REGULATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN GEOSPATIAL DATA SCIENCE (MSc(GeoDS)) (subject to approval)

(See also General Regulations and Regulations for Taught Postgraduate Curricula)

These regulations apply to candidates admitted to the Master of Science in Geospatial Data Science in the academic year 2026-27 and thereafter.

Any publication based on work approved for a higher degree should contain a reference to the effect that the work was submitted to the University of Hong Kong for the award of the degree.

Admission requirements

MSGDS 1. To be eligible for admission to the courses leading to the degree of Master of Science in Geospatial Data Science, candidates

(a) shall comply with the General Regulations and the Regulations for Taught Postgraduate Curricula;

(b) shall hold a Bachelor's degree of this University or a qualification of equivalent standard from this University or another university or comparable institution accepted for this purpose; A first degree in Geography, Remote Sensing, Geographic Information Sciences, Environmental Science, Urban Planning, and Data Science is preferred; but the subject of the first degree is not a requirement as the motivation and ability of the applicants will also be taken into account;

(c) for a candidate who is seeking admission on the basis of a qualification from a university or comparable institution outside Hong Kong of which the language of teaching and/or examination is not English, shall satisfy the University English language requirement applicable to higher degrees as prescribed under General Regulation G2(b); and

(d) shall satisfy the examiners in a qualifying examination if required.

MSGDS 2. An application for exemption from the above requirements shall be considered on a case by case basis.

Qualifying examination

MSGDS 3.

(a) A qualifying examination may be set to test candidates' formal academic ability or the candidates' ability to follow the courses of study prescribed. It shall consist of one or more written papers or their equivalent and may include a project report.

(b) Candidates who are required to satisfy the examiners in a qualifying examination shall not be permitted to register until they have satisfied the examiners in the examination.

Award of degree

MSGDS 4. To be eligible for the award of the degree of Master of Science in Geospatial Data Science, candidates

(a) shall comply with the General Regulations and the Regulations for Taught Postgraduate Curricula; and

(b) shall complete the curriculum and satisfy the examiners in accordance with the regulations set out below.

Period of study

MSGDS 5. The curriculum shall normally extend over one academic year of full-time study or two academic years of part-time study. Candidates shall not be permitted to extend their studies beyond the maximum period of registration of two academic years of full-time study or three academic years of part-time study, unless otherwise permitted or required by the Board of the Faculty.

Completion of curriculum

MSGDS 6. To complete the curriculum, candidates (either full-time or part-time)

(a) shall satisfy the requirements prescribed in TPG 6 of the Regulations for Taught Postgraduate Curricula;

(b) shall complete a total of 60 credits of courses, comprising 30 credits of compulsory courses, 18 credits of elective courses, and 12 credits of capstone experience courses;

(c) shall follow courses of instruction and complete satisfactorily all prescribed written work; and

(d) shall satisfy the examiners in all prescribed courses and in any prescribed form of assessment (including coursework and oral examination).

Dissertation

MSGDS 7. Subject to the provisions of Regulation MSGDS 6(b),

(a) for the full-time study, the title of a capstone project or dissertation shall be submitted for approval not later than April 30 of that academic year;

(b) for the part-time study, the title of a capstone project or dissertation shall be submitted for approval not later than April 30 in the candidates' final year of study; and

(c) both full-time and part-time candidates shall submit a statement declaring that a capstone project or dissertation represents their own work undertaken after registration as candidates for the degree.

Course selection

MSGDS 8.

(a) For candidates under the one-year full-time mode of study, they are required to take at least 30 and not more than 36 credits of courses in the first semester, and the remaining 30 or 24 credits of courses in the second semester.

(b) For candidates under the two-year part-time mode of study, they are required to take at least 30 and not more than 36 credits of courses in the first year of study, and the remaining 30 or 24 credits of courses in the second year of study.

Assessment

MSGDS 9. Candidates shall be assessed for each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits.

MSGDS 10. Candidates shall not be permitted to repeat a course for which they have received a passing grade for the purpose of upgrading.

