

THE ENGINEERING DIPLOMA

ADVANCED LEVEL UNITS

A GUIDE FOR LEARNERS

RKL 16.4.08

What is the Engineering Diploma?

The Engineering Diploma will expand and specialise your knowledge of the exciting and diversified Engineering Industry giving you a unique insight which will allow you to make an informed choice about your future career. As well as understanding the theory behind Engineering Concepts, learners will learn practical skills and develop an ability to solve problems both individually and as part of a team. The course is designed to be interesting, relevant to modern engineering methods and to open up a wide range of educational, training and career opportunities

What does the course involve?

Compulsory Units...

Engineering Diploma learners will complete a series of compulsory and optional units, designed to give them the knowledge, skills and experience. The higher level units have been summarised on the following pages of this booklet.

Work experience...

Diploma learners will do a minimum of 10 days work experience. They will also get the chance to learn from and be mentored by professionals working in their chosen field

The learner project...

All Diploma learners will complete an extended project to demonstrate the skills and knowledge they have acquired. Learners can choose their own project, working with staff from local industries to provide solutions for current contracts.

Additional Specialist Learning...

All Diploma learners can study additional subjects that compliment their studies and enhance career progression or university acceptance.

Personal Learning and Thinking Skills...

Mastering essential life and work skills is crucial in today's competitive market.

All Diploma learners are encouraged to develop skills like teamwork and self management as part of their course. They will learn to express themselves confidently and how to apply their knowledge and skills creatively in a business environment

What could the Diploma lead to?

The Diploma is designed to broaden a person's horizons and give them a wide range of next-step options. The Progression and Advanced Diploma could both lead onto college or university or to further training and employment. Learners who have completed the Advanced Diploma in Engineering might choose to go on to do a University Degree and study to become a design engineer for the motor industry or aeronautical industry for example or go on to study in a different area. They could also decide to start an Apprenticeship or take a job with further training

A Diploma in engineering does not mean learners have to pursue a career in the engineering Industry. A Diploma gives a learner relevant and transferable skills that will be welcomed by colleges, universities and employers

THE ENGINEERING DIPLOMA - ADVANCED LEVEL

Unit 1: Investigating Engineering Business and the Environment

Externally assessed

This unit will help you develop your understanding of business, the commercial aspects of engineering and its effects on the environment. It will also provide you with a firm foundation for employment in the engineering sector and an understanding of the organisational, financial, legal, social and environmental constraints within which an engineering company operates. In order to develop an understanding of the impact of health and safety on how an engineering company operates, you will examine relevant legislation and also conduct a risk assessment for an engineering activity.

On completion of this unit, a learner should:

- LO.1. Know how an engineering business is structured and how it operates
- LO.2. Know about internal and external factors that affect the way in which an engineering business operates
- LO.3. Know about and apply financial and planning concepts, and costing and planning techniques
- LO.4. Know the importance of legislation concerning health and safety including a risk assessment for an engineering activity.

Unit 2: Applications of Computer Aided Designing

Internally assessed

Engineering design used to involve many hours laboriously spent at a drawing board, but these days the use of computer software packages for design and presentation purposes has become standard practice. Packages range from relatively simple 2D CAD (two-dimensional Computer Aided Design) to much more complex 3-dimensional solid models and real-image representations.

- LO.1. Know about computer systems and methods of data storage
- LO.2. Know about the capabilities of design, presentation, testing and analysis software packages and how they are used as tools within engineering
- LO.3. Be able to use a CAD package to produce 2D drawings
- LO.4. Be able to use design software to produce 3D models for use as presentation drawings or as data for other software uses
- LO.5. Be able to use testing and analysis simulation software as a design support tool.

Unit 3: Selection and Application of Engineering Materials

Internally assessed

When a component fails in service, engineers must be able to understand why this has happened. A change of design, or a change to a more suitable material can then be made to reduce the risk future failure. In this unit you will find out about the structure of materials, their properties and forms of supply. You will get to know about the effects of processing and also the ways in which materials can sometimes fail in service. Information on materials is available from a number of sources and you will be introduced to some of these so that you can make selections for given purposes.

- LO.1. Know about the structure and their effects on the mechanical properties of engineering materials
- LO.2. Know about the forms of supply, applications and the selection of engineering materials
- LO.3. Know about the impact of processing on the structure of engineering materials
- LO.4. Know about the effects of loading, modes of failure and carry out testing of engineering materials.

Unit 4: Instrumentation and Control Engineering

Internally assessed

This unit will provide you with the opportunities to learn about and apply the underpinning theory behind control systems. It will also enable you to investigate the principal elements and components within instrumentation and control engineering systems including the mathematical principles required for the design and implementation of a simple control system. The topic will help you develop an understanding of instrumentation and control applications in a range of applications

- LO.1. Understand the difference between analogue and digital signals and the need for various forms of transmission media
- LO.2. Know about the use of sensors, transducers and instrumentation displays in instrumentation and control applications
- LO.3. Understand the principles and difference between open loop and closed loop systems
- LO.4. Understand the use of programmable logic controllers in instrumentation and control applications
- LO.5. Understand applications of control engineering.

