

IMPERIAL

Integrated Space Science and Engineering Summer School

A unique education opportunity to shape the future of the space industry.

21st July to 1st August 2025 at Imperial College London



IMPERIAL COLLEGE LONDON AND ISSE

Consistently rated amongst the world's best universities (1st in Europe and 2nd in World according to the QS World University Rankings 2025), Imperial College London is a science-based institution with an international reputation for excellence in teaching and research. Imperial attracts over 22,000 students and 8,000 staff of the highest international quality from more than 126 different countries.

Since its foundation in 1907, Imperial's contributions to society have included the discovery of penicillin, the development of holography and the foundations of fibre optics. This commitment to the application of research for the benefit of all continues today, with current areas of focus including interdisciplinary collaborations to improve global health, tackle climate change, develop sustainable sources of energy, address security challenges, advance data management and analysis technologies for supporting data driven research, and tackle problems at the molecular scale.

Imperial's Professional Development and Summer Programme Unit within the Institute of Extended Learning has extensive experience in developing and running a range of summer and summer schools for international undergraduate students. We draw on Imperial's education pedagogy to design and deliver programmes that provide an engaging learning experience for students, incorporating group projects that are designed to assess students' learning outcomes.



The **Integrated Space Science and Engineering (ISSE)** is a new educational offer at Imperial College London. It presents a unique opportunity to address space and its related issues. ISSE espouses a multi-stakeholder provision concept. It is provided under the auspices of the Imperial Space Lab in collaboration with Astra-Terra Limited, Hemraj Consulting and the Institute for Space Policy and Law (ISPL) and is hosted by the Department of Civil and Environmental Engineering at Imperial.

The ISSE supports multidisciplinary collaborations between the College's academic experts in various disciplines, including healthcare, financial services, climate science, and city infrastructure, to create solutions for complex problems. Alongside its research initiatives, the initiative fosters the next generation of space scientists and engineers by developing a range of postgraduate and executive courses.

The ISSE includes three academic labs, has attracted over £120,000 in funding for space science and engineering research, technology, and infrastructure, and has published over 50 papers.

Thanks to its extensive research collaborations both within the College and with a variety of external academic and industrial partners, the ISSE is establishing itself as an international hub for space science and engineering.

SUMMER SCHOOL OVERVIEW

Integrated Space Science and Engineering is revolutionising business models across industries by leveraging deep learning tools to drive better decision-making. With an increasing number of companies hiring space scientists to design, analyse data and predict potential risks, the demand for skilled professionals in this field is growing rapidly.

This summer school is specifically designed for undergraduate students in the final two years of their studies, particularly those studying IT, computing, natural/social sciences or any engineering degrees with an interest in space science and engineering. Students will be introduced to key concepts, develop a solid understanding of space science, learn from experts in space science and engineering applications, and collaborate on group projects.

PROGRAMME STRUCTURE AND FORMAT

The programme is structured around three interconnected pillars: **Fundamentals**, **Operations**, and a **Design Project**.

- **Fundamentals:** Covers the science and technology underpinning space exploration and its potential to drive innovation on Earth.
- **Operations:** Focuses on policy, commerce, logistics, and critical areas like safety, security, resilience, and sustainability.
- **Design Project:** Allows students to apply their knowledge to real-world scenarios, such as designing a space settlement for a specific mission.

These pillars build on one another, with the Fundamentals and Operations serving as the foundation for the hands-on Design Project.

Fundamentals	1. Planetary Science, Geology and Astrobiology
	2. Introduction to Space, its context, and downstream applications.
	3. Mission Planning and Human Factors
	4. Satellite Technology and Orbital Materials
	5. Rocket and Spacecraft Technology
	6. Space and Health
	7. Space Materials and Mining
	8. Earth Observation, Comms/Navigation/Surveillance, AI and Big Data
Operation	9. Space History, Policy, and Law
	10. Space Safety, Security, Resilience and Sustainability
	11. Space Operations and Logistics
	12. Commercial Space, Economics and Market
Project	Integrated Space Science Engineering Project, including role of systems engineering, requirements, automation, design concepts & project management.

Team-based learning through group project:

Students will engage in team-based learning by collaborating on a group project addressing real-world challenges in the context of space.

