Programme Specification ARO 034a

This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if they take full advantage of the learning opportunities provided.

This document is published on the University website and will be a publicly available record of the named programme.

The information contained in this form should be included in the Programme Handbook, either as presented below or in a format determined by the Faculty.

Section 1 Key Facts

<table>
<thead>
<tr>
<th>Awarding Body</th>
<th>University of Stirling</th>
</tr>
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<tbody>
<tr>
<td>Partner Institution</td>
<td>NA</td>
</tr>
<tr>
<td>Programme Name</td>
<td>Earth and planetary Observation</td>
</tr>
<tr>
<td>Award</td>
<td>MSc</td>
</tr>
<tr>
<td>Faculty</td>
<td>Natural Sciences</td>
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<tr>
<td>Division (if applicable)</td>
<td>Biological and Environmental Sciences</td>
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<tr>
<td>UCAS Code (UG only)</td>
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<td>Programme Code</td>
<td>TBC</td>
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<tr>
<td>Mode of Study</td>
<td>Full Time ☑ Part Time ☑</td>
</tr>
<tr>
<td>Location/Method of Study</td>
<td>On Campus – UK ☑ International ☐ Where: Online ☐ Blended ☐</td>
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<td>Admission Points</td>
<td>September ☑ January ☐ Other (if more than one entry point please provide a Degree Programme Table for each in the Outline Programme Structure)</td>
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<td>Length of Programme</td>
<td>1 year</td>
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<td>SCQF Level</td>
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<td>Total Credit Value</td>
<td>180</td>
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<td>ECTS Credit Value</td>
<td>90</td>
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<tr>
<td>Relevant QAA Subject Benchmark</td>
<td>Earth sciences, environmental sciences and environmental studies (UG, 2014); Physics, Astronomy and Astrophysics (UG, 2016); no relevant Masters level statement</td>
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<tr>
<td>Name of accrediting body:</td>
<td>Required for programme: No (delete as appropriate)</td>
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Section 2 Overview

PROGRAMME SUMMARY

A comprehensive summary of the programme. Our course provides a thorough scientific grounding in remote sensing and professional training in geospatial technology and programming with a unique focus on environmental applications and space exploration. The first semester of the program is devoted to develop core theoretical, field and data analytics skills alongside learning about environmental processes. In the second semester, the focus turns to the acquisition of advanced skills in optical and passive remote sensing through a wide range of applications, and include topics such as aquatic and terrestrial systems, cometary and planetary near-surface processes, icebergs, ecology, marine safety, food security, human health, climate change and much more. You will also have a specialist module on GIS for learning geo-informatics skills required in the sector. This course will allow you to work with unique specialists within the University of Stirling and to work on your research project. You will also have the option to pursue an industry-linked dissertations via the Making the Most of Masters programme. The Space sector is growing fast, driven by rising demands of Earth observation and space exploration and the need for evidence-based solutions. The rapidly increasing rate of data collection from Earth and space missions suitable for quantifying physical and biogeochemical processes on Earth and other planetary bodies (e.g. ESA Sentinel and Rosetta, NASA Mars Exploration Rovers and Landsat and Aqua missions) offers unique information about a wide range of different environments. In parallel, advances in sensors and platforms (e.g. unmanned vehicles, CubeSats) support new and more detailed characterisation of surfaces and processes. Collectively, these are revealing a new era for science applications and industry opportunities.

Key Features of the Programme (including what makes it distinctive)

This is the only MSc in the UK to combine Earth and space observation responding to the growing investment in the downstream Space sector and the increasing need by industry for trained individuals to exploit Remote Sensing tools. It is highly relevant to recruitment needs of employers and offers a range of career opportunities in the downstream Space sector with unique focus to environmental, heritage and resource management sectors. We will cover satellite, space-, (un)manned airborne -remote sensing and give a core professional and academic training in GIS, data analytics, modelling and theoretical/field/lab skills.

PROGRAMME AIMS

Overarching Programme Aims

The MSc in Earth and planetary observation aims to produce graduates that will be prepared to build a successful career in:

- Environmental, heritage and resource management (e.g. agriculture, fisheries, energy, Insurances, waste crime) sectors
- The fast-growing downstream Space and technology-driven industries, including government regulators, local authorities, universities and space agencies.

This MSc aims to provide an in-depth, critical and balanced understanding of the theoretical foundations of remote sensing alongside current and emerging environmental and other applications. This programme will develop transferable professional and academic skills and will combine interdisciplinary
WHAT WILL I BE EXPECTED TO ACHIEVE?

