The opportunity, through visiting speakers and strong links with the surveying and mapping industry, to gain an understanding of the nature, scope and impact of contemporary British and international commerce and enterprise within the discipline.

**Programme regulations (link to on-line version)**

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

## 13 Criteria for admission

Students are admitted through the UCAS scheme on an individual basis but typical entrance requirements are listed below. The intention is to admit students who are highly likely to achieve an Honours degree.

*Entry qualifications*
All candidates should have at least GCSE Grade B in Mathematics if not offered to a higher level.

In addition, various combinations of higher level qualifications are appropriate:

- A level, Advanced Vocational Certificate of Education, AS level

AAB/BBB from 18 units with at least 12 units from 6- or 12- unit qualifications.

- Scottish Qualifications

AAABB/AABB at Higher grade. Mathematics required to Higher grade. Combinations of Higher and Advanced Highers accepted.

- Other Qualifications

BTEC National Diploma in any subject with 3 Level III passes at DDD/DMM grades including Mathematics at Level III at Distinction Grade.

Access qualifications – a module in Mathematical Studies or Quantitative Methods is essential (at Credit Level for courses which are graded); modules in geographical, computer science and engineering subjects desirable (at Credit Level for courses which are graded). At least 45 level 3 credits at a minimum of Merit are required.

- International Qualifications

These are accepted subject to a minimum science requirement with each candidate considered on their merits, e.g.
International Baccalaureate, 35 points with Mathematics at grade 5.

*Admissions policy/selection tools*
The programme is designed for students with an interest in the measurement and use of spatial data and/or an interest in the science, engineering and technology of earth data collection and management. Students should therefore be committed to the application of rigorous scientific procedures in handling precise and accurate data; they should exhibit the flexibility of thought to apply their knowledge to a range of tasks; they should be aware of the integrated nature of contemporary science, engineering and technology. As students from a wide range of backgrounds are capable of meeting these requirements, admissions criteria are very broad. There are minimum science-based entry requirements, but we equally weight experience, interest and potential, as indicated on both the Personal Statement and the Referee's Report on the UCAS form.

*Non-standard Entry Requirements*
For mature students, it is expected that some indication of success at recent further education level is evident, along with some relevant experience in a field of science, engineering or technology.

*Level of English Language capability*
It is expected that non-native English speaking applicants will have achieved a level of 6.5 in IELTS assessments (or equivalent).

Almost all applicants will be offered a place on the basis of their UCAS application form alone (the exceptions are some mature students with non-conventional qualifications or background). All are invited to an Open Day at which they receive a full programme of informative talks and tours, an informal personal interview and the chance to meet current students.

## 14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: *http://www.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 Development Centre (further information is available from the Robinson Library).

*Academic and Pastoral support*
Each undergraduate and taught postgraduate student will be assigned a personal tutor.*
A personal tutor is one part of a wider network of advice and guidance available to students to support their personal and general academic development. The module leader acts as the first point of contact for subject-specific academic advice. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Student-Staff Committee, and/or at the Board of Studies. Within the academic unit, students may also receive additional academic and pastoral advice from a range of other student-facing staff including degree programme directors, dissertation/project supervisors, and administrative support staff.
*Arrangements may vary for students taking special types of provision.

The University also offers a wide range of institutional services and support upon which students can call, such as the Writing Development Centre, Careers Service and Student Wellbeing Service. This includes 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 Student Union 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 team 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. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Student-Staff Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Learning, Teaching and Student Experience Committee.

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

*External Examiner reports*
External Examiner reports are considered by the Board of Studies. The Board responds to these reports through Faculty Learning, Teaching and Student Experience Committee. External Examiner reports are shared with institutional student representatives, through the Student-Staff Committee.

Student evaluations
All modules and stages* are subject to review by student questionnaires. Informal student evaluation is also obtained at the Student-Staff Committee, and the Board of Studies. The National Student Survey is sent out every year to final-year undergraduate students, and consists of a set of questions seeking students' views on the quality of the learning and teaching. 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.
*With the exception of intercalating years and the final stages of undergraduate programmes.

*Mechanisms for gaining student feedback*
Feedback is channelled via the Student-Staff Committee and the Board of Studies.

*Faculty and University Review Mechanisms*
Every six years degree programmes in each subject area undergo periodic review. This involves both the detailed consideration of a range of documentation, and a review visit by a review team (normally one day in duration) which includes an external subject specialist and a student representative. Following the review a report is produced, which forms the basis for a decision by University Learning, Teaching and Student Experience Committee on whether the programmes reviewed should be re-approved for a further six year period.

*Accreditation reports*
Accreditation is important for this degree programme and visits by the accrediting institutions are regular (annually). In addition, annual returns are made to one of the accrediting bodies (RICS) in respect of entry qualifications, student body composition and final employment destinations, for each year's cohort. Further, an external examiner is appointed by RICS, who has an active and equal role to the academic external examiner in the assessment process.