Space has become a critical area of global focus, offering immense opportunities for innovation that can enhance life on Earth. The rapid growth in satellite launches, driven by organizations like NASA, ESA, and private companies, is transforming sectors such as food production, water management, mobility, communications, health, energy, and national security. Recognizing its importance, the United Kingdom has declared space a critical national infrastructure, emphasizing its role alongside science, innovation, and technology (SIT), as well as policy, regulation, sustainability, and security.

Space is a shared domain, with over 90 countries actively involved in its development. This global engagement brings benefits but also significant risks, highlighting the urgent need for international collaboration to ensure safe and secure use of space.

Under the guidance of Imperial academics, students will work in small groups on weekly mini-projects and present their findings to a panel of experts at the end of each week.

Learning objectives:

On completion of the ISSE summer school, students will be able to:

- **Apply Advanced Knowledge and Skills:** Demonstrate industry-relevant knowledge and apply it to real-world space challenges.
- **Drive Innovation and Problem-Solving:** Approach complex problems with an innovative mindset and propose creative solutions.
- **Foster Collaboration and Teamwork:** Work effectively in multidisciplinary teams and leverage diverse perspectives.
- **Communicate Effectively:** Articulate complex ideas and engage stakeholders through strong written and verbal communication.
- **Demonstrate Leadership:** Take on leadership roles, driving impactful initiatives and inspiring others in the space sector.
- **Engage in Ethical Practice:** Apply ethical decision-making and sustainable practices, considering regulatory and legal frameworks in space exploration.
- **Develop Entrepreneurial Skills:** Identify opportunities and create innovative ventures in the space industry.
- **Master Design and Project Management:** Utilise design thinking and project management techniques to plan and execute successful projects.

The entire programme will be taught in English and comprises 60 contact hours over two weeks. The schedule includes lectures, workshops, tutorials, project work, social activities, and relevant visits, with classes held on weekdays.

Additional Opportunities:

Beyond academics, students will have the chance to form new friendships through social activities, engage with Imperial student ambassadors, explore opportunities for further study, and experience what it's like to study at a world-class university.

CERTIFICATION

Students who successfully complete the summer school will receive a certificate from Imperial College London. A prize will be awarded to the best project team, and each student will also receive a document detailing their project marks.

ENTRY REQUIREMENTS

All students are expected to be studying an undergraduate degree, preferably in the final two years of their undergraduate studies, in any engineering discipline, natural/social sciences, IT or computing degree.

English requirements:

The summer school is designed for undergraduate or postgraduate students studying science, technology, engineering, and mathematics (STEM) and related subjects.

All students are required to have a good command of English, and if it is not their first language, they will need to satisfy the College requirement as follows:

- a minimum score of IELTS (Academic Test) 6.5 overall (with no less than 6.0 in any element) or equivalent.
- TOEFL (iBT) 92 overall (minimum 20 in all elements)

Technical requirements:

As the project has a strong technical element, students are expected to have the following knowledge and interests:

- An interest in computer sciences, engineering, sociology, visualization and natural language processing.
- A mathematical foundation (probability theory, linear algebra, etc.)
- Knowledge of machine learning.

Students will be asked to bring their own computers, pre-installed with Microsoft software for project work.

TEACHING FACULTY

The summer school is directed by Dr Sunday Popo-Ola and taught by a multi-disciplinary teaching faculty from the Civil & Environmental Engineering, Imperial Space Lab and other departments of Imperial College London.

PROGRAMME DIRECTOR



Dr Sunday Popo-Ola who is currently an Associate Professor at Imperial College London, and his work reflects the level of multidisciplinary expertise that he has obtained. His work cuts across three sub-sections within the department namely Engineering Structures, Environmental, Transportation and Systems and Mechanics. Sunday teaches Engineering Construction, Communication and Creative Design to University students.

LOCATION

The summer school will take place at Imperial College London's South Kensington Campus, located amongst many famous [attractions](#) in London.

The cultural triangle is home to three of London's most prestigious (and free) museums. Right next door is the Science Museum; across the road is the Victoria and Albert Museum; and around the corner is the Natural History Museum. From Neolithic artifacts to the latest scientific breakthroughs, experience it all just minutes from Imperial's doorstep.

The campus is also adjacent to the famous Royal Albert Hall, one of London's most iconic music venues, established in 1871 and host to the BBC Proms and countless world-renowned international artists.

In addition, the beautiful Hyde Park and the renowned Harrods Department Store are just a short walk from the campus.

