

Higher Engineering Science

Award Received

Successful completion of the course would result in an award of A-D at Higher level.

Entry Level: What do I need to do it?

Pupils ideally should have National 5 Engineering Science. We will consider pupils who have or attempting Higher Maths as there is a considerable amount of mathematical equations and problem solving required in this subject. If you are in this situation it is best to speak to Mr Martin individually.

Course Content: What will I learn?

The course is suitable for candidates who want to develop a deeper understanding of the central role of engineers as designers and problem solvers. Candidates should be able to respond to a broad and challenging exploration of engineering and will have opportunities to conceive, design, implement and control complex engineering systems. The Higher Engineering Science course covers a variety of Engineering disciplines. The areas covered are Electronics, Computer Control, Systems and Energy, Pneumatics and Mechanisms & Structures. A combination of this course together with a science and a Maths provides a very strong foundation for further study in engineering, the sciences or related careers.

Course Structure – Higher Engineering Science has three areas of study

- **Engineering contexts and challenges** Candidates develop a deep understanding of engineering concepts by exploring a range of engineering problems with some complex features, and their solutions. This allows them to explore some existing and emerging technologies and challenges, and to consider implications relating to the environment, sustainable development, and economic and social issues.
- **Electronics and control** Candidates explore an appropriate range of key concepts and devices used in electronic control systems, including analogue, digital and programmable systems. They develop skills in problem solving and evaluating through simulation, practical projects and investigative tasks across a range of contexts.
- **Mechanisms and structures** Candidates develop a deep understanding of mechanisms and structures. They develop skills in problem solving and evaluating through simulation, practical projects and investigative tasks across a range of contexts.

Teaching Methods: What will I do?

The bulk of the course is delivered through a series of units, each one exploring a new Engineering concept and technique. This is not a practical course as such but pupils will

build electronic and pneumatic circuits which will be tested and readings taken. The mechanisms and structures element is taught through computer simulation.

Pupils will mainly be working individually, although at times it may be appropriate to work in pairs, particularly when constructing electronic and pneumatic circuits.

When working through the units, pupils will use formulae to calculate, voltage, current, resistance, forces, pressure, speeds, gear ratios etc. Time is spent analysing engineering systems and extended written answers are required throughout the course.

Assessment: How will I be assessed?

There are two components that will determine the overall course assessment; a question paper and a course assignment.

Component One – Question Paper (this is worth 69% of the overall mark)

The external question paper is worth 110 marks. The purpose of the question paper is to assess the application of skills, knowledge and understanding from across the course. The question paper is 1 hour in duration.

Component Two – Course Assignment (this is worth 31% of the overall mark)

The practical activity assesses pupil's ability to apply engineering science skills and knowledge developed and acquired during the course. This is done in the context of defined tasks that require candidates to respond to a problem or situation. The assignment is worth 50 marks.

The assignment covers a problem solving process and is split into five areas. These areas are:

- Analysis
- Designing a Solution
- Building the Solution
- Testing
- Evaluation

Homework.

There will be regular homework and end of unit tests. Homework is often exam type questions that will help prepare pupils for the final exam. Homework will also, hopefully, provide further understanding of the key concepts taught in class.

Progression in the Senior Phase.

At present there is no Advanced Higher Engineering Science. S6 pupils may want to convert to Higher Physics or Maths if they do not have this already. There is also a Practical Electronics course available at National 5 for those pupils who may wish to focus on the practical element of Electronics.