Design & Technology

Key Stage 4 - Year 10

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Design and Technology: Product Design	Materials and their working properties	Designing Principles		Making Principles		New and emerging technologies
	One lesson a week students will also complete a series of practical tasks					NEA
Engineering and Manufacturing	R014: Reading engineering drawings	R014: Engineering materials	R014: Manufacturing processes	R014: Manufacturing processes	R014: Manufacturing processes	R015: NEA assessment (submit for moderation)
	R015: Interpreting engineering drawings in preparation for manufacture	R015: Planning for manufacture / risk assessment	R015: Workshop practice – marking out and using tools / equipment	R015: Workshop practice / NEA assessment	R015: Workshop practice / NEA assessment	
Hospitality and Catering	The industry, job roles and requirements	Factors affecting success Hospitality operations	Hospitality operations Health and safety	Food safety	Food safety	Food safety Meeting customer needs

Design & Technology: Product Design

Key Stage 4 – Year 10

In Year 10 you will learn about ……..

Term	Topic	Knowledge, Skills and Understanding
Autumn 1	Materials and their working properties	Students will learn about the physical and working properties of materials across a range of material areas including papers and boards, natural and manufactured timbers, metals and alloys, polymers and textiles.
Autumn 2 Spring 1	Designing principles	Students will learn how to complete investigative research through primary and secondary data. They will learn how primary and secondary data can be collected to assist the understanding of client and user needs. Students will learn how to write a design brief and produce a manufacturing specification. They will learn how the environment, and social and economic challenges influence designing and making. Students will investigate the work of others other design companies and analyse and evaluate their work. They will understand how investigating the work of other designers and design companies can inform designing. They will develop design strategies and be able to use a range of them to help produce imaginative and creative design ideas. They will also understand how to explore and develop design ideas. Students will know how to communicate, record and justify design ideas and be aware of a range of techniques to support clear communication of design ideas. They will know how to design and develop prototypes in response to client wants and needs and be able to critically evaluate prototypes and suggest modifications.
Spring 2 Summer 1	Making principles	Students will learn how to select and use materials and components appropriate to a specific task and understand how functionality, availability and cost can all affect the selection of materials and components. They will develop an understanding of how tolerances are used to ensure accuracy when making a product and understand how a range of materials are formed to designated tolerances. They will develop an understanding of why tolerances are applied during making activities and how additional material may be required or removed by a cutting method. Students will learn how effective design planning can minimise waste and learn how to be aware of how design adaptations and use of tessellation can save time and materials. They will learn the value of using measurement and marking out to create an accurate prototype and understand the use of datum points and coordinates. They will be able to recognise and characterise the appropriate tools and methods to mark out a range of materials to create prototypes and how to select and use specialist tools, equipment, techniques and processes and be aware of relevant health and safety issues when using specialist tools, equipment, techniques and processes to protect themselves and others from harm. They will know and understand that surface treatments and finishes are applied for functional and aesthetic purposes and know how to prepare different surfaces for treatments and finishes.
Summer 2	New and emerging technologies	Students will learn about the design and organisation of the workplace as well as specialist tools and equipment. They will know that new technologies need to be developed and produced in a sustainable way and be aware of the impact that excessive use of certain materials has on the environment. They will understand how the environment can be protected by responsible design and manufacturing and how waste can be disposed of with the least impact on the planet an well as the positive and negative impacts new products have on the environment. Students will learn how technology push and market pull affect consumer choice and employment, understand changes in job roles due to the emergence of new ways of working, be aware of changes in fashion and trends and how they affect designers and manufacturers and understand how new products can have both a positive and negative impact on society. They will explore contemporary and potential future use of automation, Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM), be able to recognise and characterise the use of Flexible Manufacturing Systems (FMS) and understand how Just In Time (JIT) and Lean Manufacturing contribute to manufacturing efficiencies. Students will be able to evaluate the advantages and disadvantages of planned obsolescence from different perspectives

Design & Technology: Engineering and Manufacturing

Key Stage 4 – Year 10

In Year 10 you will learn about ……..

