PROGRAMME SPECIFICATION

Name, title and level of final qualification(s)	**MSc Geographic Data Science** **PG Dip Geographic Data Science** **PG Cert Geographic Data Science** **PG Cert Geographic Data Science (Intensive)** (Level 7)
Name and title of any exit qualification(s)	PG Dip Geographic Data Science PG Cert Geographic Data Science
Awarding Body	University of London
Teaching Institution(s)	Birkbeck, University of London
Home school/other teaching departments	School of Social Sciences
Location of delivery	Central London
Language of delivery and assessment	English
Mode of study, length of study and normal start month	Full-time (1 years) Part-time (2 years) PG Cert (1 year-2 terms) Intensive PG Cert (3 months – 1 term) September
Professional, statutory or regulatory body	N/A
QAA subject benchmark group(s) Higher Education Credit Framework for England	N/A
Birkbeck Course Code	TMSGDATS_C TPDGDATS_C TPCGDATS_C TPCGDATI_C
HECoS Code	100409
Start date of programme	October 2007
Date of programme approval	Summer 2007
Date of last programme amendment approval	November 2022
Valid for academic entry year	2023-24, (also applies to continuing students).
Programme Director	Shino Shiode
Date of last revision to document	11 July 2022

Admissions requirements

A second-class honours degree (2:2) or above in geography, computer science or a cognate discipline.

Some experience with Data Science or a Geographic Information System is desirable.

Applications are reviewed on their individual merits and your professional qualifications and/or relevant work experience will be taken into consideration positively. We actively support and encourage applications from mature learners.

Course aims

The programme is motivated by Birkbeck's mission to provide opportunities for students from a wide range of cultural backgrounds to undertake study that enhances their personal skills and employability. During the course of the programmes, students will gain a conceptual understanding and practical skills of Geographic Data Science (GDS), which are increasingly recognised as desirable skills by the prospective employers across a range of sectors. Geographic Data Science is a Data Science with focus on handling and interpreting geospatial data, and it plays an increasingly crucial role in our society, contributing to solve real-world problems across sectors as diverse as transportation, insurance, banking, telecommunications, logistics, energy, retail, agriculture, healthcare, urban planning as well as the wider STEM research.

The programme also benefits from the following elements:

- Rapid expansion of the range and the volume of big data, which are intrinsically spatial in nature and require a rigorous analytical framework, and motivate the need for the conceptual understanding of and practical skills for Geographic Information Systems (GIS).
- A growing market for a course in Geographic Data Science tailored for students with limited experience in data analysis and use of GIS who wish to start building knowledge and skills in the theoretical and the practical aspects of GDS/GIS. It would enable them to enter a new job market, build up their career, and pursue further study in Geography or Computer Science or any other related fields.
- The fast-changing educational and training needs for professionals in the dynamically evolving geo-information and data science sectors.

The programme comprises three 30-credit compulsory modules, one 30-credit option module (or two 15-credit option modules) and one 60-credit dissertation module. They collectively offer a balanced combination of theoretical topics and practical hands-on exercises in which students apply the theoretical concepts to formulate, propose and submit their dissertation research. In order to address the diversity of the cognisant subject fields that are interlinked with the field of GDS, the programme has the flexibility of selecting option module(s) as part of their curriculum.

The curriculum for this programme is also designed to accommodate (1) face-to-face tutorage and support in class, and (2) a series of hands-on practical exercises that are designed to follow each lecture so that the students can develop a wholistic understanding of the theoretical knowledge and practical skills in GDS from an introductory level.

The predecessor of this programme had a curriculum that was delivered under the name of MSc/PGDip/PGCert Geographic Information Science. It was structured around GIS&T Body of Knowledge--a report published by the Association of American Geographers in 2006 and produced by scholars from some 80 institutions within UCGIS (University Consortium for Geographic Information Science). The document is widely accepted as a valuable resource for planning the courses and curricula for academic and professional programmes within the

domain of Geographic Information Science and Technology. The current Geographic Data Science programmes inherit the ethos of the previous GIS curriculum as their base framework, but with the addition of various new methods for data analytics (including the latest computational approaches and methods for handling big data) as well as visualisation methods (using state-of-the-art technologies) to cater for various needs required by the professionals and researchers in the domain of data science and analytics.

