PROGRAMME SPECIFICATION (Taught Postgraduate)	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MRes/PG Cert
4	**Programme Title**	Geospatial Data Science
5	**Programme Code**	MRes 4881F PG Cert 3178F
6	**Programme Accreditation**	N/A
7	**QAA Subject Benchmark(s)**	Engineering
8	**FHEQ Level**	Level 7
9	**Last updated**	May 2023

10 Programme Aims

1. To develop the interdisciplinary skills essential for trained experts in geospatial data science required in academia and industry.
2. To provide the key high-level expertise in spatial data acquisition, management, analysis, simulation and visualisation required to tackle challenging geospatial data science problems.
3. To provide training on the essential computer science and statistical methods relevant to large complex geospatial applications.
4. To develop the skills required to pursue a PhD in the area of interdisciplinary geospatial systems research.
5. To develop the critical skills required in the assessment, utility and use of geospatial data.
6. To develop the multidisciplinary and group working collaboration skills of students across the geospatial data science and computing interface.
7. To further research within geospatial data science via students undertaking a substantial research project leading to a subsequent related PhD in Geospatial Systems.

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 Data Science.

Knowledge and Understanding

On completing the programme students should be able to demonstrate:

A1. An understanding of the key approaches to geospatial data capture, management, analysis, simulation and visualisation.
A2. An understanding of the computing methods appropriate for geospatial data handling and analysis.
A3. Knowledge of how to apply advanced computing methods to ‘system’ scale geospatial applications.
A4. Understanding of the theory and principles employed in integrated whole ’systems’ approach to geospatial data science across multiple application domains.

A5. Practical knowledge and understanding of the statistical and software development tools appropriate for the analysis, modelling and visualisation of geospatial data.
A6. Advanced knowledge and understanding of a specialist application of geospatial data science (MRes only).

Teaching and Learning Methods

Fundamental and specialist knowledge and understanding (A1-A6) is delivered through direct student contact (lectures and tutorials), supplemented by computer-based practical sessions (A4-A5 in particular). Student understanding and learning is enhanced by module problem solving, group work and assessed projects. Independent learning is encouraged via reading lists, within module formative material reviews, seminars, and 'homework' problems; with online resources available in relation to these. Significant time in each module is available for private study to further encourage independent learning. The research thesis (MRes only) allows students to develop a deep understanding of a specialist area of geospatial data science.

Assessment Strategy

A summative assessments are used to assess knowledge and understanding, and to evaluate student problem solving, practical skills and group work. Formative assessment is included to provide student feedback throughout the course, without contributing to module marks. Formal feedback is provided for each piece of assessed coursework in the form of an individual proforma and a review session in subsequent lectures (A1-A6).

Intellectual Skills

On completing the programme students should be able to:

B1. Apply their knowledge of geospatial data capture, management, analysis and simulation to interdisciplinary applied problems.
B2. Have expertise in the advanced software packages employed in geospatial data analysis and simulation.
B3. Design, develop and apply new software for the analysis and modelling of geospatial data.
B4. Apply best principles of responsible research and innovation such as data ethics, IPR, privacy and socially inclusive principles to the use of geospatial data.
B5. Propose and undertake an extended research project involving a literature review, problem specifications, design, implementation, analysis and synthesise key findings.

Teaching and Learning Methods

Intellectual skills developed through a combination of lectures, practicals, case studies, a group project, and an in-depth individual research project (MRes only). Modules are predominately delivered in a 'blocked' manner with subsequent directed self-learning via additional online content including laboratory practicals, problem-based learning. The use of blocked modules allows: (i) rapid skills development and deep learning due to increased student participation and interest; (ii) learning is concentrated, allowing the student to focus in depth on one subject at a time; and (iii) modules may potentially be made available as short courses aimed at continuing professional development (for industry or academia);. Practical sessions and problem-solving exercises are used to develop software, programming and problem solving skills. Small group work and tutorials are used to develop knowledge and understanding on specific key topics and develop critical analysis of software packages, analytical methods and to develop an understanding of subject-specific research literature.

Assessment Strategy

Intellectual skills are assessed by written examinations and continuously-assessed material that includes written reports, practical write-ups, literature reviews, group projects, oral presentations, a poster presentation and a research thesis. The assessment methods aim

to evaluate the students' understanding and ability to apply the computational and statistical techniques that form the basis for the interdisciplinary science of Geospatial Data Science.

