ENGINEERING: OCR- Engineering Design Level 1/Level 2 - J822

Year 11

What are the aims and intentions of this curriculum?

Cambridge National Engineering Design is practical, accessible, fun to teach and exciting to learn, it inspire students to develop real-world skills to prepare them for their future. Additionally, the course develops students so they are able to identify market opportunities and solve problems, which contribute to the development of new products and systems. This qualification is aimed at learners who wish to study the processes involved in designing new engineered products and the requirements of a design specification. Through research and practical activities, learners will understand how market requirements and opportunities inform client briefs.

They will also learn how to communicate ideas using a variety of engineering conventions that include freehand sketching, formal drawing techniques , which include Computer Aided Design and Computer Aided Manufacturing. The Cambridge Nationals in Engineering Design encourages learners to communicate and consult with a client to develop a viable and innovative product. Learners will apply practical skills to produce a prototype in the form of a model and test design ideas to inform further product development. Through reflection, learners evaluate the prototype, making a comparable outcome against specification points, and assess possible, practical solutions and improvements to their prototype design. This course prepares students to continue their studies at surrounding colleges at KS5 completing Level 3 qualifications or the opportunity to start apprenticeships in areas such as Engineering, Carpentry and plumbing.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	**R038:** 1 Methods of evaluating design ideas. Design requirements; user needs, manufacturing considerations, and influences on engineering product design **R040**: Product analysis and disassembly activity **R040**: NEA Assessment (working on)	Methods of evaluating design ideas □ Production of models □ Qualitative comparison with the design brief and specification □ Ranking matrices □ Quality Function Deployment (QFD)	Students will understand and explain the type of information that can be obtained using each type of modelling process. • Identify the equipment required and stages involved in each method. • State the advantages and limitations of each method. • Students will be able to use both primary and secondary research to identify the strengths and weaknesses of existing products. **Future opportunities** By applying the practical skills and knowledge developed in this course can progress on to A Levels, a Cambridge Technical in Engineering, an apprenticeship or university. **Graduate opportunities**	Summative and formative assessment. Questioning Research and presentation Peer assessment Teacher assessment Course work grade

			• **Drafting Technician** • **CAD Drafter** • **CAD Designer** • **Project Manager/Engineer** • **Manufacturing Engineer** • **Design Engineer** • **Process Engineer** • **Biomedical Engineering** • **Mechanical Engineering**	
Autumn 2	**R040:** Virtual CAD modelling activity **R040**: Virtual CAD/Physical modelling activity **R040**: NEA Assessment (working on)	Modelling methods □ Virtual (3D CAD) □ Card □ Block □ Bread boarding □ 3D printing Methods of evaluating a design outcome. □ Methods of measuring the dimensions and functionality of the product □ Quantitative comparison with the design brief and specification □ User testing □ Reasons for identifying potential modifications and improvements to the design. **Product analysis.** Carry out product analysis using ACCESS FM. □ Aesthetics □ Cost □ Customer □ Environment □ Size □ Safety □ Function □ Materials and manufacturing Compare products using: □ Ranking matrices □ Quality Function Deployment (QFD).	Identify and explain the advantages and limitations of each method. Students will need to describe at least one modelling method in the creation of a product prototype and give one example of a product produced using one of the modelling methods. Students will access to 3D CAD software in order to produce a virtual 3D model from the product specification provided. Students will effectively produce different views of the virtual 3D model and simulate the operation of the product. Students will be able to use ACCESS FM to analyze the specified product and compare products using an appropriate customer driven engineering matrix. **Mental Health and Well being** Engineering has always been characterized by its rigor, emphasis on productivity, resiliency and hard work. Student will be encouraged to come forwards if workload becomes too much to handle. A safe space will be provided for	Summative and formative assessment. Questioning Research and presentation Peer assessment Teacher assessment Course work grade

