

## Design Technology

Unit Reference Number	T/618/6102
Unit Title	Design Technology
Unit Level	3
Number of Credits	10
Total Qualification Time (TQT)	100
Guided Learning Hours (GLH)	40
Mandatory / Optional	Mandatory
Sector Subject Area (SSA)	14.1 Foundations for learning and life
Unit Grading Structure	Pass / Fail

### Unit Aims

The aim of this unit is for learners to understand the development of approaches for solving design problems and the selection of appropriate materials. This unit also enables the learner to develop the skills and knowledge in computer aided design (CAD), in terms of producing 2D drawings.

### Learning Outcomes, Assessment Criteria and Indicative Content

Learning Outcomes – The learner will:	Assessment Criteria – The learner can:	Indicative contents
1. Demonstrate knowledge and understanding of engineering products and design.	1.1 Discuss the triggers that stimulate engineering design activity. 1.2 Evaluate commercial, regulatory or public policy-based trends that challenge current technology or design. 1.3 Discuss sustainability issues in product design process.	<ul style="list-style-type: none"> <li>• The triggers that stimulate engineering design activity, including:                             <ul style="list-style-type: none"> <li>○ market pull/technology push (product and process)</li> <li>○ demand</li> <li>○ profitability</li> <li>○ innovation</li> <li>○ market research</li> <li>○ product/process performance issues</li> <li>○ sustainability (carbon footprint)</li> <li>○ designing out risk.</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>• Design challenges             <ul style="list-style-type: none"> <li>○ reduction of energy wasted during design of an engineered product</li> <li>○ reduction of energy wasted during operation of an engineered product</li> <li>○ reduction of physical dimensions</li> <li>○ reduction of product mass</li> <li>○ increase in component efficiency</li> <li>○ energy recovery features</li> <li>○ reduced product life cycle costs</li> <li>○ integration of different power sources for vehicles</li> <li>○ reduced use of resources in high-value manufacturing</li> <li>○ designing out risk (for individual employees and customers).</li> </ul> </li> <li>• Sustainability issues throughout the product life cycle (raw materials, manufacture, packaging and distribution, use and reuse, end of life)</li> </ul>
<p>2. Understand how to apply a systems approach to electrical design.</p>	<p>2.1 Explain with examples the systems approach to electrical and electronic design.</p> <p>2.2 Explain the applications, function and operation of a range of input and a range of output devices.</p>	<ul style="list-style-type: none"> <li>• How to apply a systems approach to electrical design i.e.             <ul style="list-style-type: none"> <li>○ open and closed loop</li> <li>○ input, process and output</li> <li>○ feedback</li> <li>○ development of system block diagrams</li> </ul> </li> <li>• Function, application and operation of input devices i.e.             <ul style="list-style-type: none"> <li>○ switches (i.e. latched and momentary action)</li> <li>○ photodiode</li> <li>○ phototransistor</li> <li>○ LDR</li> <li>○ NTC thermistor</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>○ microphone</li> <li>● Function, application and operation of output devices, i.e.             <ul style="list-style-type: none"> <li>○ piezo-electric buzzers/sounders</li> <li>○ lamp</li> <li>○ Light Emitting Diode (LED)</li> <li>○ LED 7 segment display</li> <li>○ Dot matrix display</li> <li>○ Liquid Crystal Display (LCD) display module</li> <li>○ solenoid</li> <li>○ relay</li> <li>○ speaker</li> </ul> </li> </ul>
<p>3. Be able to produce 2D CAD drawings.</p>	<p>3.1 Set drawing parameters on the CAD system.            3.2 Explain the reasons for using structured layers and how they are created.            3.3 Explain the function of the commands used in producing 2D CAD drawings.            3.4 Produce 2D CAD drawings that contain essential technical information.</p>	<ul style="list-style-type: none"> <li>● Parameters: limits to suit component dimensions and paper size, drawing aids to draw entities accurately (grid spacing, snap interval, object snap mode, orthogonal mode, units benefits and limitations of using the drawing aids)</li> <li>● Layers: apply meaningful names, assign line types, assign colours, control the visibility of layers</li> <li>● Commands: line, polyline, circle, arc, polygon, rectangle, ellipse, doughnut, erase (single entities, multiple entities)</li> <li>● Technical information: projection type (pictorial: isometric, oblique; orthographic: first angle, third angle) units, scale, shape, size including tolerance, surface finish, number off, material requirements, special treatment</li> <li>● Conventions: BS 8888, types of line representation of common features</li> </ul>

## Assessment

To achieve a 'pass' for this unit, learners must provide evidence to demonstrate that they have fulfilled all the learning outcomes and meet the standards specified by all assessment criteria.

Learning Outcomes to be met	Assessment criteria to be covered	Type of assessment
All 1 to 3	All AC under LO 1 to 3	Coursework – The assessment focuses on breadth, challenge and application. Learners will draw on and extend the skills they have learned during the teaching of the unit.

## Indicative Reading list

- Gindis, E. and Kaebisch, R.C. (2021). *Up and running with AutoCAD 2021: 2D and 3D drawing, design, and modeling*. London, United Kingdom: Academic Press, An Imprint of Elsevier.
- Hamilton, S. (2007). *An analog electronics companion: basic circuit design for engineers and scientists and introduction to SPICE simulation*. Cambridge: Cambridge University Press.