Unit 5: Maintaining Engineering Plant, Equipment and Systems

Internally assessed

In this unit you will get involved with both planning and carrying out maintenance activities. You will discover what may happen when things go wrong and are not properly maintained. You will find out about the consequences of plant, equipment or systems failure and what happens to production when these are not properly maintained. You will also find out about how data is collected and used to check on performance and the condition of the plant, equipment or system. You will look at maintenance strategies and with this knowledge plan a maintenance activity.

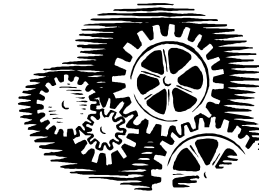
LO.1. Know about the cost of maintenance and the consequences of plant, equipment or system failure including the effects on production
LO.2. Be able to deploy effective maintenance strategies when planning a maintenance activity
LO.3. Know how the data gathered from monitoring the performance and condition of engineering plant, equipment or system can be used
LO.4. Be able to carry out a risk assessment and follow a maintenance plan using documentation for a maintenance activity on a closed loop engineering system.

Unit 6: Investigating Modern Manufacturing Techniques used in Engineering

Internally assessed

You will learn about new and innovative production systems and the processes that are now employed in this vibrant sector of the British economy. You will be able to examine where new 'lean manufacturing' systems are used and where different levels of automation can be effectively deployed. The unit will also provide you with the opportunity to put your knowledge of production planning, quality control and associated techniques into practice through practical activities done in collaboration, where possible with industry.

LO.1. Understand the differences between traditional and modern manufacturing production systems used within engineering industries
LO.2. Understand how different types of manufacturing processes utilise computer aided manufacturing systems
LO.3. Be able to plan for the production of an engineered product for industry
LO.4. Be able to work in a team and apply quality control and quality assurance systems.



Unit 7: Innovative Design and Enterprise

Internally assessed

In completing this unit, you will be encouraged to investigate how our modern world is being shaped by a combination of innovation, the use of new and exciting technologies, leading edge design ideas and people with enterprise and an entrepreneurial spirit.

LO.1. Know how a successful new product evolves
LO.2. Know about individuals who have become successful engineering entrepreneurs
LO.3. Understand how engineering activities impact on society and the environment
LO.4. Be able to produce or improve designs in an innovative way
LO.5. Know about opportunities for success when bringing a new product to market.

Unit 8: Mathematical Techniques and Applications for Engineers

Externally assessed

The unit provides the essential mathematical knowledge that you will need in order to successfully study several of the other Advanced units, such as
Unit 1: Investigating Engineering Business and the Environment
Unit 3: Selection and Application of Engineering Material
Unit 4: Instrumentation and Control Engineering
Unit 9: Principles and Application of Engineering Science.

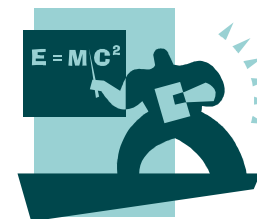
You will also need to demonstrate a proficiency in mathematics if you are planning to continue your study of engineering at a higher level.

On completion of this unit, a learner should:

- LO.1. Know how to use algebraic methods to solve engineering problems
- LO.2. Be able to use trigonometric methods to solve engineering problems
- LO.3. Be able to use statistical methods to display engineering data
- LO.4. Know how to apply elementary calculus techniques to solve engineering problems.



Mathematics is an essential tool used by engineers every day. An understanding of mathematics and an ability to apply it to the solution of common engineering problems is a skill that you need to develop during your study of engineering. Typical applications of mathematics involve determining the maximum load that can be applied to a beam, calculating the amount of energy required to operate a hoist, finding the distance travelled by a vehicle in a given time, and determining the power delivered by an amplifier to a loudspeaker.

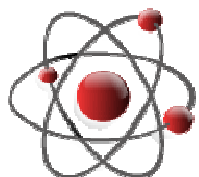


Unit 9: Principles and Application of Engineering Science

This unit provides the essential scientific principles that will help in your study of some other Advanced units, such as:

- LO.1. Be able to apply mechanical principles to determine the effects of forces in engineering systems
- LO.2. Be able to apply mechanical principles to determine the effects of motion, work and energy transfer in engineering systems

Internally assessed



Unit 3: Selection and Application of Engineering Materials,
Unit 4: Instrumentation and Control Engineering and
Unit 7: Innovative Design and Enterprise.

A good understanding of scientific principles is also an essential prerequisite if you are planning to continue your study of engineering at a higher level.

- LO.3. Be able to apply electrical principles to determine the effects of electric charge and current and determine the voltage, current, resistance and power in electrical circuits
- LO.4. Be able to apply the principles of heat and thermodynamics to determine the effects of expansion and compression of gases and energy transfer in engineering systems
- LO.5. Know about the principles of chemistry and the effects of chemical processes and reactions
- LO.6. Be able to apply the principles of fluid dynamics to determine the effects of viscosity and the forces acting in hydrostatic systems.