Programme Specification (Postgraduate)

FOR ENTRY YEAR: 2025/26

Date created: 02/02/2021 **Last amended:** 13/02/2026 **Version no.** 4

Please note, this programme is currently undergoing review as part of the University's continuous cycle of curriculum enhancement. The information in Appendix 1 represents the current structure and content of the programme. Any future enhancements to the programme in terms of content will be communicated to applicants and offer holders once finalised.

1. Programme title(s) and code(s)

MSc, PGDip /PGCert* in Space Exploration Systems

Notes

* An award marked with an asterisk is only available as an exit award and is not available for students to register onto.

2. Awarding body or institution

University of Leicester

3. a) Mode of study

Full-time

b) Type of study

Campus-based

4. Registration periods

The normal period of registration for the MSc in Space Exploration Systems is 12 months (October to September) for the full-time programme.

The maximum period of registration for the MSc in Space Exploration Systems is 24 months to accommodate final presentations.

The normal period of registration for the PGDip in Space Exploration Systems is 6 months for the full-time programme.

The maximum period of registration for the PGDip in Space Exploration Systems is 12 months.

5. Typical entry requirements

The entry requirements will be based on the standard requirements applied to MSc courses in general at the University of Leicester. A first or 2:1 BSc, BEng, honours degree, MPhys, MEng or Master's degree in a relevant subject or a qualification recognised by the University of Leicester as equivalent. Graduates with a 2:2 or equivalent degree classification applying for the course will be considered on a case-by-case basis. The course is aimed at graduate students with Physics or Engineering backgrounds. Students with degrees in other scientific disciplines (e.g. Mathematics, Chemistry, Biology, etc.) wishing to register for this course would need to be assessed on a case-by-case basis to determine if their background were suitable for the course. This will be done should the need arise and only if the necessary information cannot be obtained from the application form provided.

Applicants without English as a first language will be required to meet the University English Language requirements. This will require applicants to demonstrate IELTS 6.0 or equivalent. Further

details of acceptable English requirements can be found on the University of Leicester website: www.le.ac.uk/englishskills.

6. Accreditation of Prior Learning

Accreditation of prior learning will be assessed on a case-by-case basis, within an overall requirement that, at the time of application any prior learning which is more than five years old will not normally be considered current for this purpose. Certificated or experiential learning for the purpose of exemption from the requirement of programmes of study and assessment will be determined on a case-by-case basis, whether it has been undertaken at the University or elsewhere.

7. Programme aims

The programme is aimed at equipping physicists and engineers with in-depth knowledge of space systems engineering, space instrumentation, space mission design and the core engineering required to develop a mission through each phase from initial concept, through design, to launch and operations. In addition the course will provide physicists with systems engineering knowledge, required to work in industry, and engineers with an appreciation for space science and instrumentation in order to bridge the divide between systems engineering and space science. Through practical modules and the option to undertake a hardware-based project, hands-on skills relevant to the construction and testing of spacecraft are also covered.

The training provided should result in graduates that are trained to work in an industrial environment using modern and company-oriented engineering methods. The course blends project work, workshops, experimental studies, traditional teaching methods, seminars in a teaching environment that is aimed at duplicating industrial settings. Innovative use of teaching space will be developed for the course.

Existing collaborative links with industry will be integrated into course by exploring ideas for MSc projects, targeting project mentoring schemes as well as seminars and workshops. An international group of honorary lecturers and guest lecturers will be invited to deliver part of the programme and will provide additional expertise, which will strengthen the course.

8. Reference points used to inform the programme specification

- QAA Benchmarking Statement
- Framework for Higher Education Qualifications (FHEQ)
- UK Quality Code for Higher Education
- University Education Strategy
- University Assessment Strategy [log in required]
- University of Leicester Periodic Developmental Review Report
- External Examiners' reports (annual)
- United Nations Education for Sustainable Development Goals
- Student Destinations Data

9. Programme Outcomes

All students (MSc and PGDip) will be required to complete the same elements of the taught component of the course. The module descriptions, skills matrix and learning outcomes for the taught component of the course are the same for all MSc and PGDip students.

The skills matrix and learning outcomes are the same for all MSc students.

