



immerse Academic
EDUCATION INSIGHTS

Engineering

SYLLABUS OVERVIEW

15-18 YEARS OLD

TOKYO

About the Programme

Immerse Education is an award-winning provider of summer experiences offering academic and career-focused programmes for high school students worldwide, in such locations as Boston, Cambridge, London, New York, Oxford, San Francisco, Singapore, Sydney, Tokyo, and Toronto. Our programmes aim to deliver engaging, academically challenging content within a university-style classroom environment.

The Academic Insights programmes give participants a valuable introduction to studying their chosen subject at an advanced university level, preparing them for future academic success and life at university. During the programme, students experience university-style teaching, explore complex topics, and develop the skills, confidence, and curiosity needed for successful applications and higher-level study.



PLEASE NOTE:

The topics depicted in this guide represent examples of the types of modules students can look forward to participating in during the programme. Please note that final syllabi are subject to modification.



TOKYO



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ACADEMIC INSIGHTS

Academic Sessions

Sessions during the programme are organised into thematic areas that allow students to explore a broad range of topics in depth. The programme combines two types of sessions: theory-based sessions that introduce advanced concepts similar to university study, and practical-based sessions that encourage students to apply this knowledge to case studies, real-world projects, or research tasks. Topics highlighted in this guide are indicative and may be adapted by tutors to reflect their academic expertise or participants' interests. This approach helps students develop both subject knowledge and the ability to think critically and independently.





Preparatory work

Some tutors may ask participants to complete preparatory work before the start of the programme, such as assigned reading, independent pre-research, or a series of short exercises. These tasks help ensure that all students begin the course with a shared foundation of understanding and are ready to engage in higher-level discussion and analysis. Preparatory materials are provided in advance and designed to make students feel more confident, better prepared, and able to get the most out of their academic experience once the programme begins.

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Academic Difficulty

Immerse Education's Academic Insights programmes are designed to introduce students to university-level study and build on necessary skills. The material can be challenging, but tutors provide structured guidance, personalised feedback, and encouragement throughout. Each participant is supported according to their own level and learning goals, ensuring that everyone is able to progress and achieve their potential. This academically stimulating experience is something to look forward to — an opportunity to build confidence, expand knowledge, and develop valuable study skills in a supportive and inspiring environment.



Aim of the Engineering Programme

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Introduction to Engineering

Engineering transforms ideas into tangible solutions that shape our future. This programme helps students understand the theories and methodologies behind design, construction, and technology development. Set in Tokyo, a global centre for innovation and advanced research, the course invites participants to explore how academic study leads to breakthroughs in areas such as robotics, energy systems, and sustainable infrastructure. Students learn to connect theory with critical inquiry, preparing for higher-level engineering study.