The aim of all evaluation and accreditation is to continually ensure that the programme achieves its stated aims, meets the national Benchmarking Statement for the discipline and produces graduates in line with developments in the subject and the changing needs of employers.

## 16 Regulation of assessment

*Pass mark*
The pass mark is 40 (Undergraduate programmes)

*Course requirements*
Progression is subject to the University's Undergraduate Progress Regulations and Undergraduate Examination Conventions. In summary, students must pass, or be deemed to have passed, 120 credits at each Stage. Limited compensation up to 40 credits and down to a mark of 35 is possible at each Stage and there are resit opportunities, with certain restrictions.

*Weighting of stages*
The marks from Stages 2 and 3 will contribute to the final classification of the degree.
The percentages of marks contributing to the degree for Stages 2 and 3 is 50:50.

*Common Marking Scheme*
The University employs a common marking scheme, which is specified in the Undergraduate Examination Conventions, namely

| | **Modules used for degree classification (DC)** | **Modules not used for degree classification** |
|---|---|---|
| <40 | Fail | Failing |
| 40-49 | Third Class | Basic |
| 50-59 | Second Class, Second Division | Good |
| 60-69 | Second Class, First Division | Very Good |
| 70+ | First Class | Excellent |

*Role of the External Examiner*
An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching, Learning and Student Experience 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

As indicated above, a second external examiner is also appointed to represent the interests of one of the accrediting bodies: they have similar duties.

| In addition, information relating to the programme is provided in: |
| --- |
| The University Prospectus: http://www.ncl.ac.uk/undergraduate/<br><br>The School Brochure: http://www.ncl.ac.uk/marketing/services/print/publications/ordering/)<br><br>Degree Programme and University Regulations: http://www.ncl.ac.uk/regulations/docs/<br><br>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**

**Bold modules, compulsory;** light modules, optional

| **A Knowledge and understanding** | **Modules within which Knowledge and understanding are taught, practised and/or assessed** |
|---|---|
| **A1 Fundamentals of measurement and spatial data collection** | **CEG1701, CEG1703, CEG1705, CEG1706**<br>**CEG2701, CEG2703, CEG2708, CEG2709, CEG2710**<br>**CEG3706, CEG3707, CEG3709, CEG3710** |
| **A2 An appreciation of the concepts of accuracy and precision in spatial data handling** | **CEG1701, CEG1702, CEG1703, CEG1705, CEG1706**<br>**CEG2701, CEG2703**, **CEG2704, CEG2708, CEG2709, CEG2710, CEG2721**<br>**CEG3703,** CEG3715**, CEG3706, CEG3707, CEG3709, CEG3710** |
| **A3 Knowledge of the application of spatial data in navigation, precise measurement and deformation monitoring** | **CEG1701, CEG1702, CEG1703, CEG1705, CEG1706**<br>**CEG2701, CEG2703, CEG2704, CEG2708, CEG2709, CEG2710, CEG2720, LAW2053**<br>**CEG3703,** CEG3715, **CEG3706**, **CEG3707**, **CEG3710** |
| **A4 The role of geomatics in the broad fields of engineering, applied science and technology** | **CEG1702, CEG1703, CEG1705, CEG1706**<br>**CEG2701, CEG2703, CEG2704, CEG2722, CEG2708, CEG2709, CEG2710, CEG2711, CEG2720, CEG2721**<br>**CEG3703,** CEG3715, **CEG3706**, **CEG3707, CEG3709** |
| **A5 An understanding of the impact of information technology on geomatics** | **CEG1702, CEG1703**<br>**CEG2704, CEG2721, CEG2722**<br>**CEG3703,** CEG3715**, CEG3705** |
| **A6 A good grounding in the basic sciences of mathematics, geophysics and physics** | **CEG1707**<br>**CEG2703, CEG2705, CEG2722, CEG2708** |
| **A7 Management and business practices within geomatics** | **CEG2720, CEG2721, LAW2053**<br>**CEG3703** |
| **A8 Professional and ethical responsibilities** | **CEG1711**<br>**CEG2720**<br>**CEG3703, CEG3799** |
| **A9 The academic requirements of the partner professional institutions (The Royal Institution of Chartered Surveyors and the Chartered Institution of Civil Engineering Surveyors)** | These areas of knowledge and understanding encompass the vast majority of the syllabus and are therefore introduced, practised and assessed in all the modules within the degree programmes: they are therefore not detailed here. |

