Programme Specification (Postgraduate)
For students entering in 2020/21 (Ignite)
Date amended: September 2020

1. Programme title(s):

MSc/PG Dip/PG Cert[1] Satellite Data Science
MSc/PG Dip[1] Satellite Data Science with Industry

HECOS Code

101056	25%
100956	25%
100369	25%
100992	15%
100370	10%

2. Awarding body or institution

University of Leicester

3. a) Mode of study:

Full Time/Part time[2]

For with Industry: The taught modules would all be taken in the first two semesters. This is followed by the industrial placement, which is between 3 and 12 months long. This is followed by the in-house project, taking 10 weeks.

b) Type of study:

Campus-based (ignite blended learning)

For with industry: The taught modules and project are campus based. The industrial placement is off campus, on the site of the Placement Provider.

4. Registration periods:

The normal period of registration for the MSc in Satellite Data Science is 12 months (full time) and 24 months (part time)

The maximum period of registration for the MSc in Satellite Data Science is 24 months (full time) and 48 months (part time)

Note: Normal and maximum periods of registration for the 'with industry' variant accommodate an extra period of registration corresponding to the placement duration, such that normal period is between 18-24 months (dependent on length of placement obtained) and the maximum period is 36 months.

5. Typical entry requirements:

Students are required to have a first, upper second or lower second class honours degree (or equivalent) in any subject and/or ii) several years appropriate professional experience. However, students with nonstandard qualifications are expressly encouraged to apply and will be considered

[1] Diploma and certificate are exit awards only
[2] Part time study is not available for the 'with industry' optional route.

on a case by case basis. In particular we give due consideration to prior professional experience gained by mature students in relevant areas of work. In such cases applicants would be expected to provide detailed information on work experience to enable its full evaluation by admissions staff. We also consider alternative qualifications, for example in different subject areas, where these are supported by relevant experience within the field of the MSc programme. Students for whom English is not their first language are required to achieve a minimum IELTS score of 6.5 with at least 6 in all four categories.

6. Accreditation of Prior Learning:

No accredited prior learning would be accepted for exemption from modules on the programme.

7. Programme aims:

The programme aims to provide students with training in data science techniques with an emphasis placed on application to satellite observations of the Earth's surface and atmosphere. Students will learn a range of skills suitable for a range of Earth observation & data science careers in industry or further academic research. Specifically, the objectives of this course are:

- To develop analytical skills to use and process big datasets from satellites and other sensors.
- To learn computer programming languages (Python and R).
- To effectively utilise and modify open-access big data processing environments such as python and R.
- To ensure students are familiar with the extensive application of Earth observations to multiple sectors throughout the world.
- To ensure students can evaluate/critique both the potential and the limitations of current software, and information quality.
- To allow students to use data from space-based sensors to understand and tackle pressing global environmental challenges related to the biosphere and atmosphere.
- To build a high level of competence in independent learning skills; original research methodology; original research implementation;oral presentations; report writing; web-based and multimedia communication.

For the with industry variant only, these additional programme aims apply:

- Prepare students for career and training opportunities which relates to their degree – in both the private and public sectors, and voluntary organisations.
- Construct effective applications for placement opportunities.
- Provide students the opportunity to recognise suitable plans for transitioning into the workplace.

8. Reference points used to inform the programme specification:

- University of Leicester Learning and Teaching Strategy 2017-2021[3]
- University of Leicester Periodic Developmental Review Report
- QAA Characteristics Statement: Master's Degree September 2020
- External Examiners' reports (annual)
- Survey of competitor programmes

9. Programme Outcomes:

Unless otherwise stated, programme outcomes apply to all awards specified in 1. Programme title(s).

[3] https://www2.le.ac.uk/offices/sas2/quality/learnteach#discovery-led-and-discovery-enabling-learning-strategy