Detailed Learning Outcomes

On successful completion of this programme, you should be able to:

Knowledge and Understanding:
1. Demonstrate a critical evaluation of the principles, theories and concepts in remote sensing covering active and passive sensors and understand the fundamental physical processes that underpin these.
2. Be able to critically apply knowledge of remote sensing principles and theories for the study of the Earth and other planetary environments.
3. Demonstrate a coherent and systematic understanding of evidence-based, data-driven contextually appropriate solutions to environmental problems.
4. Exhibit the ability to make links across disciplinary boundaries within remote sensing, environmental sciences and space exploration and synthesize information to critically evaluate and reason remote sensing approaches in the context of Earth observation and space exploration.

Intellectual, Practical and Transferable Skills and other graduate attributes:
5. The ability to retrieve, analyse, interpret and validate remote sensing information from a wide variety of sensors/missions.
6. Collect, analyse and visualise complex spatial environmental data using appropriate geospatial techniques and specialist software.
7. Be able to demonstrate the appropriateness of modelling or numerical solutions in analysing common problems in remote sensing and environmental sciences.
8. Explain and critically appraise the rationale for the selection of remote sensing methods in Earth observation and space exploration.
9. Critically analyse literature on remote sensing, Earth and space sciences.
10. Develop skills in applying remote sensing, computational, statistical and geospatial methods for problem solving in Earth observation and space exploration contexts.
11. Demonstrate, by producing a dissertation, that you can plan and safely and ethically carry out an independent research project, involving a literature review, problem specification, data collection and analysis in Earth observation / space exploration.

Values and Attitudes:
12. Confidently analyse and understand environmental/remote sensing challenges and provide context-specific solutions.
13. Demonstrate an ability to manage a given project or task by working constructively either independently or in a team.

HOW WILL I LEARN?

Outline of the teaching methods and approach to be used on the programme.

Our collaborative, research-led approach consistently earns us five stars for our teaching in the QS World University Rankings. Our students have named us first in Scotland for having good teachers, quality lecturers and performance feedback in the most recent International Student Barometer. We also have >94% student satisfaction rate in the department of Biological and Environmental Sciences in PTES. The basis of the course is research-led teaching, delivered by staff who are world-leaders in their fields. This MSc will transfer to students the knowledge and expertise gained by USTIR world-leading and groundbreaking research. Stirling provides an ideal location for studying the environment.

The following teaching and learning strategies will be followed in order to achieve the intended learning outcomes (as listed above):
1. Lectures
2. Guided reading
3. Field and Lab classes
4. Assignments
5. Guest lectures. Guest lecturers are drawn from academia and industry giving a good view of EO and space exploration activities and careers

6. Dissertation

**WHAT TYPES OF ASSESSMENT AND FEEDBACK CAN I EXPECT?**

*Outline of the assessment methods and approach to be used on the programme.*

**Assessment and Assessment Criteria**

This programme uses a diversity of assessment methods, including coursework and written or practical examinations and applies standard MSc grade criteria as defined by the university’s Common Marking Scheme. Coursework is mainly based on relevant research carried out in the field or the laboratory, working either individually or in groups, and includes elements of literature review and research design. Coursework may be either individually or group assessed. A final year research dissertation includes an industry-linked option. Assessments are anonymously graded wherever possible, and grading is subject to robust moderation procedures.

**Feedback on Assessment**

You will receive feedback on coursework within 3 weeks of completion of the assessment. Feedback is usually provided electronically on formal coursework. Feedback and Guidance sessions with teaching staff are available on all modules. These provide regular opportunities to discuss feedback further. More information about feedback on assessment can be found here; [http://www.stir.ac.uk/academicpolicy/handbook/assessment/](http://www.stir.ac.uk/academicpolicy/handbook/assessment/)

**Assessment Regulations**

*Highlight any exceptions to the assessment regulations for this programme*

There are no exceptions to the assessment regulations for this programme

If you would like to know more about the way in which assessment works at the University of Stirling, please see the full version of the assessment regulations at:

- Postgraduate – Taught
- Postgraduate - Research

**WHAT WILL I STUDY?**

*Outline Programme Structure*

The list below shows compulsory and option modules for this programme. Option modules are revised over time and, in some cases, will be dependent upon pre-requisite and/or co-requisites being taken. More information about these requirements can be found in the relevant Module Descriptors. The options available each year can be subject to change due to student demand and availability of teaching staff.