The definition of academic standards is guided by the qualification descriptors laid down in the Framework for Higher Education. The following factors specified by these descriptors were considered to be of particular importance for this programme:

- a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights;
- a comprehensive understanding of techniques applicable to a practical project;
- a practical understanding of how established techniques and enquiry are used to create and interpret knowledge; and
- conceptual understanding that enables the students to evaluate critically current problems and the methodologies for geospatial data analysis.

Course structure

Level	Module Code	Module Title	Credit	Comp Core/ Option	Likely teaching term(s)
MSc Geographic Data Science, Full-time - 1 year					
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory	T1
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory	T1
7	SSGE114S7	Spatial Data Analytics	30	Compulsory	T2
7		Option(s) – see below.	1 x 30 or 2 x15	Option	T1, 2 or 3
7	GGPH017D7	GDS Dissertation	60	Core	
MSc Geographic Data Science, Part-time – 2 years					
Year 1					
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory	T1
7	SSGE114S7	Spatial Data Analytics	30	Compulsory	T2
Year 2					
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory	T1
7		Option(s) – see below.	1 x 30 or 2 x15	Option	T1, 2 or 3
7	GGPH017D7	GDS Dissertation	60	Core	

PG Dip Geographic Data Science, Full-time – 1 year					
Year 1					
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory	T1
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory	T1
7	SSGE114S7	Spatial Data Analytics	30	Compulsory	T2
7		Option(s) – see below.	1 x 30 or 2 x15	Option	T1, 2 or 3
PG Dip Geographic Data Science, Part-time – 2 years					
Year 1					
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory	T1
7	SSGE114S7	Spatial Data Analytics	30	Compulsory	T2
Year 2					
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory	T1
7		Option(s) – see below	1 x 30 or 2 x 15	Option	T1, 2 or 3
PG Cert Geographic Data Science, Part-time – 2 terms, Autumn and Spring					
Year 1					
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory	T1
7	SSGE114S7	Spatial Data Analytics	30	Compulsory	T2
PG Cert Geographic Data Science Part-time (Intensive), 1 term, Autumn					
Year 1					
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory	T1
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory	T1
Indicative options for MSc and PG Dip:					
7	SSGE116S7	Earth Observation and Environmental Dynamics	30	Option	T2
7	SSGE117S7	Social and Urban Applications Using Geospatial Technologies	30	Option	T2
Students may also take an alternative 30 credit module offered within the Geography department or 2 x 15 credit modules from the MSc Data Science in the Computer Science department subject to approval of the course director					

Core: *Module must be taken and passed by student*
Compulsory: *Module must be taken but can be considered for compensated credit (see CAS regulations paragraph 24)*
Option: *Student can choose to take this module*

How you will learn

The programme comprises four 30-credit taught modules (three of which are compulsory and the other one is an option module, although the option can be also acquired through two 15-credit modules) and one 60-credit research module. The taught modules consist of a combination of theoretical topics complemented by practical hands-on exercises in which student apply the theoretical concepts, typically in the context of real-world issues.

The three compulsory modules are designed to offer collectively a broad education and training in GDS at the postgraduate level.

1. The “Introduction to Geographic Data Science” module covers a range of fundamental topics and training in GDS/GISc at the introductory level, including the digital spatial-data formats and cartographic concepts.
2. The “Programming for Geospatial Science and Visualisation” module offers the opportunity to learn basic programming skills, using contemporary tools, to create automated reproducible workflows of geospatial data. The module also extends the cartographic and programming skills acquired through the first module to explore more advanced cartographic representations and develop web applications using different media and formats.
3. The first half of the “Spatial Data Analytics” module focuses on introducing quantitative methods and techniques for analysing spatial data, while the second half of the module delves into more advanced spatial and spatial-temporal analysis and modelling techniques that cater for specific applications.

In addition to the above three compulsory modules, students are allowed to select one 30-credit module (or two 15-credit modules) as an option module. The recommended choice of an option module is either “Earth Observation and Environmental Dynamics” or “Social and Environmental Applications Using Geospatial Technologies.” Alternatively, students can instead take another module within the Geography Department (or take two 15-credit modules from MSc Data Science, Computer Science), subject to case-by-case approval.

The programme provides an exit point, in the form of the Post-graduate Certificate in Geographic Data Science, for those who have completed two modules (60 credits in total) and do not wish to proceed to a more advanced training. The programme provides another exit point in the form of the Post-graduate Diploma in Geographic Data Science, for those who have completed all the taught modules (120 credits in total) and have gained advanced knowledge in GDS but do not wish to continue on to the dissertation project.