NOTE: In the table below, some portion of teaching and learning methods mode of delivery will be online/distance based.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(a) Discipline specific knowledge and competencies		
Knowledge		
Articulate core knowledge and principles of Earth observations to illustrate application of these data to complex processes in the Earth system	Lectures, seminars, targeted reading and literature review, journal discussions, computer practicals, self-directed research projects	Essays, project reports, practical exercises, oral and/or poster seminar presentations, dissertation
Concepts		
Ability to describe and evaluate fundamental knowledge of Earth observations; computer programming; quantitative/statistical analysis techniques and tools .	Lectures, seminars, targeted reading and literature review, journal discussions, computer practicals, self-directed research projects	Essays, project reports, practical exercises, oral presentations, dissertation
Techniques		
Demonstrate a comprehensive understanding and practical application of the fundamental knowledge of Earth observations, through the use of computer programming, and quantitative/statistical techniques and tools.	Lectures, seminars, targeted reading and literature review, journal discussions, computer practicals, self-directed research projects	Practical exercises, project reports, essays,, oral and/or poster seminar presentations, dissertation
Critical analysis		
Critical appraisal of published material. Ability to apply understanding of concepts with independence, rigour and self-reflexivity	Lectures, seminars, targeted reading, practical classes, self-directed project work, self-directed research work.	Essays, project reports, oral presentations, dissertation.
Presentation		
Presentation of: project results to professional standard; thematic data analyses and maps to a professional standard. Ability to organise and structure research material; ability to deliver written and oral seminar reports and summaries	Self-directed project work, self-directed research work.	Essays, project reports, oral presentations, dissertation.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Appraisal of evidence		
Ability to analyse and evaluate a variety of complex problems related to Earth observations. Ability to assess the relevance and quality of a substantial range of primary and secondary literatures and materials. Ability to mount and sustain an independent level of inquiry at an advanced level. Ability to identify, assemble, analyse and manage complex datasets; ability to analyse and assess a body of thematic data using appropriate techniques and data models	Targeted reading, practical classes, self-directed project work, self-directed research work	Project reports, oral presentations oral presentations, dissertation.
(b) Transferable skills		
Research skills		
Ability to: independently analyse complex ideas and construct sophisticated critical arguments; plan and manage projects that use Earth observation data; locate, organise and analyse evidence; report on findings; demonstrate programming and data analytical skill; effectively visualise data.	Core lectures, practicals and seminars, problem- oriented practical exercises, project work	Project reports, practical exercises, oral seminar presentations, exams, dissertation
Communication skills		
Ability to: deliver oral presentations; respond to questions; write clearly and concisely; make effective use of graphical summaries; communicate results from data analysis in an accessible way.	Seminars, problem-solving exercises, classroom discussions, meetings with supervisors	Oral seminar presentations, essays, seminar reports, project reports, exams, dissertation
Data presentation		
Ability to: present project results clearly and effectively; use appropriate IT and computational resources; to undertake basic statistical summaries and analysis; employ appropriate and effective graphical representations of Earth observation data	Targeted seminar and practical sessions, essay, seminar, dissertation and practical report feedback	Seminar reports, group-project reports, dissertation

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Information technology		
The whole course is centered around data, data analysis, and computer programming Confident and informed use of personal computer hardware and associated software including programming Ability to: collect and process satellite data from a variety of sources	Computer-based practical classes; project/dissertation work using computers/computer software Computer-based practical classes; project/dissertation work using computers/computer software	Project reports, practical exercises, oral presentations dissertation Project reports, practical exercises, oral presentations dissertation
Problem solving		
Solving spatial problems, writing data processing code, hypothesis testing	Research methods module; practical classes, project work, independent research project	Project reports, practical exercises, exams, dissertation
Working relationships		
Project management; organisational skills; time management; ability to contribute and comment on ideas; working in groups	Problem-oriented practical exercises, seminars, dissertation proposal meeting, coordinator-student meetings	Oral seminar presentations, seminar reports, group-project reports, meeting coursework deadlines
Managing learning		
Identifying a credible research project; establishing an effective research timetable; managing information; reflecting on and writing up results. Developing specialised analytical skills.	Dissertation module; seminars, practical classes, project work	Project reports, practical exercises, oral seminar presentations, exams, dissertation
Career management		
The ability to see how skills learnt in a university can be used in 'real world' settings; appreciation of the knowledge and skills required by the Satellite Data Science specialist in an industrial setting	Induction week session with Career Development Services, personal tutor sessions, work placement (where 'with industry' programme)	Discussions with personal tutors and concerning career progression and the applications of GIS.

PG Diploma and PG Certificate		
Intended Learning Outcomes for these exit awards remain similar to the full MSc programme. However, it is recognised that for: 1) PG Diploma – outcomes that are predominately demonstrated by the dissertation will not be as effectively met. 2) PG Certificate – given a student can exit from the programme having successfully passed a range of modules, it is clear that not all of the learning outcomes will be achieved with this award.	Teaching and Learning methods for these exit awards remain similar to the full MSc programme. However, it is recognised that for: 1) PG Diploma – there will be no teaching and learning associated with the dissertation 2) PG Certificate – the teaching and learning methods will be dependent on the set of modules successfully completed	Demonstration of Intended Learning Outcomes for these exit awards remains similar to the full MSc programme. However, it is recognised that for: 1) PG Diploma – the dissertation will not be used as a method to evidence any of the learning outcomes 2) PG Certificate – the demonstration of learning outcomes will be dependent on the set of modules successfully completed
Placement Preparation 1 and 2		
1. Select appropriate resources for researching/securing placement opportunities 2. Explain the process for applying for and securing a relevant placement 3. Construct effective applications for placement opportunities 4. Recognise suitable plans for transitioning into a placement	Students are provided with dedicated and timetabled sessions to prepare to search and secure an industrial placement. Problem solving classes, Masterclasses, Career development programmes, Independent research.	Formative module feedback through session tasks and exercises