MSGDS 11. Candidates who have failed to satisfy the examiners at their first attempt in not more than two courses, not including the capstone project, in an academic year may be permitted to make up for the failed course(s) in the following manner:

(a) undergoing re-assessment/re-examination in the failed course to be held on a specified date not less than two months and not more than twelve months after publication of the results; or

(b) re-submitting failed coursework, without having to repeat the same course of instruction; or
(c) repeating the failed course by undergoing instruction and satisfying the assessments; or
(d) for elective courses, taking another course in lieu and satisfying the assessment requirements.

MSGDS 12. Candidates who have presented an unsatisfactory capstone project in an academic year may be permitted to revise and re-submit the capstone project within a specified period of not less than two months and not more than twelve months after publication of the results.

MSGDS 13. Candidates who
(a) have failed to satisfy the examiners at the first attempt in three or more courses, not including the capstone project, in an academic year; or
(b) have failed to satisfy the examiners in any course(s) or the capstone project at the second attempt; or
(c) are not permitted to present themselves for re-assessment/re-examination in any failed course(s) or to repeat the failed course(s) or take another course in lieu; or
(d) are not permitted to revise and re-submit the capstone project which they have presented and failed to satisfy the examiners; or
(e) have exceeded the maximum period of registration;
may be required to discontinue their studies.

MSGDS 14. Candidates who are unable because of their illness to be present at the written examination of any course may apply for permission to present themselves for a supplementary examination of the same course, which shall be held at a time to be determined by the Board of Examiners. Any such application shall be made on the form prescribed within seven calendar days of the first day of the candidate's absence from any examination. Candidates who fail to satisfy the examiners in the supplementary examination shall be considered as failure at the first attempt.

MSGDS 15. There shall be no appeal against the results of examinations and all other forms of assessment.

Grading system

MSGDS 16. Individual courses shall be graded according to the following grading system:

Grade	*Standard*	*Grade Point*
A+	Excellent	4.3
A		4.0
A-		3.7
B+	Good	3.3
B		3.0
B-		2.7
C+	Satisfactory	2.3
C		2.0
C-		1.7
D+	Pass	1.3
D		1.0
F	Fail	0

Classification of awards

MSGDS 17. On successful completion of the curriculum, candidates who have shown exceptional merit may be awarded a mark of distinction, and this mark shall be recorded in the candidates' degree diploma.

SYLLABUSES FOR THE DEGREE OF MASTER OF SCIENCE IN GEOSPATIAL DATA SCIENCE

CURRICULUM

The curriculum provides an opportunity to local and non-local students to obtain advanced education and training in the most up-to-date knowledge and skills of geospatial data science.

Candidates are required to complete a total of 60 credits, i.e., a total of 5 compulsory courses (6 credits each), 3 elective courses (6 credits each), and one capstone experience course, either "GEOG7306 Capstone project in geospatial data science" (12 credits) or "GEOG7315 Dissertation in geospatial data science" (12 credits).

An adequate number of elective courses will be offered to students in each academic year. Each course entails one session of two lecture hours per week over one semester.

Compulsory Courses
Candidates shall complete all of the following five courses:
GEOG7301. Introduction to geospatial data science (6 credits)
GEOG7302. Geographic information system for spatial analysis (6 credits)
GEOG7303. Spatial statistics (6 credits)
GEOG7304. Satellite data processing and information extraction (6 credits)
GEOG7305. Programming for geospatial data (6 credits)

Capstone Experience Course
Candidates shall complete one the following capstone experience courses:
GEOG7306. Capstone project in geospatial data science (12 credits)
GEOG7315. Dissertation in geospatial data science (12 credits)

Elective Courses
Candidates shall complete three of the following courses, with a maximum of one shared elective course (6 credits) from the Master of Social Sciences (MSocSc) in the field of Social Data Analytics :
GEOG7307. Big data analytics (6 credits)
GEOG7308. Machine learning for geospatial data (6 credits)
GEOG7309. Drones and data collection (6 credits)
GEOG7310. Cloud computing for geospatial data analytics (6 credits)
GEOG7311. Web GIS (6 credits)
GEOG7312. Geospatial data for climate change (6 credits)
GEOG7313. Geospatial data for sustainable development (6 credits)
GEOG7314. Land cover and land use (6 credits)