The final module is the MSc Dissertation, which consists of an independent research phase in which students produce their MSc dissertation. It is designed for the students to introduce and integrate all knowledge and skills they will have acquired through the eight taught modules. The successful completion of that module will lead to the award of the final degree, the Master of Science in Geographic Data Science.

Most scheduled teaching sessions are either lectures or practical computing sessions held in a computer lab room to make use of GDS/GIS software and other relevant software. For each session, materials are uploaded in advance and are designed to serve as the basis for the lectures on each module.

The computer-based practical sessions allow students to gain practical experience for themselves in the handling, analysis and modelling of data. They are therefore designed to be completed through a self-paced learning process. Students work individually using detailed guidance notes and discuss their results and any difficulties amongst themselves, while the members of staff will provide tutorial assistance.

Other teaching and learning methods include:

- Self-paced practical exercises with step-by-step instructions and datasets delivered through the online learning environment;
- Individual project work aimed at extending practical skills gained from practical exercises;
- Undertaking of independent research for the development and completion of an MSc dissertation; and
- Access to the Birkbeck Electronic Library which provides a range of relevant resource materials in a format that is accessible online. Students are strongly encouraged to utilise this facility.

The learning methods outlined above promote balanced learning through individual study and peer/tutor interaction. It ensures the development of practical skills in GDS/GIS application supported by the foundation in the necessary theoretical and the conceptual understanding. The self-paced nature of the materials allows students to adopt a flexible approach to their learning whilst ensuring that students develop the ability to manage their work schedules and meet deadlines.

How we will assess you

The following methods of assessment are used in this programme:

1. Theoretical and practical assessed coursework

Each of the taught modules is assessed through one or two essay(s) with an element of the practical GIS analysis. Each essay is designed to enable the students to assimilate the materials and to promote a deeper and more comprehensive understanding of and engagement with the taught materials of the respective module.

The coursework elements collectively ensure that students get practice throughout the year and are given feedback independently without the time pressure of examinations.

The type of questions and problems set within the assignments are designed to cover both theory and practice, address the individual learning outcomes, and discriminate between different levels of achievement. However, the assessment strategy recognises that students may exhibit a varying degree of aptitudes and abilities in different aspects of the course and may also perform better through different forms of assessment. This is particularly relevant to Birkbeck students who vary considerably in terms of their academic background, prior work experience, current career path and future career plans. The assessment strategy is therefore designed to:

- ensure a good coverage of the curriculum and address the range of learning outcomes;
- perform an on-going formative function via the theoretical and practical assignments associated with all course modules; and
- give all students the opportunity to demonstrate their strengths and show what they can do well.

2. A dissertation

The dissertation module is assessed by:

a) Research proposal and literature review

This component of the dissertation module consists of two tasks. In the first part, students will develop their own research proposal for their MSc thesis. The core learning objective of this is to identify the relevant research topic and to acquire the practical and written skills in

constructing and presenting an independent research project. It is expected to help the students develop, sustain or initiate their dissertation research and to think strategically about their timetable until the completion of their dissertation in the coming months; whilst also allowing the GDS Team to identify an appropriate advisor who can guide and support them through this work. In the second part of the dissertation module, they will prepare and submit a piece of literature review for their dissertation. It aims to help them clarify the significance of their research and facilitate their discussion with their supervisor to refine their research direction. Both tasks are subject to formative assessment.

b) MSc dissertation

In their dissertation project, students are required to undertake an independent research project. Assessment criteria reflect professional requirements with respect to the methodological and practical knowledge of GDS as well as sound understanding of the background to the problem, clear identification of the question(s) to be investigated or the problem(s) to be solved, selection of suitable data and analysis techniques, their successful execution, and the ability to draw conclusions that are consistent with the analysis and to communicate the results in writing as well as through visual outputs (maps and figures) in a way that is accessible by the general, non-expert audience. Coursework and dissertation are all double marked. Students are provided with written feedback on all submitted coursework elements, usually within four weeks of submission. All marks are moderated by the External Examiner, who is also asked to comment on the suitability of the assessment methods, criteria and procedures.

The assessment methods are reviewed annually by all contributing staff to ensure that our assessment methods appropriately tests key skills and accurately reflects the abilities and academic capacity of students with diverse educational backgrounds and life experiences. They are also discussed with the External Examiner annually through relevant board meetings with a scope for further discussion facilitated by the External Examiners' written comments.