On Placement		
1. Apply the theoretical and practical aspects of the material studied at the University and demonstrate the personal and professional skills necessary for your role within the organisation. 2. Compose a Professional Development Plan considering your strengths, development areas and motivations for your next step 3. Modify your CV to include the skills and experience you have gained through your significant experience gained in the past 12 months.	Students undertake a minimum of 3 months experience in the workplace. Project supervision, independent research	Completion of Monthly Reflective Journals to record skills development, major achievements, key areas of work, learning points and challenges overcome. Assessed by a Placement Portfolio, comprising of a Reflective Summary, Professional Development Plan, and Updated CV (excluded from word count) to formally assess on a pass or fail basis. Formative feedback during a Placement Visit (in person or via Skype) from Placement Provider and Placement Tutor regarding reflection on skills development, areas of strength and weakness and contribution to the workplace.

10. Special features

After completing the eight taught modules and exams in the first year of the course, students on the industry variant will carry out between 3 and 12 months employment in an industrial placement. Students will be encouraged to undertake the maximum period of employment possible, to gain the full benefit of experience in industry.

On the return from an industrial placement, the Placement Student will carry out an in-house project in the School or Department, as per the normal non-Industry MSc. The project will be supervised and assessed within the Department. The project title will be decided, in conjunction with the Placement Student, while they are on placement.

During the industrial placement, appropriate support will be provided by the School or Department as defined in the Code of Practice.

Placement Students will be expected to complete a Monthly Reflective Journal to record their training. This will support the Placement Student to complete the Placement Portfolio which is assessed on a pass/fail basis, and will have no credit weighting in the MSc

Placement Students who do not pass the assessment or meet the minimum duration of an industrial placement will receive the standard MSc degree.

11. Indicators of programme quality

For the with industry option:

It is the student's responsibility to secure an industrial placement. Students are invited to attended Placement Preparation modules, additional support workshops and 1-2-1 appointments with the Career Development Service. Employer led activities provide a platform for students to engage with organisations who are recruiting students for year in industry roles.

The 'with Industry' MSc relies on the Placement Provider to provide work suitable for an MSc student. To ensure the role is relevant, the School or Department assesses the industrial placement

through the University's Placement Approval Process. The Placement Provider will be asked to provider:

- An indication of the area of the organisation where the Placement Student will work.
- An indication of the area of expertise that the Placement Student should have or will gain.
- Whether the work is suitable only for a UK national, for and EU national or for an overseas student.
- The resources available to the Placement Student. For example, design software, textbooks, laboratory equipment, product specimens, access to facilities in the organisation.
- Identification of a suitable industrial mentor (i.e. a graduate with knowledge of the area and at least a couple of years of experience in the field).

When a Placement Student starts an industrial placement, they will be required to complete health and safety documents and confirm they have completed a formal induction process no later than the 2nd week of placement. A Placement Student on an industrial placement will also gain from being able to:

1. Apply the theoretical and practical aspects of the material studied at the University and demonstrate the personal and professional skills necessary for your role within the organisation.
2. Compose a Professional Development Plan considering your strengths, development areas and motivations for your next step
3. Modify your CV to include the skills and experience you have gained through your significant experience gained in the past 12 months

Placement Students will be provided with a Study Guide for their industrial placement and support them to complete the assessment. The School or Department will undertake a placement start check, regular communications, visits to the workplace (physical and/or virtual) and evaluation. Communication and contact between the Placement Student, Placement Provider and University provides support should issues arise.

12. Scheme of Assessment:

As defined in Senate Regulation 6: Regulations governing taught postgraduate programmes of study.

13. Progression points

As defined in Senate Regulation 6: Regulations governing taught postgraduate programmes of study with the additional requirement that students must pass the dissertation proposal module. A candidate who does not pass the dissertation proposal module (PASS = 50%) at the second attempt will not be able to progress to the dissertation component of the Degree and therefore can only, at best, graduate with a PG Diploma.

For the 'with industry' option students are subject to the following progression rules (in addition to any rules applicable to their core programme):

A Placement Student will revert back to the degree without Year in Industry if:

1. They fail to secure an industrial placement role.
2. They fail to pass the assessment related to the industrial placement.
3. The industrial placement ends early due to the behaviour of the Placement Student not being in accordance with the University's Regulations for Students, Student Responsibilities. The Placement Student will need to return to the University and carry out an in-house project in the School or Department, as per the normal non-Industry MSc. To prevent such an incident from happening, processes are in place to identify any possible issues or concerns

early in the industrial placement role. This includes a start check, regular communications, visits to the workplace (physical and/or virtual) and evaluation. Communication and contact between the Placement Student, Placement Provider and University provides support should issues arise.