Shared elective courses from Master of Social Sciences (MSocSc) in the field of Social Data Analytics
MSDA7101. Big data solutions to social problems (6 credits)
MSDA7104. Social network analysis (6 credits)

The schedule for the teaching of courses conforms to the dates of semesters of the Faculty of Social Sciences. Courses will be examined by a combination of coursework assessment and a written examination, normally held at the end of the semester, or by coursework assessment alone.

COURSE DESCRIPTIONS

Compulsory Courses

GEOG7301. Introduction to geospatial data science (6 credits)

This course offers an introduction to the principles and techniques of geospatial data science, covering the fundamentals of Geographic Information Systems (GIS), spatial data visualization, analysis, management, remote sensing, and ethical considerations. Students will gain hands-on experience using GIS software and learn how to apply geospatial techniques to real-world problems in various domains, such as urban planning, environmental management, public health, and transportation.

Assessment: 100% coursework

GEOG7302. Geographic information system for spatial analysis (6 credits)

This course provides an in-depth exploration of Geographic Information Systems (GIS) and their application in spatial analysis. Through a combination of theoretical concepts and hands-on exercises, students will learn how to use GIS tools and techniques to analyze and visualize spatial data. The course

will cover topics such as data acquisition and management, geoprocessing, spatial analysis techniques, and cartographic visualization. By the end of the course, students will be able to apply GIS principles and techniques to address social, economic and environmental problems and make informed decisions using spatial data.

Assessment: 60% coursework, 40% examination

GEOG7303. Spatial statistics (6 credits)

This course is about quantitative analysis of spatial data. It is intended to provide a broad survey of various spatial analysis and statistic methods. The course is geared towards helping students: (1) develop an understanding of the important theoretical concepts in spatial data analysis; and (2) gain practical experience in application of spatial analysis and statistics to a variety of social and environmental problems using advanced statistical software. This course covers a wide range of topical areas including point pattern analysis, area data analysis, continuous data analysis, spatial sampling and multivariate spatial and temporal analysis.

Assessment: 100% coursework

GEOG7304. Satellite data processing and information extraction (6 credits)

This course introduces digital image processing and analysis applied to satellite and aircraft land remote sensing data. It will introduce principles of electromagnetic radiation, satellite remote sensing platforms and sensors, image statistics extraction, radiometric and geometric correction, image enhancement, and thematic classification. Students will gain hands-on experience with state-of-the-art software tools and methodologies for processing satellite imagery, extracting valuable information, and integrating these insights into decision-making processes across diverse fields, such as environmental monitoring, agriculture, urban planning, and disaster management.

Assessment: 60% coursework, 40% examination

GEOG7305. Programming for geospatial data (6 credits)

This course teaches programming and scripting for geospatial data users. Students will be introduced to how to use Python programming to manipulate, analyze, and visualize geospatial big data. Students will learn to employ various spatial statistics methods for advanced geospatial analysis and solve geospatial problems with a multi-petabyte catalog of satellite imagery and geospatial datasets.

Assessment: 60% coursework, 40% examination

Capstone Experience Courses

GEOG7306. Capstone project in geospatial data science (12 credits)

Each student must undertake a project as a demonstration of his/her competence in geospatial data science. The data and materials for this project can originate from an internship, or from relevant work experience at the student's current employer. The Department of Geography will work with each student individually to determine the best mechanism for obtaining the necessary data and experience. Under the direction of a faculty advisor, the student will prepare a project report which shall contain an explanation of the requirements for the work, a technical account of the activities undertaken, including

a literature review, a description of the methods and approaches taken, a critical discussion of the results obtained, along with conclusions and recommendations developed from the project. The final project will consist of a full geospatial data analysis report and each student will need to give a presentation of a specific topic on using geospatial data to analysis climate, environmental, economic and social issues. This will enable the student to present potential employers with a portfolio containing an example of their ability to collect and analysis geospatial data on a project and will show that they understand how to apply the geospatial data to solve real world problems.