- Where an “Option list” is specified, you have a choice of which module to take at this point in the degree programme and these choices are listed below
- For year 1 and 2 where “Any Module” is used it means that you can choose from all modules available to the year group and you can see the full list by following these links:

  - Undergraduate
  - Postgraduate

**Year 1**

Total year 1 credit value = **180**
Compulsory credits = **160**
Option credits = **20**

Compulsory Modules
<table>
<thead>
<tr>
<th>Module Title</th>
<th>Module Code</th>
<th>Credit</th>
<th>Semester</th>
<th>SCQF Level</th>
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</thead>
<tbody>
<tr>
<td>Fundamentals of Remote Sensing</td>
<td>EAPLPG1</td>
<td>20</td>
<td>Autumn</td>
<td>11</td>
</tr>
<tr>
<td>Representing and manipulating data</td>
<td>ITNPBD2</td>
<td>20</td>
<td>Autumn</td>
<td>11</td>
</tr>
<tr>
<td>Geomatics</td>
<td>ENMPG1</td>
<td>20</td>
<td>Spring</td>
<td>11</td>
</tr>
<tr>
<td>Applications in Earth Observation</td>
<td>EAPLPG2</td>
<td>20</td>
<td>Spring</td>
<td>11</td>
</tr>
<tr>
<td>Planetary exploration</td>
<td>EAPLPG3</td>
<td>20</td>
<td>Spring</td>
<td>11</td>
</tr>
<tr>
<td>Dissertation</td>
<td>ENMPG18</td>
<td>60</td>
<td>Spring/Summer</td>
<td>11</td>
</tr>
</tbody>
</table>

Option Modules – you may choose one of the following modules

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Module Code</th>
<th>Credit</th>
<th>Semester</th>
<th>SCQF Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Techniques</td>
<td>ENMPG17</td>
<td>20</td>
<td>Autumn</td>
<td>11</td>
</tr>
<tr>
<td>Relational and non-Relational databases</td>
<td>ITNPBD3</td>
<td>20</td>
<td>Autumn</td>
<td>11</td>
</tr>
</tbody>
</table>

**READING LIST**

Required and Recommended Reading for the Programme
There are also specific reading lists for each module

**Section 3 Student Support [PLEASE UPDATE AS NEEDED FOR THE STUDENT COHORT]**

**SUPPORT FOR STUDENT LEARNING**

**Induction**
You will receive an induction during the first few days of your MSc programme. This includes a range of social events, information sessions and activities to help you orientate yourself at Stirling and access all the services available to you. These are opportunities to meet staff and other students on your programme, in the Faculty and from across the university.

**Study Skills Support**
Student Learning Services (SLS) are committed to providing comprehensive guidance on all aspects of effective and efficient learning. The ultimate aim of the service is to enable you to make the most of your academic studies at the University and for you to become an independent, successful learner during your time at the University of Stirling. This is facilitated through collaborative work with experienced tutors and by offering a variety of courses, workshops and tutorials.

MSc students are welcome to use Student Learning Services. However, the service may be particularly beneficial:

- If you have been out of education for some time.

**What SLS are able to do:**

- Advise you on academic skills relevant to your studies at University.
- Help you consolidate your previous learning and develop new learning strategies.
- Advise on action-plans to potentially improve grades.
- Suggest practical solutions if you feel overwhelmed by assignment work.

More information can be found here: http://www.stir.ac.uk/campus-life/learning-support/student-learning-services/
STEER
STEER is a University-wide peer support scheme linking in returning student "Captains" with new undergraduate or taught post-graduate "Crew" during their first year at Stirling.

The scheme aims to help you make the most of your time at the University, help new students - the Crew - settle in and realise the opportunities available to them. You can find out more information here: https://www.stirlingstudentsunion.com/representation/studentsupport/steer/

Stirling Graduate School
For Research Postgraduate Students the Stirling Graduate School as well as your own faculty will provide support. More information can be found here: http://www.stir.ac.uk/graduateschool/current-pg-students/skills-development/

Academic and Pastoral Support
Adviser of Studies: Advisers have an important role to play in enhancing your academic and personal development and are essential to ensuring you make the most of your time at university. Advisers provide a personalised point of contact for you to discuss academic concerns or queries within the academic community. The general purpose of the role is to provide more in-depth advice on the academic options available to you and on the academic policies and regulations within the University. More information can be found here: http://www.stir.ac.uk/registry/advisers/

Personal Tutor: The role of a personal tutor is to help you feel part of the University community. There are a specific and consistent source of guidance, information and support for you throughout your studies. The tutor should be your first formal point of contact for general academic guidance and pastoral support. More information can be found here: http://www.stir.ac.uk/tse/personal-tutor/

Support and Wellbeing: At university you may face non-academic issues where you need some expert help or guidance. There are lots of ways we can help you in your day-to-day life at University. Student Support Services provide a range of high-quality services to assist you during the course of your studies, help prepare you for life after graduation. We aim to enhance the student experience and help you to get the most out of your time at University. More information can be found here: http://www.stir.ac.uk/campus-life/support-and-wellbeing/

Student Union: you can also access support through the Students’ Union, more information can be found here: https://www.stirlingstudentsunion.com/representation/studentsupport/

