

Engineering Design Overview – Year 10

OCR Level 1/ level 2 Cambridge National in Engineering Design – This course is taught over 5 hours a fortnight

	Autumn 1 - Spring 1	Spring 2 - Summer 1
Topic(s)	RO39 Topic 1: manual production of free hand sketches Topic 2: production of engineering drawing Topic 3: use of computer aided design	RO40 Topic 1: product evaluation Topic 2: modelling design ideas
Topic Objectives	<ul style="list-style-type: none"> Produce freehand sketches using 2D/3D sketches, shading and annotations. Create isometric sketches for design proposals. Develop engineering drawing including third angle orthographic, projection and assembly drawings. Use CAD to model Anna render 3D designs, Including complex shapes and assemblies. Apply CAD tools to create assemblies with components and animations. 	<ul style="list-style-type: none"> Analyse and compare products using Access FM and Engineering matrices. Disassemble products to assess their components, materials, and assembly methods. Create virtual 3D CAD models and simulate product performance. Produce physical prototypes using appropriate materials and tools. Record key stages of prototype creation and compare against design specification.
Acquired Knowledge/Skills	<p>Unit RO39 focuses on the skills required to effectively communicate engineering designs. Students will learn to produce freehand sketches, create technical drawings, and use CAD to develop and present design proposals. The unit includes methods for 2D and 3D visual representation, annotations, and using CAD software to creating and assembling design components.</p> <ul style="list-style-type: none"> Skills in freehand sketching with various line weights, textures and tone. Understanding of orthographic projection an assembly drawings. Familiarity with CAD tools for creating 3D models and assemblies. Knowledge of CAD geometry, dimensioning and rendering techniques. Ability to create exploded views and sectional drawing. 	<p>Unit RO40 focuses on evaluating and modelling design ideas to ensure they meet specific criteria. Students will learn to analyse products using tools like Access FM, create both virtual and physical models, and evaluate product performance and functionality. The unit includes disassembling products to understand their design, components and manufacturing process along side creating 3D CAD models and prototypes.</p> <ul style="list-style-type: none"> Understanding of product evaluation techniques like Access FM and QFD. Skills in product disassembly, including the use of tools and analysis of components. Proficiency in creating and simulating 3D CAD models. Experience in selecting materials and processes for prototype production. Knowledge of safe working practises and recording methods like Gantt charts and work plans.
Assessments	OCR- set assignment Centre assessed and OCR moderated This set assignment contained 4 practical tasks. It should take approximately 10-12 GLH to complete	OCR- set assignment. Centre assessed and OCR moderated. This set assignment contains six practical tasks. It should take approximately 10-12 GHL to complete.

Citizenship	<ul style="list-style-type: none"> • PSHE Development - Students build resilience, problem-solving and critical thinking through iterative design, while teamwork and communication develop social skills. Ethical and environmental awareness supports responsible choices, helping students grow in independence, confidence and employability. • Careers Education - The course develops practical and theoretical skills relevant to engineering, design and manufacturing, including CAD, design principles and project management. Students gain industry-aligned, transferable skills that prepare them for further study, apprenticeships and careers such as design engineer or CAD technician. • Fundamental British Values - Democracy is reinforced through group decision-making; the rule of law through health and safety and industry standards; and individual liberty through creative freedom and independent problem-solving. Collaborative work promotes mutual respect and tolerance by valuing diverse ideas and cultural influences. • SMSC Development - Creativity and reflection support spiritual growth, while considering sustainability and ethical resource use develops moral understanding. Teamwork and peer collaboration strengthen social skills, and exploring global design traditions builds cultural awareness and appreciation.
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Engineering Design Overview – Year 11



OCR Level 1/ level 2 Cambridge National in Engineering Design – This course is taught over 5 hours a fortnight		
Autumn 1 - Spring 1		Spring 2 - Summer 1
Topic(s)	RO39 Topic 1: manual production of free hand sketches Topic 2: production of engineering drawing Topic 3: use of computer aided design	RO40 Topic 1: product evaluation Topic 2: modelling design ideas
Topic Objectives	<ul style="list-style-type: none"> • Produce freehand sketches using 2D/3D sketches, shading and annotations. • Create isometric sketches for design proposals. • Develop engineering drawing including third angle orthographic, projection and assembly drawings. • Use CAD to model Anna render 3D designs, Including complex shapes and assemblies. • Apply CAD tools to create assemblies with components and animations. 	<ul style="list-style-type: none"> • Analyse and compare products using Access FM and Engineering matrices. • Disassemble products to assess their components, materials, and assembly methods. • Create virtual 3D CAD models and simulate product performance. • Produce physical prototypes using appropriate materials and tools. • Record key stages of prototype creation and compare against design specification.
Acquired Knowledge/Skills	Unit RO39 focuses on the skills required to effectively communicate engineering designs. Students will learn to produce freehand sketches, create technical drawings, and use CAD to develop and present design	Unit RO40 focuses on evaluating and modelling design ideas to ensure they meet specific criteria. Students will learn to analyse products using tools like Access FM, create both virtual and physical models, and evaluate product

	<p>proposals. The unit includes methods for 2D and 3D visual representation, annotations, and using CAD software to creating and assembling design components.</p> <ul style="list-style-type: none"> • Skills in freehand sketching with various line weights, textures and tone. • Understanding of orthographic projection an assembly drawings. • Familiarity with CAD tools for creating 3D models and assemblies. • Knowledge of CAD geometry, dimensioning and rendering techniques. • Ability to create exploded views and sectional drawing. 	<p>performance and functionality. The unit includes disassembling products to understand their design, components and manufacturing process along side creating 3D CAD models and prototypes.</p> <ul style="list-style-type: none"> • Understanding of product evaluation techniques like Access FM and QFD. • Skills in product disassembly, including the use of tools and analysis of components. • Proficiency in creating and simulating 3D CAD models. • Experience in selecting materials and processes for prototype production. • Knowledge of safe working practises and recording methods like Gantt charts and work plans.
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