Assessment: 100% coursework

GEOG7315. Dissertation in geospatial data science (12 credits)

Candidates must complete a year-long independent research project which addresses a topic of geospatial data science under the supervision of a dissertation supervisor. The dissertation shall be 10,000-20,000 words in length. Additionally, candidates are expected to present the dissertation findings orally in the 'dissertation seminars' series. Attendance and participation in the 'dissertation seminars' series are required. The date for submitting the dissertation would be announced at the start of the first year of study (for full-time candidates) or at the start of the final year of study (for part-time candidates).

Assessment: 100% coursework

Elective Courses

GEOG7307. Big data analytics (6 credits)

This course is designed to introduce statistical analysis over big data sets (and tackling big data problems), primarily in geography and spatial sciences, but with broader appeal throughout the socio-behavioral sciences. Students will be introduced to a range of methods that can be applied to the exploration, modeling, and visualization of big quantitative data. This course explores data fusion, statistical analysis, and data-mining for geospatial and non-geospatial data in structured and unstructured form, with an emphasis on large silos of data across diverse sources and assumptions.

Assessment: 100% coursework

GEOG7308. Machine learning for geospatial data (6 credits)

This course offers an in-depth exploration of machine learning algorithms and techniques for geospatial data analysis. Students will learn the core principles of machine learning, with an emphasis on applying these concepts to geospatial challenges such as feature extraction, data preprocessing, and model selection. The curriculum covers essential algorithms such as random forests, neural networks and transformers, alongside emerging trends in geospatial AI and cloud computing. Through hands-on labs and real-world projects, students will apply Python and key libraries (e.g., scikit-learn, Pytorch) to authentic datasets in remote sensing, environmental monitoring, and spatial modeling. By the end, students will possess the theoretical depth and practical skills to solve real-world geospatial problems and drive impactful insights.

Assessment: 70% coursework, 30% examination

GEOG7309. Drones and data collection (6 credits)

This course explores the use of drones as a powerful tool for data collection in various industries, including agriculture, environmental monitoring, and infrastructure inspection. Students will learn the fundamentals of drone technology, data acquisition methods, and data processing techniques to transform multisource data observations into valuable insights of the natural and built systems. The

course will also cover legal and ethical considerations, safety guidelines, and best practices in drone operations.

Assessment: 60% coursework, 40% examination

GEOG7310. Cloud computing for geospatial data analytics (6 credits)

This course provides an in-depth exploration of cloud computing with a focus on geospatial data analytics. Students will learn about cloud computing concepts, platforms, and services, and how they can be used to manage and analyze large geospatial datasets. Topics covered include cloud architecture, data storage and retrieval, processing and analysis, and visualization. Students will also gain hands-on experience with cloud-based tools and technologies, and develop skills for building and deploying cloud-based geospatial data applications.

Assessment: 100% coursework

GEOG7311. Web GIS (6 credits)

This course is designed to: (1) introduce the concepts and theories that are related to an increasingly important technology – Internet/Web GIS; (2) introduce various technologies or techniques for creating, analyzing, and disseminating GIS data and services via the Internet. The topics covered include the hardware/software structure of the Internet (e.g., server-client model, TCP/IP protocol), the evolution of Web GIS, and most importantly, different technology options. Students will be required to practice almost all of the Web GIS tools including Google Map API, ArcGIS Server, JavaScript API, GeoJSON, Mapbox, and Leaflet. Students will also be exposed to the experience of working with the cloud environment such as AWS EC2 and ArcGIS Online.