| B Intellectual skills | Modules within which Intellectual skills are taught, practised and/or assessed |
|---|---|
| **B1 Data analysis**<br>• mathematical analysis<br>• image processing and interpretation | **CEG1701, CEG1702, CEG1703, CEG1705, CEG1706, CEG1707**<br>**CEG2701, CEG2703, CEG2705, CEG2708, CEG2709, CEG2710**, **, CEG2720**<br>**CEG3706, CEG3707,** CEG3708**, CEG3710** |
| **B2 Synthesis**<br>• appropriate data modelling<br>• appropriate data integration | **CEG1701, CEG1702, CEG1703, CEG1705, CEG1706**<br>**CEG2703**, **CEG2704, CEG2708, CEG2709, CEG2710, CEG2711, CEG2720, CEG2721**<br>CEG3715**, CEG3706, CEG3707, CEG3709, CEG3799** |
| **B3 Critical analysis**<br>• appraisal of data<br>• development of argument | **CEG1701, CEG1702, CEG1703, CEG1705, CEG1706, CEG1707, CEG1711**<br>**CEG2701, CEG2703, CEG2704, CEG2708, CEG2709, CEG2710**, **, CEG2720, LAW2053**<br>**CEG3703,** CEG3715**, CEG3707, CEG3710, CEG3799** |
| **B4 Research skills and independent student learning** | **CEG1711**<br>**CEG2720**<br>CEG3715**, CEG3799** |
| **B5 Problem Solving** | **CEG1701, CEG1702, CEG1703, CEG1705, CEG1706, CEG1707**<br>**CEG2704, CEG2705**, **CEG2722, CEG2720, LAW2053**<br>**CEG3707, CEG3709, CEG3799** |

| C Practical skills | Modules within which Practical skills are taught, practised and/or assessed |
|---|---|
| **C1 Field skills**<br>• planning<br>• observation<br>• recording and processing<br>• application of scientific principles in the field | **CEG1701, CEG1703**<br>**CEG2701, CEG2710**<br>**CEG3702, CEG3709, CEG3710** |
| **C2 Programming skills**<br>• office based problem solving using IT | **CEG1713**<br>**CEG2722**<br>CEG3715 |
| **C3 Experimental design**<br>• hypothesis testing<br>• use of equipment, hardware and software<br>• assessment of results | **CEG1701, CEG1702, CEG1703, CEG1705, CEG1707, CEG1713**<br>**CEG2701, CEG2703, CEG2704, CEG2705, CEG2722, CEG2708, CEG2709, CEG2710, CEG2720**<br>CEG3715, **CEG3706, CEG3707,** CEG3708, **CEG3709, CEG3710, CEG3799** |
| **C4 Project management for geomatics** | **CEG2713, CEG2721**<br>**CEG3703, CEG3799,** |

| D Transferable/Key skills | Modules within which Transferable/Key skills are taught, practised and/or assessed |
|---|---|
| **D1 Communication**<br>• written (w)<br>• oral (o)<br>• interpersonal | **(w)CEG1701, (w)CEG1702, (w)CEG1703, (w)CEG1705, (w)CEG1706, (w)CEG1711**<br>**(w)CEG2701, (w)CEG2703**, **(w)CEG2704, (w)CEG2722, (w)CEG2708, (w)CEG2709, (w)CEG2710, (w)CEG2720**<br>**(w)CEG3703,** (w)CEG3715, **(w)CEG3707, (w)CEG3709, (w)CEG3799**<br><br>**(o)CEG1701, (o)CEG1702, (o)CEG1703, (o)CEG1705, (o)CEG1706, (o)CEG1711**<br>**(o)CEG2701, (o)CEG2704, (o)CEG2709, (o)CEG2720, (o)LAW2053**<br>**(o)CEG3703,** (o)CEG3715, **(o)CEG3706, (o)CEG3707, (o)CEG3799**<br><br>**Interpersonal** communication skills are introduced, practised and assessed in the vast majority of modules within the degree programmes. |
| **D2 Teamwork**<br>• coordination<br>• resolving conflicts<br>• leadership | **CEG1701, CEG1702, CEG1703**<br>**CEG2701, CEG2704, CEG2710, CEG2711**<br>**CEG3702, CEG3703,** CEG3715, **CEG3707** |
| **D3 Planning and Organising**<br>• setting objectives<br>• allocating resources<br>• time management | **CEG1701, CEG1703, CEG1711**<br>**CEG2701, CEG2703, CEG2704, CEG2720**<br>**CEG3703,** CEG3715**, CEG3710**, **CEG3799** |
| **D4 Initiative and adaptability**<br>• responding to change<br>• working independently | **CEG1701, CEG1705, CEG1711**<br>**CEG2720**<br>**CEG3703, CEG3710, CEG3799** |
| **D5 Numeracy**<br>• understanding numbers and mathematics<br>• using numbers and mathematics correctly | These skills are introduced, practised and assessed in the vast majority of modules within the degree programmes, and are therefore not detailed here. |
| **D6 Literacy**<br>• reading critically and with purpose | These skills are introduced, practised and assessed in the vast majority of modules within the degree programmes, and are therefore not detailed here. |
| **D7 IT**<br>• effective use of a wide range of computing technology | These skills are introduced, practised and assessed in the vast majority of modules within the degree programmes, and are therefore not detailed here. |