Learning outcomes (what you can expect to achieve)

'Learning outcomes' indicate what you should be able to know or do at the end of your course. Providing them helps you to understand what your teachers will expect and also the learning requirements upon which you will be assessed.

On successful completion of this programme, a student will be expected to be able to:

Subject Specific

- gain practical experience of using at least two major GIS and Remote Sensing software packages as well as other data analysis and visualisation software packages;
- understand the computer programming principles used to extend GIS operation to undertake software customisation, development and analysis;
- relate theory surrounding digital representation of spatial phenomena to practical analysis of spatial data; and
- relate theory surrounding spatial analysis methodologies to applied spatial analysis tasks.

Intellectual

- conceptualise theoretical concepts for the representation of spatial data;
- justify appropriate spatial analysis methodologies to solve geospatial problems;
- critically evaluate the outcome from geospatial data analysis; and
- apply theoretical understanding of spatial data models to a selection of relevant data and methods for solving spatial problems.

Practical

- import, integrate, manipulate, analyse and report spatial data using contemporary specialised packages;
- undertake handling, visualising and analysing spatial data using a contemporary programming languages;
- report and discuss methods, analysis techniques and results from the projects; and
- work successfully with diverse data formats and standards.

Personal and Social

- undertake individual project work;
- undertake active participation in discussions with tutors and peers;
- plan effectively and organize work schedules;
- complete work in accordance to deadlines; and
- communicate and collaborate successfully with student body.

Careers and further study

Given the strong demand for data scientists, careers for Geographic Data Science (GDS) graduates are diverse and wide ranging. Sectors in which GDS specialists/analysts are in demand include: consultancy, local authorities, environment, urban planning, retail, defence, security, utility, space. This tendency is also confirmed by the UK government guidelines which recognise the importance of and the high demand in geospatial skills:

Finally, for students who wish to take on further study, the Geography department offer an MPhil/PhD course:

Birkbeck offers a range of careers support to its students. You can find out more on the careers pages of our website.

Academic regulations and course management

Birkbeck's academic regulations are contained in its Common Award Scheme Regulations and Policies published by year of application on the Birkbeck website.

You will have access to a course handbook on Moodle and this will outline how your course is managed, including who to contact if you have any questions about your module or course.

Support for your study

Your learning at Birkbeck is supported by your teaching team and other resources and people in the College there to help you with your study. Birkbeck uses a virtual learning environment called Moodle and each course has a dedicated Moodle page and there are further Moodle sites for each of your modules. This will include your course handbook.

Birkbeck will introduce you to the Library and IT support, how to access materials online, including using Moodle, and provide you with an orientation which includes an online Moodle module to guide you through all of the support available. You will also be allocated a personal tutor and provided with information about learning support offered within your School and by the College.

Please check our website for more information about student support services. This covers the whole of your time as a student with us including learning support and support for your wellbeing.

Quality and standards at Birkbeck

Birkbeck's courses are subject to our quality assurance procedures. This means that new courses must follow our design principles and meet the requirements of our academic regulations. Each new course or module is subject to a course approval process where the proposal is scrutinised by subject specialists, quality professionals and external representatives to ensure that it will offer an excellent student experience and meet the expectation of regulatory and other professional bodies.

You will be invited to participate in an online survey for each module you take. We take these surveys seriously and they are considered by the course team to develop both modules and the overall courses. Please take the time to complete any surveys you are sent as a student.

We conduct an annual process of reviewing our portfolio of courses which analyses student achievement, equality data and includes an action plan for each department to identify ongoing enhancements to our education, including changes made as a result of student feedback.

Our periodic review process is a regular check (usually every four years) on the courses by department with a specialist team including students.

Each course will have an external examiner associated with it who produces an annual report and any recommendations. Students can read the most recent external examiner reports on the course Moodle pages. Our courses are all subject to Birkbeck Baseline Standards for our Moodle module information. This supports the accessibility of our education including expectations of what information is provided online for students.

The information in this programme specification has been approved by the College's Academic Board and every effort has been made to ensure the accuracy of the information it contains.

Programme specifications are reviewed periodically. If any changes are made to courses, including core and/or compulsory modules, the relevant department is required to provide a revised programme specification. Students will be notified of any changes via Moodle.

Further information about specifications and an archive of programme specifications for the College's courses is available online.