Assessment: 100% coursework

GEOG7312. Geospatial data for climate change (6 credits)

This course focuses on the science behind the challenges facing our planet's environment. Students will be introduced how to combine geospatial data with biology, chemistry, physics, earth science and human geography to address climate challenges such as flooding, permafrost thawing, drought and forest fires, peatland degradation, rising sea levels and coastal change, and changing economic opportunities in climate sensitive sectors. This course aims to provide students with knowledge of basic science of climate change and the potential applications of geospatial data in supporting climate change mitigation and adaptation. The role of human beings on climate change will be critically examined based on geospatial data.

Assessment: 100% coursework

GEOG7313. Geospatial data for sustainable development (6 credits)

This course is designed to introduce applications of geospatial data in local and global sustainable development. The course will focus on some specific United Nation's sustainable development goals (SDGs) that geospatial data have addressed, including SDG 1 (Zero hunger), SDG 2 (No poverty), SDG 13 (Climate action), SDG 14 (Life below water) and SDG 15 (Life on land). Popular geospatial data initiatives that greatly support sustainable development including Global Forest Watch, Global Fishing Watch, global near-real-time Carbon Monitor will also be introduced. Students will learn about how geospatial data, in particular remote sensing based Earth Observation (EO) data, can fulfill SDGs needs for SDG progress monitoring and interaction analysis.

Assessment: 100% coursework

GEOG7314. Land cover and land use (6 credits)

This course provides an in-depth understanding of Land Use and Land Cover (LULC) concepts and their applications in spatial planning, environmental impact assessment, carbon reduction, and nature conservation. Students will be introduced to advanced methods and software for LULC mapping and change detection using remote sensing data. The course covers all stages of LULC mapping, from acquiring satellite data to assessing map accuracy and designing change maps for selected areas. Upon completion of the course, students will be able to effectively use remote sensing data for land cover analysis and environmental impact assessment.

Assessment: 100% coursework

MSDA7101. Big data solutions to social problems (6 credits)

Do Google and Facebook understand us better than we do ourselves? Are we becoming lab rats every time we go online? Is the impartially designed algorithm for predicting the probability of recidivism truly fair for sentencing individuals? What are the ethical issues underpinning big data science? When big data analytics are routinely applied in our daily lives, the ability to audit the adopted algorithms becomes crucial. This course aims to build students' big data literacy through three major areas of focus: (1) Defining what big data is; (2) Providing an overview of existing big data analytical techniques; and (3) Discussing opportunities and challenges of big data analytics in tackling social problems.

The course will focus on elaborating the core principles of a variety of techniques adopted when predicting future phenomena through the lens of big data. We will use a case study approach to provide an in-depth understanding of various big data analytics, with the goal inspiring the students to think creatively and critically about how big data analytics can be used to making scientific discoveries and do social good.

Assessment: 100% coursework

MSDA7104. Social network analysis (6 credits)

The basic premise of this course is that the social world is relational. We can not ignore that we are influenced by people we know, have met and respect; ideas and allegiances are formed and maintained in social settings and organisations; not all people have equal opportunities when it comes to finding a job; we communicate over networks, be they online or offline; etc. In this course we aim to produce a detailed understanding of the web of social contacts that structure our daily life and society. We will consider the network both as an object that is interesting in its own right and as something that creates co-dependencies between social units in terms of outcomes and properties of these social units themselves.

The overarching goal of the course is to provide us with tools that bridge theories on the one hand, and what we can actually observe in observational and archival empirics on the other. Put another way, we aim to avail ourselves of approaches that permits us to test if our theoretical ideas about social interaction are supported by what people, organisations and countries actually do. The course is structured around a collection of themes based on such theoretical concepts such as cohesion, embeddedness, homophily, transitivity, the Mathew effect, structural holes, influence, selection. We will examine these both from the perspective of how they structure the network and how these network effects structure behaviour, opinions and beliefs.

For the purposes of getting some practical understanding of the approaches presented, we will also explore analytic methods using block models, stochastic actor-oriented models, exponential random graph models, network autocorrelation and network effects models. It is not expected that the students become expert users in any of these methods but to appreciate the common goal across these models, namely to model and take into account the interdependencies. Data will mostly be handled in R but orientation to other analysis packages will be given.

Assessment: 100% coursework
