Year of entry: 2022/23

Programme Specification

1	**Awarding body**	University of London					
2	**Teaching Institution**	**Birkbeck College**					
3	**Programme Title(s)**	**MSc Geographic Data Science** **PG Dip Geographic Data Science** **PG Cert Geographic Data Science** **PG Cert Geographic Data Science (Intensive)**					
4	**Programme Code(s)**	TMSGDATS_C (MSc) TPDGDATS_C (PG Dip) TPCGDATS_C (PG Cert) TPCGDATI_C (PG Cert intensive version)					
5	**UCAS code (if applicable)**	N/A					
6	**Home Department**	Geography					
7	**Exit Award(s)**	PG Dip Geographic Data Science PG Cert Geographic Data Science					
8	**Duration of Study** (number of years)	1 year (FT) or 2 years (PT)					
9	**Mode of Study**	FT	**X**	PT	**X**	DL	
10	**Level of Award (FHEQ)**	7					
11	**Other teaching depts or institution**	N/A					
12	**Professional, Statutory Regulatory Body(PSRB) details**	N/A					
13	***QAA Benchmark Statement***	N/A					

14	**Programme Rationale & 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. Within the programmes, students will gain practical skills and a conceptual understanding of Geographic Data Science (GDS), which are increasingly recognised as desirable skills by the prospective employers. Geographic Data Science—a Data Science with a focus on handling and interpreting geospatial data—plays an increasingly crucial role in our society, transforming sectors as diverse as transportation, insurance, banking, telecommunications, logistics, energy, retail, agriculture, healthcare, urban planning as well as the wider STEM research. The programme is also motivated by the following factors: • The rapid expansion of the range and the volume of big data, which are intrinsically spatial in nature and requires rigorous analytical framework, motivates the need for the conceptual understanding of and practical skills for Geographic Information Systems (GIS). • The understanding that there is 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 practical aspects of GDS/GIS. This would enable them to enter a new job market, build up their career, or 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 developing 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 that consist of 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 programmes are given the flexibility of selecting option module(s) as part of their curriculum. The curriculum for this course 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 start developing their theoretical knowledge and practical skills in GDS from an introductory level. The curriculum of the predecessor of this programme was offered under the name of MSc/PGDip/PGCert Geographic Information Science and 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 this curriculum as their base framework, but with the addition of various new methods for data analysis (including the latest computational approaches and methods for handling big data) as well as visualisation methods (using state-of-the-art technologies) to the curriculum to cater for various needs required of the professionals and researchers of data analysis. The definition of academic standards is guided by 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.

15	**Entry Criteria**
	The minimum entrance requirement is a second-class honours degree or better in geography, computer science or cognate discipline (or their international equivalents). Some experience with Data Science and/or GIS is desirable.However, the admissions tutor has discretion to consider applicants with (1) a degree of a lower standard than a second class honours degree (or equivalent) or (2) relevant professional experience instead of a degree, but the tutor must be satisfied that these applicants are as well prepared to enter the programme as those candidates who meet the normal entrance requirement. This is determined after a formal application has been submitted.

16	**Learning Outcomes**
	On successful completion of this programme, a student will be expected to be able to: **Subject Specific:** On successful completion of the course the student, will have demonstrated an ability to: • 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:** On successful completion of the qualification the student will have demonstrated an ability to: • 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:** On successful completion of the qualification the student will have demonstrated an ability to: • 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:** On successful completion of the qualification, the student will have demonstrated an ability to: • 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.

17	**Learning, teaching and assessment methods**
	Learning and Teaching Methods: 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 aim to serve as the basis for the lectures on each module.

Computer practical sessions allow students to gain practical experience for themselves in the handing, analysis and modelling of data. They are therefore part of a self-paced learning process. Students work individually using detailed guidance notes and discuss their results and any difficulties amongst themselves and with the members of staff present to provide tutorial assistance.

Other teaching and learning methods include:

- Self-paced practical exercises with step through 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.

Assessment Methods:
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.