Accessibility and Inclusion (A&I)
Disorder as well as medical conditions and mental health difficulties. A&I can also support you if you have A&I are committed to offering a service which is welcoming and supportive of the needs of all students. Our service takes into account the full range of needs you may have, in a wide variety of circumstances including - physical and mobility difficulties, sensory impairments, specific learning difficulties including dyslexia and autistic spectrum short-term, temporary impairments or other difficulties as a result of an accident, injury, illness or surgery. More information can be found here: http://www.stir.ac.uk/student-support/accessibility-inclusion-service/

Learning Resources
You can find out more about the resources available to support your learning here: http://www.stir.ac.uk/campus-life/learning-support/

Section 4 Programme Evaluation and Enhancement

METHODS FOR EVALUATING AND IMPROVING THE QUALITY AND STANDARDS OF TEACHING AND LEARNING

ARO 034a August 2017 v1.4
Module Evaluation
Module evaluations are carried out each year and are an important way of getting student feedback on the modules we teach. We aim to evaluate every module we teach in every semester. You can find out more here: http://www.stir.ac.uk/registry/studentinformation/moduleevaluation/

Programme Review
Programmes are reviewed annually and on a 5 yearly cycle. You can get involved in a variety of different ways; by completing module evaluations, becoming a course representative and attending Student Staff Consultative Committees, or participating in the review process itself. You can find out more here: http://www.stir.ac.uk/academicpolicy/handbook/review-and-monitoring/

External Examiner(s) (To be added following Stage 2 approval)
Name of External Examiner: TBA
Institution: TBA
Please add as required.

Section 5 My Future

WHAT KIND OF CAREER MIGHT I GO ON TO?
What career avenues does this qualification open up to the student?
Upon completion of the MSc, graduates will be prepared to build a successful career in the fast-growing downstream Space and technology-driven industries or work in environmental, heritage and resource managements sectors including government regulators, local authorities, universities and space agencies.

How does this programme facilitate your development of the Graduate Attributes?

Connected
- The programme will connect you with public, private and third sector cases via guest lectures and placement opportunities
- The programme will connect you with knowledge, experiences and people providing different cultures, beliefs and traditions, via diverse student and staff population and international examples of remote sensing applications
- The programme will connect you with multidisciplinary knowledge, understanding and skills as applied to complex real-world issues and processes
- The programme will enable you to work with other academic and community members as part of the inclusive learning community and communicate effectively through digital and other media

Innovative
- through participation in active and ethical, world leading, international research
- through use of latest international research and novel technologies to develop new understandings and creative solutions
- through independent critical and reflective thinking to lead to opportunities for improvement in your own learning and to take action

Transformative
- through developing responsible remote sensing scientists and active global citizens who are socially, culturally and environmentally aware
- through providing training in professionalism, allowing you to develop as an adaptable and resilient remote sensing scientist, equipped to succeed in the global market place
- through sharing new perspectives and boarding your horizon
- The programme can transform your intellectual/cultural passion and excellence

WHAT STUDY ABROAD OPPORTUNITIES ARE AVAILABLE?

ARO 034a August 2017 v1.4
There are no study abroad opportunities embedded in this MSc programme.

**WHAT PLACEMENT OPPORTUNITIES ARE AVAILABLE?**
You are given the opportunity to go on a placement as part of your dissertation. Most of the modules include work-related assessments and some of them invite guest speakers from public, private and third sector.

**WHAT FURTHER STUDY OPTIONS ARE AVAILABLE TO ME?**
What programmes of study could the student go on to after successfully completing this one? After the completion of this MSc, you will have the appropriate and sufficient background that will allow you to apply for a PhD in relevant fields.

**WHAT OTHER INFORMATION DO I NEED TO KNOW?**
Information that should be displayed at module registration and/or on the Degree Programme Table webpages to help students understand any programme specific requirements or agreed exceptions to regulations. This could also include useful information that will enable a student to decide to take this programme, prepare for the programme, or that will be useful to them on completion of the programme e.g. professional recognition/accreditations etc.
There may be costs associated with travel to placements, or purchase of additional text books.

### Section 6 Admissions

**HOW DO I ENTER THE PROGRAMME?**

*Admissions Criteria*
A minimum of a second class honours degree or equivalent in a numerate subject such as geosciences, geography, environmental sciences, physics, engineering, mathematics. Applicants without these formal qualifications but with significant appropriate work experience are encouraged to apply.

*English language requirements*
If English is not your first language you must have one of the following qualifications as evidence of your English language skills:
- IELTS: 6.0 with 5.5 minimum in each skill
- Cambridge Certificate of Proficiency in English (CPE): Grade C or above
- Cambridge Certificate of Advanced English (CAE): Grade C or above
- Pearson Test of English (Academic): 54 with 51 in each component
- IBT TOEFL: 80 with no subtest less than 17