4. They discontinue their industrial placement and carry out an in-house project in the School or Department, as per the normal non-Industry MSc.

In the event that a Placement Student is moved to the standard campus-based MSc, the Placement Provider will be notified immediately. For overseas students, the UKBA will also be informed immediately. Placement Provider's will be made that any contract of employment shall be made subject to satisfactory completion of the taught part of the MSc.

Three months is the minimum time required for an industrial placement to be formally recognised. If the industrial placement is terminated earlier than 3 months as a result of event outside of the Placement Students control (for example redundancy, or company liquidation), the following process will be adopted:

1. If the Placement Student has completed less than 2 months, they will be supported to search for another placement to take them up to the required minimum of 3 months for the industrial placement to be formally recognised. If the Placement Student does not find a placement to meet this criteria they will be required to suspend and transferred onto the degree without industry.
2. If the Placement Student has completed 2 months, they will be supported to search for another placement to take them up to the 3 months required for the industrial placement to be formally recognised. If the Placement Student cannot source an additional placement to take them to 3 months, assessments related to the industrial placement will be set for the student to make it possible for the individual learning objectives for the industrial placement to be met. This will allow with industry to be recognised in the degree certificate.
3. The duration of time between the two Placement Providers to meet the minimum 3 months of an industrial placement must not exceed the period of time required to comply with visa requirements.
4. A Placement Student is permitted to undertake an industrial placement which runs across two academic years.

14. Rules relating to re-sits or re-submissions:

As defined in Senate Regulation 6: Regulations governing taught postgraduate programmes of study students can resit up to 50% of the credits. The mark obtained for resubmitted work or a re-sit is capped at 50%.

15. **Additional features** (e.g. timetable for admissions)

Admissions are in October only.

Appendix 1: Programme structure (programme regulations)

MSc in Satellite Data Science

SEMESTER 1

Core Modules			**Credits**
GY7701	FUNDAMENTALS OF GIS		15
GY7702	R FOR DATA SCIENCE		15
GY7705	REMOTE SENSING		15
PA7201	EARTH OBSERVATIONS OF THE ATMOSMPHERE		15
		Semester Total	**60**

SEMESTER 2

Core Modules		**Credits**
GY7709	SATELLITE DATA ANALYSIS IN PYTHON	15
CO7093	BIG DATA AND PREDICTIVE ANALYSIS	15
GY7707	GEOSPATIAL DATA ANALYSIS	15
GY7708	GEOSPATIAL DATABASES AND INFORMATION RETRIEVAL	15
	Semester Total	**60**

SUMMER

Core Modules		**Credits**
GY7720	MSc DISSERTATION	60
	Total Credits	**180**

MSc in Satellite Data Science (Part Time) – Indicative Structure

	SEMESTER 1 YEAR 1		
Core Modules			**Credits**
GY7705	REMOTE SENSING		15
PA7201	EARTH OBSERVATIONS OF THE ATMOSPHERE		15
		Semester Total	**30**
	SEMESTER 2 YEAR 1		
Core Modules			**Credits**
GY7709	SATELLITE DATA ANALYSIS IN PYTHON		15
CO7093	BIG DATA AND PREDICTIVE ANALYSIS		15
		Semester Total	**30**
	SEMESTER 1 YEAR 2		
Core Modules			**Credits**
GY7701	FUNDAMENTALS OF GIS		15
GY7702	R FOR DATA SCIENCE		15
		Semester Total	**30**
	SEMESTER 1 YEAR 2		
			Credits
GY7707	GEOSPATIAL DATA ANALYSIS		15
GY7708	GEOSPATIAL DATABASES AND INFORMATION RETRIEVAL		15
		Semester Total	**30**
	SUMMER YEAR 2		
Core Modules			**Credits**
GY7720	DISSERTATION		60
		Semester Total	**60**

MSc in in Satellite Data Science with Industry

Programme structure is the same as for the non-industry degree (above), with the addition of

YEAR 1

SEMESTER 1

Core Modules		**Credits**
ADGY7221	PLACEMENT PREPARATION 1	0

SEMESTER 2

Core Modules		**Credits**
ADGY7222	PLACEMENT PREPARATION 2	0

ON PLACEMENT

Core Modules		**Credits**
ADGY7223	ON PLACEMENT	0

Appendix 2: Module specifications

See module specification database http://www.le.ac.uk/sas/courses/documentation