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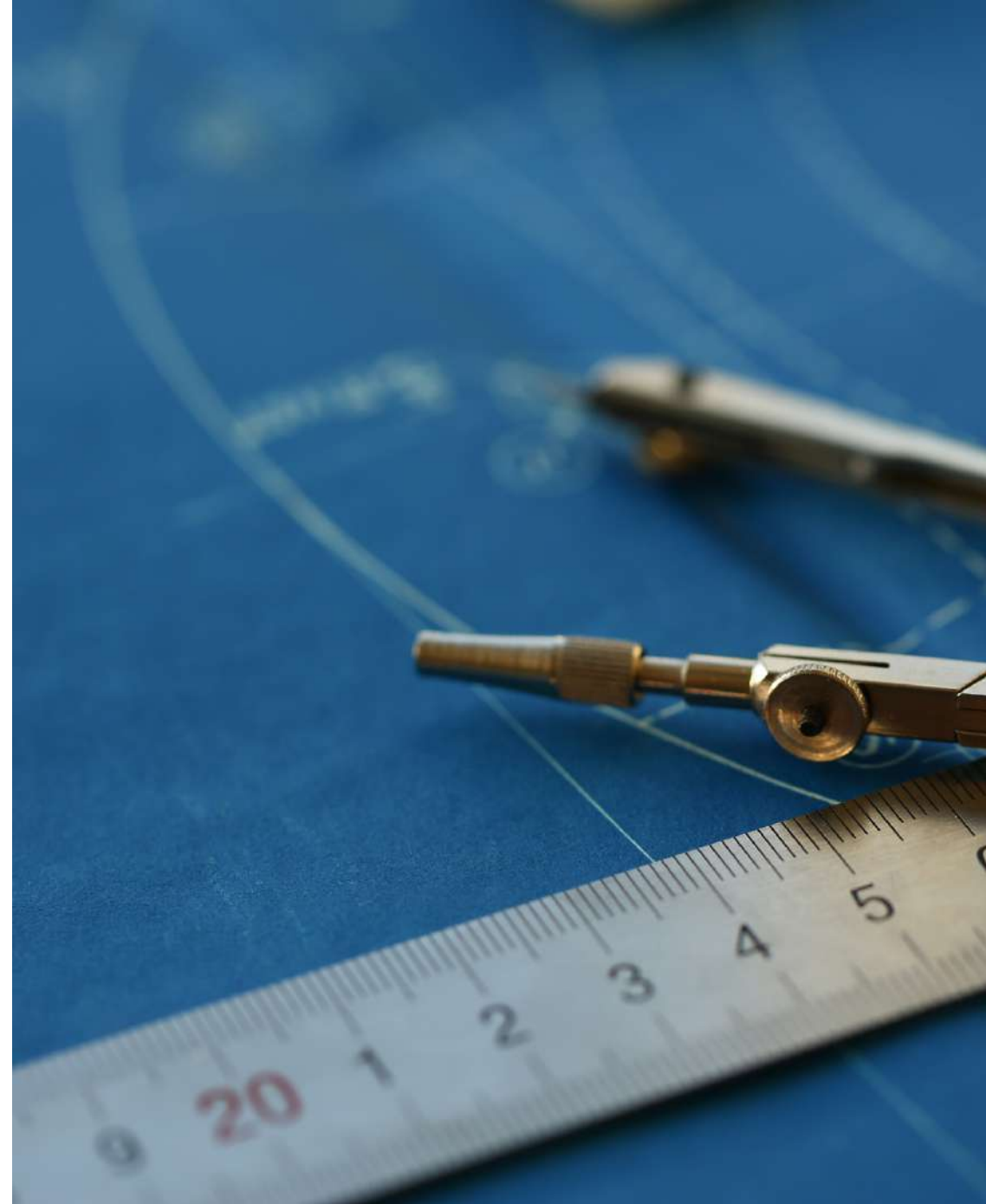
ACADEMIC INSIGHTS

