Engineering

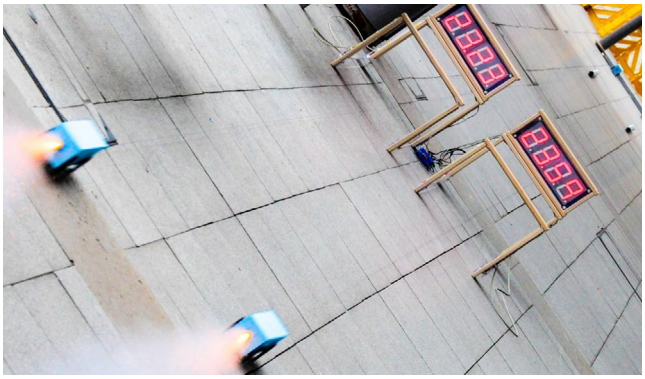
The syllabus aims to enable students to:

- Gain a better understanding of the engineering industry from a commercial and individual engineers point of view
- Understand the nature of different areas of engineering and the demands of the engineering and related industries and evaluate the social, economic and environmental impact of engineering
- Develop a knowledge and understanding of the range of engineering technologies, and the complex sub-groups that make up engineering and related industries
- Apply their knowledge and understanding of engineering, its practical and technological aspects, through project-based practical study of engineering design and production

	Topics Covered	Course Outline
Week 1 Engineering materials, processes & techniques	• Materials: metals, alloys, polymers, elastomers, adhesives, composites & ceramics • Properties of materials: mechanical, physical, thermal, electrical, magnetic and modification of properties • Materials processing: forming, casting and moulding techniques	Engineers need to be familiar with a wide range of materials, manufacturing processes and techniques in order to fully develop new products or modify existing ones. It is important for engineers to appreciate the properties of materials as they govern the way in which they are used. Students will examine the properties of a range of common engineering materials and their suitability for various applications. They will look at the way materials can be shaped into components for use in products, such as by machining or by moulding.
Week 2 The role of an engineer	• Engineering disciplines & services • The application of technology in engineering • Evaluation and modification	Human intervention and new technologies have significantly shaped the modern world. All manufactured objects around us have been engineered; from the transport systems that take us around cities to the mobile communications that help us keep in touch. The role of the engineer has increasingly involved the use of scientific, technical and mathematical knowledge to improve our lives. Students students will investigate the role of an engineer when designing and manufacturing an engineered product or service in order to understand how new technologies, time and cost constraints, and health and safety legislation influenced the engineering decisions made during the design or manufacture of an engineered product.
Week 3 Principles of design, planning and prototyping	• Engineering products • Engineering drawings • Project planning • Manufacturing	Engineers are problem solvers. They are given a specification from a client, which they develop into a practical product or service using their technical knowledge and understanding to obtain an optimum design solution. Students will be guided on how to read, interpret and understand engineering drawings and how to generate their own. Using a client brief students will produce a design solution and plan an engineered project. At the end of the week students will report back to their peers about the project in the form of a short presentation.
Week 4 Applied engineering systems	• Static structural systems • Electro-mechanical systems • Electronics, instrumentation and control • Health and safety factors	Engineered products are many and varied. They range in complexity from everyday items such as bicycles and mobile phones to aircraft and space vehicles. It is often useful to think of these as engineering systems, each with its particular input and output. Students will study through investigation that the more complex products can usually be broken down into a number of interconnected sub-systems. These are often arrangements of mechanical, electrical and electronic components that enable the product to function and be controlled. In this unit you will look at ways in which engineering techniques and principles are applied in some important systems and how systems can be used to solve engineering problems.

Engineering

Students will enjoy two full-day excursions per week. One will be a traditional 'fun' or cultural excursion, with all other students on the Young Professionals programme. The other weekly excursion is known as a study-in-action day, where students visit destinations relating to their chosen academic stream. The locations visited by Engineering students are:



WE ARE CURIOUS:
BLOODHOUND ROCKET
Week 1

Students learn about the science and technology underlying the Bloodhound project, which aims to set a new land speed record of over 1000 mph. The topics include science, technology, engineering and maths.

Students will:

- Design and build their own rocket-powered cars that they then use in the end-of-day rocket-powered race over a 25m track with data-logging timer gates
- Analyse the cars' performance data from the race

ROYAL INSTITUTION OF SCIENCE:
HIGH VELOCITY EGGSPORTER
Week 3

In this high-octane workshop, developed by the Transport Research Laboratory, students design, build and crash their own vehicles. Students also learn about vehicle safety and forces in an immersive, engaging and practical way. Although in the test, the passengers are replaced by eggs, in real life, crash tests help to prevent accidents and the loss of lives and are a crucial part to vehicle safety.

Students will:

- Design, build and crash test their own transport vehicle on a specially designed rig
- Analyse test results with the help of accelerometers attached to the vehicle, and high speed photography

THAMES BARRIER
Week 2

Opened by the Queen in 1984, the Thames Barrier stretches out more than 500m long on the river and cost about half a billion pounds to build – an engineering feat on its own. With its ten gates, raised monthly for testing, the Barrier regulates the tidal surges of the Thames in order to protect the city from flooding.

Students will:

- Learn through a mix of exhibitions, a working scale model and videos about the Barrier's past, present and future in protecting London through science, engineering and technology

MINI FACTORY
Week 4

BMW Group Plant Oxford is the heart and birthplace of the famous MINI: a sight just as famous as the Tower of London, Big Ben, or the red double-deckers. Although there are three different plants in the UK that have had a role in producing these cars, it is the plant in Oxford that has assembled and sent almost 3 million cars to one of the 110 MINI countries!

Students will:

- Tour the plant with an expert guide
- Gain an insight into automotive production
- Learn about the design and engineering science behind the MINI