Practical Skills

On completing the programme students should be able to:
C1 Apply state of the art geospatial software to applied interdisciplinary problems.
C2 Implement appropriate computing solutions for the analysis of geospatial data.
C3 Critically evaluate research and literature relating to geospatial data and its application.
C4 Employ appropriate approaches to responsible research and innovation in the use of geospatial data and analytics.
C5. Comprehensively plan and manage an original piece of research on a selected topic.

Teaching and Learning Methods

Lectures, seminars and computer-based practicals will be employed to provide students with the key software and computing practical skills required for geospatial research. Critical evaluation of current research will be developed through literature searching, coursework exercises and in the research project. The dedicated module on Understanding Geospatial Data: Social, Legal and Ethical Perspectives will provide students with key skills on responsible research practice which will be applied within the group project and research project.

Assessment Strategy

Practical skills are assessed in the form of individual reports from practical classes, literature reviews, seminar contribution, tutorial exercises and the group project reports.

Transferable/Key Skills

On completing the programme students should be able to:
D1 Verbally communicate geospatial data science concepts and methods. .
D2 Communicate effectively via written work.
D3 Work effectively within a group based environment.
D4 Effectively employ computational methods for geospatial data analysis.

Teaching and Learning Methods

Verbal presentation skills are developed by group discussions in tutorial sessions, by communication during group exercises, and by the preparation of oral presentations on specific research topics and for seminar exercises. Written communication skills are developed during independent study, the preparation of coursework, web page design, poster presentation and through the completion of the group project and the project thesis (MRes only). Lectures and practicals cover the use of online resources and research techniques. The group project module and seminar group work develop group/team working skills. Module practicals and practical exercises develop generic transferable computing skills.

Assessment Strategy

Written communication skills are assessed by report preparation, the research thesis and literature reviews. Oral communication skills are assessed in oral presentations and seminar discussion contributions. Computer-based literacy is assessed through the preparation of literature reviews and through peer-and self-assessment. Group work is formally evaluated using group-based problem solving, particularly in the group project module. Independent work is assessed in literature reviews and research projects.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

This one-year programme forms the training component for the 4-year EPSRC Centre for Doctoral Training in Geospatial Systems. Students will be recruited from the engineering, computing, mathematical and statistical sciences, geographical/environmental sciences.

The taught component will provide training on the key concepts and application of geospatial data management, analysis, simulation and visualisation, along with key computing skills that is transforming the applied use of geospatial data.

Semester 1:
Students will initially study a blocked module delivered by the CDT partners at the University of Nottingham. Thereafter students will take modules in blocked form, with exception of the 10 credit project module.

Semester 2:
Students will study blocked modules which includes a 5-day residential workshop in Nottingham. MRes students will also chose their research project in semester 2 and start initial project work in weeks 35-37 (depending on Easter).

Semester 3:
Students will continue working on their MRes project in semester 3. Students who have not performed sufficiently well to progress so the MRes project will be awarded a PG Certificate provided appropriate performance on taught modules has been achieved.

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

This programme forms the initial training component of the four year PhD in the EPSRC CDT in Geospatial Systems. The training is distinctive in that it combines the core knowledge, understanding and skill required in geospatial data science on spatial data capture, management, analysis, simulation and visualisation, with the new computing methods that are transforming the applied use of geospatial data in academia and industry. The programme provides students with detailed practical skills in the application of the approaches covered in the taught modules. The group project allow students to bring this learning together in an integrated group project while the individual research project allows students to start to focus on the research area relating to their PhD research starting in year 2. The programme is distinctive in that it will be accessible to engineers, computing scientists and also students with a background in the geographical and environmental sciences; providing training to an interdisciplinary cohort. The programme is predominately delivered by co-investigators and theme leads within the CDT.

Programme regulations (link to on-line version)

13 Support for Student Learning

Generic information regarding University provision is available at the following link.
Generic Information

14 Methods for evaluating and improving the quality and standards of teaching and learning

Generic information regarding University provision is available at the following link.
Generic Information

Accreditation reports

Additional mechanisms

15 Regulation of assessment
Generic information regarding University provision is available at the following link. Generic Information

In addition, information relating to the programme is provided in:

The University Prospectus: https://www.ncl.ac.uk/postgraduate/

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

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.