Programme Specification (Postgraduate)

FOR ENTRY YEAR: 2023/24

Date created: 06/10/2022 **Last amended:** 28/02/2023 **Version no.** 1

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

MSc in Spacecraft Engineering

Postgraduate Diploma (PGDip) in Spacecraft Engineering *

Postgraduate Certificate (PGCert) in Spacecraft Engineering *

Notes

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

HECOS Code

HECOS Code	%
100115	50
100116	50

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 Spacecraft Engineering is 12 months.

The maximum period of registration for the MSc in Spacecraft Engineering is 24 months to accommodate final presentations.

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 BEng, honours degree, MEng or Master's degree in an Engineering discipline 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 Aerospace, Control Systems, Mechanical, or Mechatronics Engineering backgrounds. Students with degrees in other engineering or scientific disciplines (e.g. Physics, 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 was 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 provide evidence of appropriate language skills according to the current University language requirements for Engineering: https://le.ac.uk/study/research-degrees/entry-reqs/eng-lang-reqs

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 aims to equip graduate engineers with the necessary specialist knowledge, skills and experience that enables them to effectively work in and, ultimately, lead interdisciplinary teams on the design of complex, high value engineering systems, used in extreme environments – namely spacecraft and satellites.

The course will provide engineers with in-depth knowledge of systems engineering, space and planetary environmental conditions, and core spacecraft technologies. 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. The course will make use of specialist and innovative teaching facilities.

Existing collaborative links with industry will be integrated into the course by exploring ideas for MSc projects, targeting project mentoring schemes as well as seminars and workshops.

8. Reference points used to inform the programme specification

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

For MSc Spacecraft Engineering, the 'QAA Master's Degree Characteristics' document has been consulted, and the key benchmarks have been mapped against both the relevant programme ILOs and the programme's entry requirements.

9. Programme Outcomes

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

a) Discipline specific knowledge and competencies

i) Knowledge

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate knowledge of spacecraft technology and engineering, including the latest technological innovations in crewed and un-crewed spaceflight.	Lectures, seminars and major project.	Examinations, coursework assignments, project reviews and final reports.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate knowledge of the fundamental physical and engineering principles appropriate to astronautics, space exploration and spacecraft engineering.	Lectures, seminars and major project.	Examinations, coursework assignments, project reviews and final reports.
State and explain the key requirements placed on spacecraft and space systems, derived from mission requirements.	Lectures, seminars and major project.	Examinations, coursework assignments, project reviews and final reports.
Describe the function and operation of key spacecraft systems, sub-systems and components (incl. power and propulsion, instrumentation, communications and materials).	Lectures, seminars and major project.	Examinations, coursework assignments, project reviews and final reports.
Demonstrate a broad awareness of the European space industry in terms of, e.g., software, products, sensors, technologies, and the focus of major aerospace companies, policies and priorities of major contributors to the European Space Agency (ESA), complementarity between roles on project teams, awareness of management principles, risk, etc.	Lectures, seminars and major project.	Examinations, coursework assignments, project reviews and final reports.

ii) Concepts

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Select and apply appropriate mathematical, numerical and software based models for use in the concept or preliminary design of spacecraft systems, sub-systems and instruments.	Lectures, computational workshops and major project.	Examinations, coursework assignments, project reviews and final reports.
Select and apply appropriate mathematical, numerical models or commercial analysis packages to allow detailed design, predictive analysis, and validation of spacecraft systems, sub-systems and instruments.	Lectures, computational workshops and major project.	Examinations, coursework assignments, project reviews and final reports.
Compile and perform standard systems engineering analyses such as technical budgets, trade-offs, safety/reliability analysis, risk registers.	Lectures, computational workshops and major project.	Examinations, coursework assignments, 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.	Experimental workshops and major project.	Laboratory and design exercise reports, coursework assignments, project reviews and final reports.
Select and apply physical and engineering principles, design requirements, tools, software and modelling methods, optimisation methods, and trade-offs for spacecraft systems or instrument design.	Computational workshops, practical demonstrations and major project.	Laboratory and design exercise reports, coursework assignments, project reviews and final reports.

iv) Critical analysis

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Design, predict, analyse and evaluate the performance of spacecraft systems against their design specifications, derived from mission requirements.	Lectures, computational/experimental workshops and major project.	Examinations, coursework assignments, laboratory exercises project reviews and final reports.
Critically assess the strengths and weaknesses of spacecraft systems, sub-systems and instruments.	Lectures, computational/experimental workshops and major project.	Examinations, coursework assignments, 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.	Ethics workshops and major project.	Coursework assignments, project reviews and final reports.
Communicate effectively and professionally with colleagues, collaborators, managers and customers in face-to-face situations.	Ethics workshops and major project.	Coursework assignments, project reviews and final reports.