There are no distinctions between the learning outcomes associated with the three choices of Major Project available to students (UK, International and Spacecraft Engineering). The same MSc degree is awarded to students successfully completing the taught component and their chosen Major Project component, irrespective of the project choice. A certificate of participation in the International

Project Placement will be offered to students who have elected to participate in this placement option.

a) Discipline specific knowledge and competencies

i) Knowledge

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate knowledge of the objectives of space exploration and exploitation, and the achievements of key missions.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Demonstrate knowledge of the fundamental physical and engineering principles appropriate to astronautics, space exploration and space science.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
State and explain the key requirements (incl. science requirements) on space systems/missions.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Describe the function and operation of key spacecraft systems, sub-systems and components (incl. power and propulsion, instrumentation, sensors, optics)	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Demonstrate a broad awareness of the European space industry e.g. software, products, sensors, technologies, and focus of the main large aerospace companies, policies and priorities of major contributors to ESA, complementarity between roles on project teams, awareness of management principles, risk etc...	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports

ii) Concepts

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Select and apply appropriate mathematical models for use as 'hand calculations' in the concept or preliminary design of space mission, systems, sub-systems and instruments.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Select and apply appropriate mathematical models or commercial analysis packages to allow detailed analysis of particular aspects of a space mission, system, sub- system or instrument. Validate models.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Compile and perform standard systems engineering analyses such as technical budgets, trade-offs, safety/reliability analysis, risk registers.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports

iii) Techniques

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Design and implement data collection campaigns and/or mechanical/electrical assembly, verification and validation for instruments or components in accordance with safety, security and cleanliness standards.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports
Select and apply physical principles, requirements, tools, software and modelling methods, optimisation methods, trade-offs for space mission or instrument design.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports

iv) Critical analysis

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Describe and explain the scientific questions that space exploration seeks to answer including the wider implications of space exploration and exploitation for society.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Critically assess the strengths and weaknesses of space missions, systems, sub-systems or instruments.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports

v) Presentation

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Produce formal technical documents, procedures or instructions to space industry standards.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Communicate effectively and professionally with colleagues, collaborators, managers and customers in face-to-face situations.	Lectures, workshops and major project	Coursework assignments, project reviews

vi) Appraisal of evidence

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Critically appraise the applicability of models or design techniques at each stage of the system lifecycle.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Interpret the results of experimental, modelling or systems engineering data to draw conclusions or recommend future work.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Identify areas for development of novel technologies, enhancements to existing technologies and/or improved modelling or analysis techniques.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports

vii) Other discipline specific competencies

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Produce and regularly reflect and review a personal Professional Development Plan and learning log of an appropriate standard to begin the journey towards eventual registration as a chartered professional (CPhys or CEng).	Lectures, workshops and major project	Coursework assignment, project final reports

b) Transferable skills

i) Research skills

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate an understanding of how to locate and gather information from different sources and critically appraise the information collected.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate the ability to organise, record, analyse, communicate and critically evaluate information from different sources.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports

ii) Communication skills

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Communicating effectively and professionally with colleagues, collaborators, managers and customers in face-to-face situations.	Lectures, workshops and major project	Project reviews and final reports
Listening as an effective way of interacting professionally with colleagues, collaborators, managers and customers.	Lectures, workshops and major project	Project meetings and reviews
Effective written communication and description of complex physical and engineering concepts.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports

iii) Data presentation

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate the ability to communicate and break down complex physical and engineering concepts and the ability to present these logically and correctly.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports

iv) Information technology

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Office skills and use of common software packages.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports
Programming skills to solve technical or scientific problems that could be applied in more generic contexts.	Lectures, workshops and major project	Coursework assignment, project reviews and final reports
Demonstrate the ability to adapt to different technical design or analysis software environments.	Lectures, workshops and major project	Performance in workshop sessions, coursework assignment, project reviews and final reports

v) Problem solving

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate an understanding of the importance of data and information when faced with a problem to solve.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Demonstrate an understanding of the requirement to determine the cause of the problem and to find solutions by producing a broad range of ideas and putting these to practical use.	Lectures, workshops and major project	Project meetings, reviews and final reports

vi) Numeracy skills

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Competence and understanding of numerical data, statistics and graphs.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports
Demonstrate the ability to apply mathematical knowledge in different contexts.	Lectures, workshops and major project	Examinations, coursework assignment, project reviews and final reports

vii) Working relationships

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Constructive and professional attitude to performing a role including reliability, flexibility and commitment.	Lectures, workshops and major project	Project meetings, reviews and final reports
Listening, communicating, sharing knowledge and experience with colleagues and encouraging them.	Lectures, workshops and major project	Project meetings, reviews and final reports

viii) Managing learning

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate an understanding of the importance of self-motivation and the voluntary pursuit of knowledge for professional or personal requirements.	Lectures, workshops and major project	Coursework assignments, project meetings, reviews and final reports
Demonstrate an understanding of personal learning styles and thought processes as well as the ability to develop appropriate strategies for acquiring knowledge.	Lectures, workshops and major project	Coursework assignments, project meetings, reviews and final reports