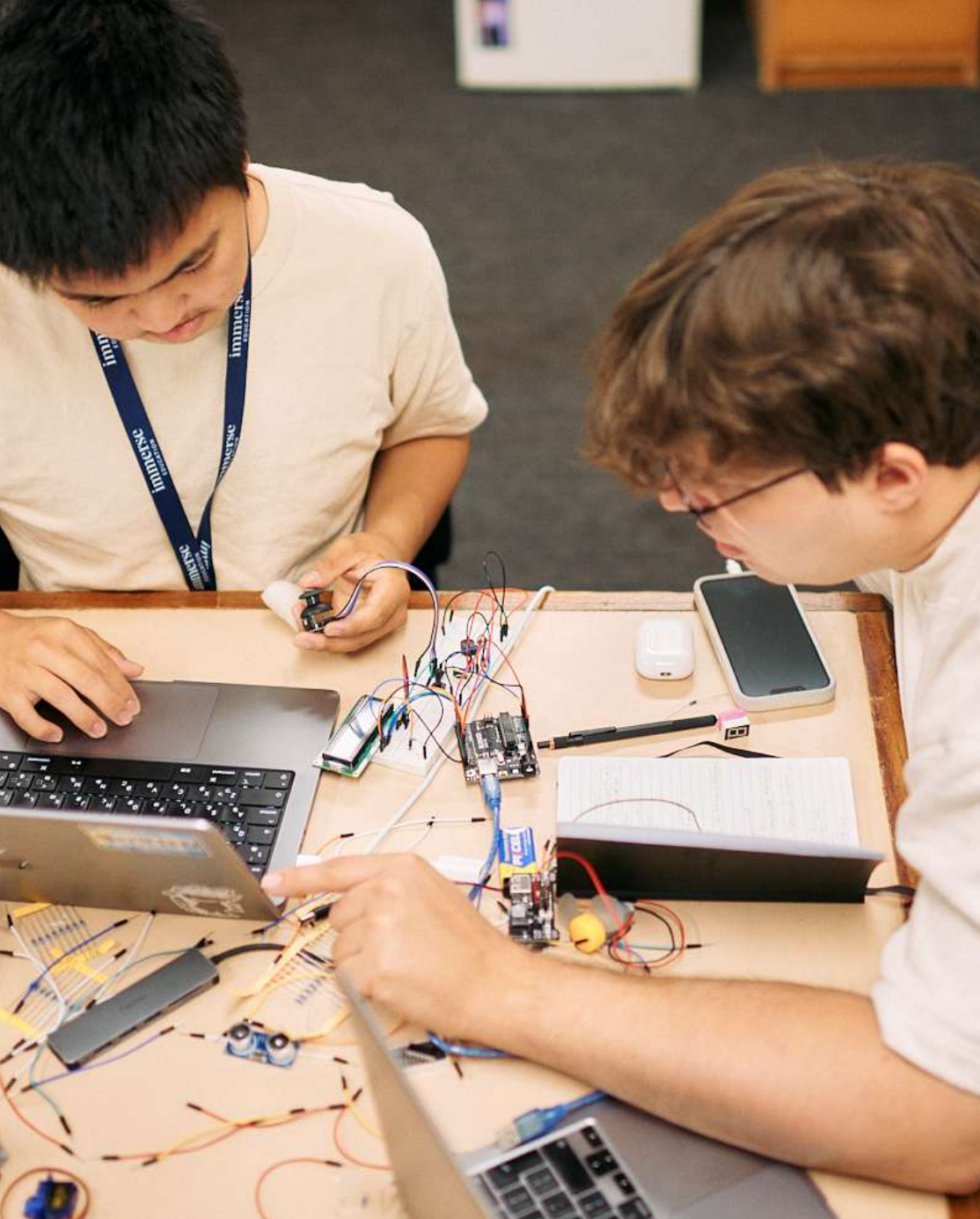
Fundamentals of Engineering Design

Discover how engineers approach complex challenges through structured design and analysis. You will learn about the design cycle, from conceptualisation to optimisation, and evaluate how mathematical modelling supports innovation. Case studies from global engineering projects help students understand how theory informs effective solutions. This topic develops logical reasoning and systematic problem-solving, fundamental to all areas of engineering study.

Mechanics and Structural Engineering

Explore how physical laws govern the movement and stability of systems. You will study core concepts such as force, motion, stress, and equilibrium, applying these principles to machines, buildings, and vehicles. Students analyse how geometry and materials influence strength and efficiency. This topic builds quantitative and analytical skills essential for mechanical and civil engineering at university level.