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 assignments, project reviews and final reports.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Interpret the results of experimental, modelling or systems engineering data and use as the basis for recommending future design improvements.	Lectures, workshops and major project.	Examinations, coursework assignments, project reviews and final reports.
Identify areas for development of novel technologies, enhancements to existing technologies and/or improved design techniques.	Lectures, workshops and major project.	Examinations, coursework assignments, 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 Professional Registration as, e.g., Chartered Engineer (CEng).	Professional development workshops and major project.	Coursework assignments, project reviews and 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.	Workshops and major project.	Coursework assignments, project reviews and final reports.
Demonstrate the ability to organise, record, analyse, communicate and critically evaluate information from different sources.	Workshops and major project.	Coursework assignments, 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.	Ethics workshops and major project.	Coursework assignments, project reviews and final reports.
Listening as an effective way of interacting professionally with colleagues, collaborators, managers and customers.	Ethics workshops and major project.	Coursework assignments, project reviews and final reports.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Effective written communication and description of complex physical and engineering concepts.	Workshops and major project.	Coursework assignments, 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 supervision.	Coursework assignments, 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.	Workshops and major project.	Coursework assignments, project reviews and final reports.
Programming skills to solve technical or engineering problems that could be applied in more generic contexts.	Workshops and major project.	Coursework assignments, project reviews and final reports.
Demonstrate the ability to adapt to different technical design or analysis software environments.	Workshops and major project.	Coursework assignments, 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, computational/experimental workshops and major project.	Examinations, coursework assignments, 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 put these to practical use.	Lectures, computational/experimental workshops and major project.	Examinations, coursework assignments, project reviews and final reports.

vi) Numeracy skills

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate competence in handling, presenting and analysing numerical data, statistics and visual data.	Lectures, computational/experimental workshops and major project.	Examinations, coursework assignments/reports, project reviews and final reports.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Demonstrate the ability to apply mathematical knowledge in different contexts.	Lectures, computational/experimental workshops and major project.	Examinations, coursework assignments, 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.	Group working in modules, workshops and major project.	Project reviews and final reports.
Listening, communicating, sharing knowledge and experience with colleagues and encouraging them.	Workshops and major project.	Project reviews and final reports.

viii) Managing learning

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

10. Special features

- The University of Leicester's School of Engineering, and School of Physics and Astronomy, share a number of modules as part of the cross-disciplinary nature of the course.
- The themes for the Group Project will be selected by the MSc academic team based on current or recent spacecraft or satellite design activities at Space Park Leicester.

11. Indicators of programme quality

The University of Leicester quality assurance team, internal programme approval panels and external reviewers from 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.

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.

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 (e.g. timetable for admissions)

UNIVERSITY OF LEICESTER

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Date created: Click or tap here to enter text. **Last amended:** Click or tap to enter a date. **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.

MSc in Spacecraft Engineering

Credit breakdown

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

Choose an item. credits in total

Level 7/Year 1 **Choose an item.**

Core modules

Delivery period	Code	Title	Credits
Semester 1	EG7413	Spacecraft Systems Engineering	15 credits
Semester 1	EG7010	Engineering Design Case Study	15 credits
Semester 1	PA7013	Spaceflight Dynamics & Propulsion	15 credits
Semester 1 & 2	PA7014	Space and Planetary Environment	15 credits
Semester 2	EG7126	Advanced Composite Materials	15 credits

Delivery period	Code	Title	Credits
Semester 2	EG7040	Attitude & Orbit Control Systems	15 credits
Semester 2	EG7217	Advanced Communications	15 credits
Semester 2	PA7052	Advanced Spacecraft Engineering	15 credits
Summer	EG7401	Group Spacecraft Engineering Project	60 credits

Notes
n/a

Appendix 2: Module specifications

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