10. Special features

- The University of Leicester School of Physics and Astronomy and School of Engineering share a number of modules as part of the cross disciplinary nature of the course.
- Students on the MSc course must select one of the three major projects on offer.
- The themes for the UK and International Projects are selected by a project committee that includes industry.
- The theme for the Spacecraft Engineering project is a selected by the MSc academic team and relates to a small satellite mission being developed by the team.
- The International Project is part of the Space Exploration and Development Systems (SEEDS) programme.
- The SEEDS programme is a collaboration between University of Leicester and international partners, Politecnico di Torino, Italy and Institut Supérieur de l'Aéronautique et de l'Espace, Toulouse, France. All three partners will be involved in delivering the International Project. Students electing to participate in this programme will be required to spend 2 months at each of the three institutes to complete the project, which will be selected by the international placement programme committee and industry.
- Students must select their project choice by the 31st of January.
- Additional requirements that need to be met in order to be eligible to participate in the International Project are highlighted in Section 13 below.

10a. Research-inspired Education

Students on this programme will advance through the four quadrants of the University of Leicester Research-inspired Education Framework as follows:

RiE Quadrant	Narrative
	Our programme provides the training to ensure the students become junior researchers or space professionals by the end of their degrees. Students start their degree by learning the fundamental principles and key physical concepts of relevance to space exploration. They are introduced to and trained in tools and techniques, which are essential in understanding these topics. Across the programme students develop crucial transferable skills for both research and future employment, including report writing, group work, presentation skills, reading research papers, and library skills, including searching and using reference manager software. They also develop skills in specific tools that are relevant to the space industry.
Research-briefed Bringing staff research content into the curriculum.	• **Research briefed** – Staff introduce their research content into teaching where possible, for example, using worked examples from their research, how theories are applied and why they are useful.
Research-based Framed enquiry for exploring	• **Research based** – Students work in groups on problems in workshops and laboratory classes within several of the core modules. Laboratory modules teach the students the important of the scientific method, experimental

existing knowledge. **Research-oriented** Students critique published research content and process. **Research-apprenticed** Experiencing the research process and methods; building new knowledge.	techniques and the importance of keeping a professional lab book and include data analysis techniques. • **Research oriented** – Students use physics to solve real world problems in space science and are exposed to the formal approaches to evaluation and validation adopted within the space industry. Project work embedded in the programme operates at the cutting edge of the research and industry environment and delivers solutions that could be taken forward in a professional context. Teams present their solutions, to their peers who can critique the material and the process. • **Research apprenticed** – Students work individually and in groups to present findings from data management and critical appraisals. The final research project provides students with the tools to critique published content and experience and engage with the research process, the also develop experience of professional approached to space mission development. All students will push the boundaries of knowledge in this final dissertation based on their independent research, supported by expert supervisors.

As part of studying at a research-intensive university, students on this programme have the following extra or co-curricular opportunities available to them to gain exposure to research culture:

The School has a programme of weekly "Space lates" events hosted by the National Space Centre together with monthly "Cosmic Coffee" academia/industry interactions and a programme of specialist lectures, both at Space Park Leicester, to which MSc students are encouraged to attend through promotion via standard student comms channels (e.g. Teams and email) and Space Park advertising.

Teaching on this programme will be research-informed (it draws consciously on systematic inquiry into the teaching and learning process itself) in the following way:

The School supports all staff involved in teaching to gain an accredited Higher Education teaching qualification, in which they demonstrate their use of teaching theory to support their own practice and reflect on their current teaching and continuing professional development.

All Physics teaching staff attend Teaching Enhancement meetings (held three times a year) where examples of good practice are shared. These meetings also provide a forum to enhance what is delivered and teaching and assessment methodologies.

The Director of Education is a member of the University's Education Leadership Group. Teaching staff attend other educational meetings.

11. Indicators of programme quality

The University of Leicester quality assurance team, internal programme approval panels and external reviewers from industry and academia have assessed the course outline and programme outcomes and approved the addition of this new course to the range of postgraduate taught courses on offer at the University of Leicester. The course coordinating team have received an endorsement from the UK Space Agency.

12. Criteria for award and classification

This programme follows the standard scheme of taught postgraduate award and classification set out in Senate Regulations – see the version of *Senate Regulation 6 governing taught postgraduate programmes of study* relevant to year of entry.

