Mathematics in the Advanced Engineering Diploma

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Engineering Diploma

- Due to start in September!
- Three levels - Foundation, Higher, Advanced
- Academic concepts and theories - applying them to engineering contexts

Advanced Diploma

- 1080 Guided Learning Hours

- 540 Principal Learning
- 180 Generic Learning
- 360 Additional/Specialist Learning

Structure

- The Engineered World - 60 hours
- Discovering Engineering Technology - 270 hours
- Engineering the Future - 60 hours
- Analytical Methods for Engineering - 150 hours (Maths 60, Science 90)

Aims

- **Prepare learners for employment training at 18-19**
- **Provide learners with academically rigorous study sufficient for H E progression**
- **Provide learners with sub-sector specific pathways**

Mathematics component

Maths is a pre-requisite for any student wishing to study engineering at a high level. Current A Level Maths units may be taken as ASL within the advanced diploma.

HE Institutions are concerned that the current A level Maths units may not provide the required rigour for entry to a CEng programme.

The Advanced Engineering Diploma contains embedded maths and an optional supporting maths unit sufficient for students progressing to a broad range of degrees. This supporting unit has been specifically designed with HE representatives to meet their requirements.

EPC Task Force

- Engineering Professors' Council was concerned about the small mathematics component.
- Sets up a Task Force comprising mathematicians, engineers and representatives from Awarding bodies and QCA.

Task Force role

- To develop a syllabus for an additional learning ‘unit’ based on the Loughborough University mathematics modules taught to Science and Engineering Foundation Studies students.
- Guided Learning Hours are set eventually at 180.

Not just a syllabus

- Teaching ‘in context’
- Engineering exemplars, supported by industry, setting mathematics in the real world of engineering
- Support material for teachers
- Two papers - basic techniques and comprehension of a case study

Learning outcomes - 1

- The idea of mathematical modelling
- Models of growth and decay
- Models of oscillatory behaviour
- Functions and their graphs
- 2D and 3D coordinate geometry
- Differentiation and applications
- Integration and applications

Learning outcomes - 2

- Methods of Linear Algebra
- Statistics and Probability
- Algebraic processes
- Mathematical arguments and proofs
- Translating realistic concepts into mathematics
- Effective use of ICT

Topics - 1

- **Mathematical Models in Engineering**
- **Proportion and Linear Laws**
- **Polynomial Curves**
- **Functions**
- **Trigonometric functions and identities**
- **Exponential and logarithmic functions**
- **Sequences and series** □

Topics - 2

- **Rates of change and differentiation**
- **Stationary points and optimisation**
- **Indefinite integration**
- **Definite integration and applications**
- ***Further techniques of integration***
- **Factor and *remainder* theorems, inequalities**
- ***Complex numbers***

Topics - 3

- **Vector methods**
- ***Matrices and determinants***
- ***Modelling with differential equations***
- **Geometry of conic sections**
- **2D and *3D* geometry**
- **Descriptive statistics**
- **Probability**