18	**Programme Description**
	The programme comprises four 30-credit taught modules (three of which are compulsory and the other one is an option module) and one research module. The taught modules consist of a combination of theoretical topics supplemented by practical hands-on exercises in which student apply the theoretical concepts. 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.

(4) 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 module is: "Earth Observation and Environmental Dynamics" (30 credits), as it best complements the first three compulsory modules and completes the circle of a comprehensive GDS learning. Another module that is similarly relevant to GDS is a newly proposed method "Social and Environmental Applications Using Geospatial Technologies". Alternatively, students can take another module within Geography Department instead (or take two 15-credit modules from MSc Data Science, Computer Science) on a case-by-case approval basis.

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.

(5) 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.

19 **Programme Structure**

Full Time MSc programme – 1 year

Year 1

Level	Module Code	Module Title	Credits	Status
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory
7	SSGE114S7	Spatial Data Analytics	30	Compulsory
7		The suggested modules are: SSGE116S7 "Earth Observation and Environmental Dynamics" (30 credits) **or** SSGE117S7 "Social and Environmental Applications Using Geospatial Technologies" (30 credits) although students can take another module within Geography Department instead (or take two 15-credit modules from MSc Data Science, Computer Science) on a case-by-case approval basis.	30	Option
7	GGPH017D7	GISc Dissertation	60	Compulsory

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Part Time MSc programme – 2 years				
Year 1				
Level	**Module Code**	**Module Title**	**Credits**	**Status**
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory
7	SSGE114S7	Spatial Data Analytics	30	Compulsory
Year 2				
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory
7		The suggested modules are: SSGE116S7 "Earth Observation and Environmental Dynamics" (30 credits) or SSGE117S7 "Social and Environmental Applications Using Geospatial Technologies" (30 credits) although students can take another module within Geography Department instead (or take two 15-credit modules from MSc Data Science, Computer Science) on a case-by-case approval basis.	30	Option
7	GGPH017D7	GISc Dissertation	60	Compulsory

Full Time PG Dip programme – 1 year				
Year 1				
Level	**Module Code**	**Module Title**	**Credits**	**Status**
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory
7	SSGE114S7	Spatial Data Analytics	30	Compulsory
7		The suggested modules are: SSGE116S7 "Earth Observation and Environmental Dynamics" (30 credits) **or** SSGE117S7 "Social and Environmental Applications Using Geospatial Technologies" (30 credits) although students can take another module within Geography Department instead (or take two 15-credit modules from MSc Data Science, Computer Science) on a case-by-case approval basis.	30	Option

Part Time PG Dip programme – 2 years				
Year 1				
Level	**Module Code**	**Module Title**	**Credits**	**Status**
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory
7	SSGE114S7	Spatial Data Analytics	30	Compulsory

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Year 2				
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory
7		The suggested modules are: SSGE116S7 "Earth Observation and Environmental Dynamics" (30 credits) or SSGE117S7 "Social and Environmental Applications Using Geospatial Technologies" (30 credits) although students can take another module within Geography Department instead (or take two 15-credit modules from MSc Data Science, Computer Science) on a case-by-case approval basis.	30	Option
Part Time PG Cert programme (2 terms, Autumn and Spring)				
Year 1				
Level	**Module Code**	**Module Title**	**Credits**	**Status**
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory
7	SSGE114S7	Spatial Data Analytics	30	Compulsory
Part Time PG Cert intensive programme (1 term - Autumn)				
Year 1				
Level	**Module Code**	**Module Title**	**Credits**	**Status**
7	SSGE113S7	Introduction to Geographic Data Science	30	Compulsory
7	SSGE115S7	Programming for Geospatial Science and Visualisation	30	Compulsory

Status*

CORE – Module must be taken and passed by student; COMPULSORY – Module must be taken, mark can be reviewed at sub-exam board; OPTIONAL – Student can choose to take this module

20	**Programme Director**	Dr Shino Shiode
21	**Start Date** ***(term/year)***	October 2007
22	**Date approved by TQEC**	Spring 2007
23	**Date approved by Academic Board**	Summer 2007
24	**Date(s) updated/amended**	January 2021