13. Progression points

As defined in Senate Regulations - refer to the version of *Senate Regulation 6 governing taught postgraduate programmes of study* relevant to year of entry.

The following additional progression requirements for this programme have been approved:

- Students wishing to participate in the International Project Placement (SEEDS) must pass at the first attempt all of the following which are assessed in the January assessment period:

  - modules PA7013, EG7010 and EG7413
  - the examination component of PA7011

  AND must achieve a minimum of 60.00% in at least three of the associated examination components of the above modules.

  Students who do not meet this requirement, but otherwise meet the requirements to progress to the project component, will be unable to participate in the International Project and will instead join the analogous campus-based project module, PA7091 (a science mission design study) between the same dates as the International Project.
- Students selecting the PGDip route will only be required to complete the taught component of the course and will be required to meet the progression rules outlined in Senate Regulation 6.
- A PGCert exit route as an intermediate award can be provided in cases where students fail to meet the PGDip or MSc requirements and progression rules. A PGCert can be awarded in the case of students having at least 60 core credits at 50%. Exam Board approval will be required in cases where an intermediate award or exit route is offered.

In cases where a student has failed to meet a requirement to progress he or she will be required to withdraw from the course and a recommendation will be made to the Board of Examiners for an intermediate/exit award where appropriate.

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

As defined in Senate Regulations - refer to the version of *Senate Regulation 6 governing taught postgraduate programmes of study* relevant to year of entry.

15. External Examiners reports

The details of the External Examiner(s) for this programme and the most recent External Examiners' reports for this programme can be found at exampapers@Leicester [log-in required]

16. Additional features

In summary, to participate in the International Project stream (SEEDS), students will be required to:

1. Meet the progression requirements detailed in 13. above.

2. Meet the additional cost of accommodation and subsistence while on placement in Italy and France. Students will spend 2 months in Italy and 2 months in France, in addition to 2 months in the UK, during the placement period.

3. Students should have appropriate visa documents in place well in advance of starting the International Project.

4. Should a final project presentation opportunity be organised at the European Space Agency in the Netherlands students will be required to meet the additional cost of travel, subsistence and accommodation.

UNIVERSITY OF LEICESTER

Programme Specification (Postgraduate) FOR ENTRY YEAR: 2025/26

Date created: Click or tap here to enter text. **Last amended:** 02/05/2025 **Version no.** 1

Appendix 1: Programme structure (programme regulations)

The University regularly reviews its programmes and modules to ensure that they reflect the current status of the discipline and offer the best learning experience to students. On occasion, it may be necessary to alter particular aspects of a course or module.

Updates to the programme

Academic year	Module	Update
2025/26	EG7010 Engineering Design Case Study	Module moved from Semester 2 to Semester 1

MSc in Space Exploration Systems

Credit breakdown

Status	Year long	Semester 1	Semester 2	Other delivery period
Core taught	15 credits	45 credits	30 credits	n/a
Optional	n/a	15 credits	15 credits	n/a
Dissertation/project	60 credits	n/a	n/a	n/a

180 credits in total

PGDip in Space Exploration Systems

Credit breakdown

Status	Year long	Semester 1	Semester 2	Other delivery period
Core taught	30 credits	60 credits	30 credits	n/a
Optional	n/a	n/a	n/a	n/a

120 credits in total

Level 7/Year 1 2025/26

Core modules

Delivery period	Code	Title	Credits
Semester 1	PA7011	Foundations of Professional Space Science & Engineering	15 credits
Semester 1	PA7013	Spaceflight Dynamics and Propulsion	15 credits
Semester 1	EG7413	Spacecraft Systems Engineering	15 credits
Semester 1 & 2	PA7014	Space, Planetary Environment, Planetary Surfaces	15 credits
Semester 2	PA7015	Spacecraft Instrumentation for Space and Planetary Science	15 credits
Semester 1	EG7010	Engineering Design Case Study	15 credits
Semester 1 & 2	PA7051	Human Spaceflight and Nuclear Systems	15 credits
Semester 2	PA7052	Advanced Spacecraft Engineering	15 credits

Major Projects (Choose 1)

Delivery period	Code	Title	Credits
April to September	PA7091	UK Research Project	60 credits
April to September	PA7092	International Research Project (SEEDS)	60 credits

Notes
n/a

Appendix 2: Module specifications

See taught postgraduate module specification database [login required] (Note - modules are organized by year of delivery).