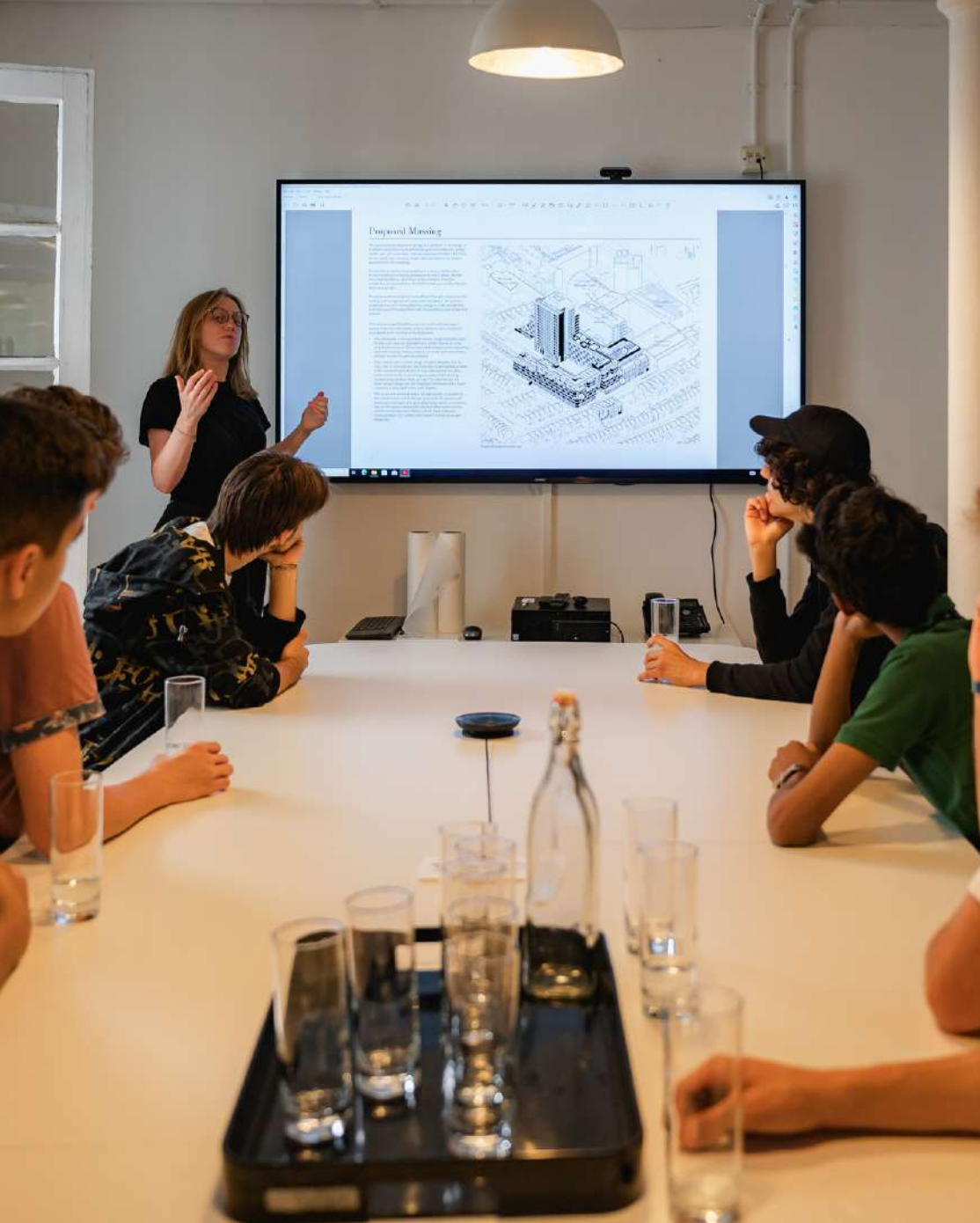
Electrical and Electronic Engineering

Understand how electricity and electronics drive modern innovation. You will explore current, voltage, and circuit theory, along with digital systems and control concepts. Examples drawn from robotics and automation, key strengths in Japan's engineering sector, illustrate how electrical theory supports technological advancement. This topic enhances problem-solving and analytical skills while introducing the principles that underpin electrical and computer engineering.

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Environmental and Sustainable Engineering

Examine how engineers design efficient and sustainable energy systems. You will study thermodynamics, energy transfer, and renewable technologies, exploring how global engineering responds to environmental challenges. Through examples from Asia's rapidly evolving energy landscape, students assess how theory supports sustainable progress. This topic encourages critical thinking and introduces environmental responsibility as an essential part of engineering education.

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Materials and Manufacturing Processes

Investigate how material science supports engineering design and performance. You will study the structure and properties of metals, polymers, and composites, and learn how processing techniques affect quality and durability. Students analyse how engineers choose materials to meet environmental, cost, and performance goals. This topic strengthens research and evaluation skills while building an understanding of materials' role in innovation and sustainable engineering.





Emerging Technologies and Innovation

Explore how new technologies reshape engineering practice and research. You will analyse developments in robotics, nanotechnology, and smart infrastructure, evaluating their impact on industry and society. Using Tokyo's position as a centre of technological innovation as a case study, students consider how academic research drives real-world progress. This part promotes reflective thinking and curiosity, helping students connect their studies to the future of engineering.





Personal Project

Each Academic Insights programme includes an individual project focused on independent research and academic reflection. The Personal Project allows students to explore a specific topic or question in greater depth, applying theoretical knowledge and original thinking. With guidance from their tutor, participants develop their ideas throughout the programme and present their findings at the end. The Personal Project may take the form of essay, presentation, creative piece, or report.





After Your Programme

By the end of the programme, students gain a solid understanding of their chosen subject and how it is studied at university. They leave with enhanced independent thinking, critical research and analysis, and communication skills, as well as confidence for advanced learning. Each participant receives an individual feedback report from their tutor, highlighting strengths, progress, and personalised recommendations for future study. Students can also use their Personal Project and tutor feedback as part of their university applications or portfolios, showcasing both academic ability and intellectual curiosity.

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