			students to talk about their emotions accurately and sensitively using appropriate vocabulary. Curriculum will be tailored so all students are able to access it. Teachers will know how to recognize early signs of mental wellbeing concerns. Personal guidance Every student will have opportunities for guidance interviews with a career adviser, who could be internal (a member of school or college staff) or external, provided they are trained to an appropriate level.3. These will be available for all students whenever significant study or career choices are being made. They will be expected for all students but will be timed to meet their individual needs.	
Spring 1	**R040:** Virtual CAD/Physical modelling activity **R039:** NEA Assessment (resubmit for moderation)[1] **R040**: NEA Assessment (submit for moderation) [1] **R038:** Examination (early opportunity)	Carry out product disassembly □ Use of manufacturers manuals or other published sources □ Use appropriate tools and instruments □ Analyze the disassembled product ♣ components and their functions ♣ assembly methods ♣ materials ♣ production methods ♣ maintenance considerations Methods of modelling Virtual CAD 3D ◆ Create a 3D model using CAD 3D software. ◆ Simulate the operation of the product using CAD software	Students will undertake a product disassembly carefully, under close supervision, and following safety guidelines, in order to analyze how it is made and assembled. Students will compile a step-by-step photographic evidence of the disassembly, and explain how they used tools and instruments safely. **Develop the creative, technical and practical expertise needed to perform everyday tasks confidently and participate successfully increasingly in a technological world.** **Understand and respectful relationships, including friendships.** The legal rights and responsibilities regarding equality will be reinforced with reference to the	Summative and formative assessment. Questioning Research and presentation Peer assessment Teacher assessment Course work grade

			protected characteristics as defined in the Equality Act 2010 that everyone is equal and unique. Students must consider that not all their peers will be able to efficiently use the CAD 3D software to create their models and should be mindful of that. They will be encouraged to offer help to their peers and not criticize their effort. **Future opportunities** If you are drawn to a career that utilizes CAD, you may have already looked into becoming a CAD engineer. The term CAD means "Computer-Aided Design" and holds an array of jobs under its umbrella. A CAD engineering expert has a particular profession as they create designs in 2D and 3D drafting projects for various plans. These plans can be used in many different fields, ranging from mechanical to electrical including chemical engineering. This article is designed to look at a CAD engineer's tasks and what you can expect in this role.	
Spring 2	**R038:** Revision of topic areas/exam revision **R040**: Physical modelling activity	Physical modelling □ Select an appropriate modelling method: ♣ sheet ♣ block ♣ bread boarding ♣ 3D printing □ Select and use appropriate materials, processes, tools and equipment to produce a prototype. □ Apply safe working procedures when making the prototype □ Record the key stages of making the prototype. □ Compare the prototype against the product design specification.	Students will be able to plan the production of a prototype, and identify and plan the different stages required to manufacture it. Students will analyze the risk assessment that they can use as part of their production plan. Students will be able to follow their production plan in order to produce a prototype, working safely at all times. Students will take photographs at each stage, and keep a diary of the activities that they carry out. Students will evaluate their manufactured prototype against the product specification, and	Summative and formative assessment. Exam past paper questions. Revision resources.

		□ Identify potential improvements in the design.	suggest a range of potential design improvements. **Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work.** **Understand and respectful relationships, including friendships.** Students will know the characteristics of positive and healthy friendships in all contexts including online. They will respect each other when working in groups and doing peer assessments. Students will show solidarity, honesty, generosity and respect to other cultures when doing their prototypes. They will not discriminate against others and always respect others' boundaries and decisions.	
Summer 1	**R038:** Exam revision **R038:** Examination (final opportunity) **R040**: NEA Assessment (submit for moderation)[1]		**R040**: NEA Assessment. (**Practical)** Basic first aid and Health and Prevention Student will understand the basic procedure if they sustain cuts and burns from tools and soldering iron. They will carry out risk assessment and teacher will demonstrate the use of all tools, equipment and machines. Students will also know the procedure to be taken in the event of accidents. All students will be thoroughly assessed and given a certificate before they are allowed to use the machines.	Past paper questions