Term	Topic	Knowledge, Skills and Understanding
Autumn 1	Interpreting engineering drawings	Students will be required to understand standard drawing conventions and interpret drawings in preparation to manufacture components by hand and machine, including programming for computer numerical control (CNC), and to be able to perform quality control checks. They will need to apply their skill at interpreting engineering drawings throughout the NEA units in preparation for the assessments.
Autumn 2	Engineering materials Planning for manufacture Understanding risk	Students need to develop an understanding of the types and properties of engineering materials and how these are processed by hand and machine. Being able to accurately plan for manufacture by hand and machine will be required in both NEA Units R015 and R016 and this will help students develop a key skill in how to plan. It is crucial that students work safely in all practical aspects of the qualification. This is achieved through risk assessment activities, planning, developing standard operating procedures and through demonstrating safe working in practice in the workshop. This will be a key transferrable skill they will demonstrate in assessment activities, take into other activities and the workplace.
Spring 1	Using manual processes, tools and machines	Students will learn about and practically apply a range of manufacturing processes. Throughout both NEA units, students will gain valuable skills at using hand tools and manual and computer-controlled machines. They will develop and refine these skills through a series of practice activities in preparation for undertaking the NEA assessments in R015 and R016.
Spring 2		
Summer 1		
Summer 2	NEA	There is often a need to manufacture one-off products in engineering. This might be for a unique application or product, or there may be a need to manufacture replacements for failed items. In addition, there will often be the need to produce a prototype in order to evaluate a design. In this unit students will learn to identify the information required to make a product, plan the production of a product and carry out risk assessments for the processes, tools and equipment needed to produce a product in small quantities. They will also learn how to select and safely use the equipment, processes and tools required to mark out, measure and manufacture a product in small quantities, using a range of hand-held equipment and conventional (non-Computer Numerical Control (CNC) machining methods.

Design & Technology: Hospitality and Catering

Key Stage 4 – Year 10

In Year 10 you will learn about ……..

Term	Topic	Knowledge, Skills and Understanding
Autumn 1	The industry, job roles and requirements	Students will develop an understanding of the environment in which hospitality and catering providers operate. They will learn how to describe the structure of the hospitality and catering industry. They will explore types of provider, types of service, commercial establishments and non-commercial catering establishments. They will learn about standards and ratings for various types of establishments and about job roles within the industry and the qualities and skills that each job role requires. Students will learn to analyse job requirements based on supply and demand, jobs for specific needs, rates of pay, training, qualifications and experience. They will also explore personal attributes that are required for various job roles as well as working conditions of employees.
Autumn 2	Factors affecting success Hospitality operations	Students will develop an understanding of the environment in which hospitality and catering providers operate and will be able to explain the factors that affect the success of hospitality and catering providers. Students will look at costs, profit and economy. They will develop an understanding for environmental issues, the use of technology and emerging and innovative cooking techniques. Students will explore customer demographics, lifestyles and expectations, customer service and service provision and businesses successfully tackle the competition. They will also explore trends, political factors and media. Students will be able to describe the operation of a kitchen and front of house in regards to layout, work flow, operational activities, equipment and materials, stock control and dress code.
Spring 1	Hospitality operations Health and safety	Students will further develop an understanding of how hospitality and catering provisions operate and will be able to explain how they meet customer requirements. They will explore the various types of customer for example, leisure, business/corporate and local residents. They will look at the requirements of customer needs, customer expectations, customer trends, equality and customer rights. Students will learn how hospitality and catering provision meets health and safety requirements, they will explore personal safety responsibilities in the workplace, risks to personal safety and personal safety control measures.
Spring 2	Food safety	Students will learn how food can cause ill health exploring bacteria, microbes, chemicals, metals, poisonous plants, allergies and intolerances. They will also learn about the role and responsibilities of the Environmental Health Officer.
Summer 1	Food safety	Students will continue to learn how food can cause ill health exploring safety legislation, the food safety act, HACCP, food hygiene and food labelling. Students will also learn about common types of food poisoning including salmonella, E-coli, clostridium perfringens, listeria, bacillius cereus and staphylococcus aureus.
Summer 2	Food safety Meeting customer needs	Students will continue to learn how food can cause ill health exploring the symptoms of food induced ill health, looking at both visible and visible symptoms. They will look at the eight most common food allergies and what symptoms may appear following exposure to these foods. Students will develop an understanding of how to propose a hospitality and catering provision to meet specific requirements.

Design & Technology

Key Stage 4 - Year 11

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Food related causes of ill health
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Hospitality and catering providers
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Customer requirements in hospitality and catering
Hospitality and catering provision to meet specific requirements
Health and safety in hospitality and catering provision
Food Safety</td><td></td></tr>
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Design & Technology: Product Design

Key Stage 4 – Year 11

In Year 11 you will learn about ……..

Term	Topic	Knowledge, Skills and Understanding
Autumn 1	Energy, materials, systems and devices	Students will explore how power is generated from oil, gas, coal and nuclear sources and how renewable energy is generated from a variety of sources. They will look at arguments for and against the selection of fossil fuels, nuclear power and renewable energy. Students will understand the difference between alkaline and rechargeable batteries. They will be able to describe kinetic pumped storage systems. They will know the names and definitions of a range of modern, smart and composite materials and how they might be applied to given situations. They will understand the unique properties of technical textiles and justify suitable applications. Students will know the benefits of microencapsulation. They will be able to recognise and describe a range of input and output components, physically and symbolically and understand that all systems comprise of one or more inputs, processes and outputs. They will be able to suggest a suitable input or output device for a given scenario and recognise different types of mechanical movement. They will be able to state examples of first, second and third order levers and understand how linkages change the direction of movement as well as suggest a suitable linkage for a given scenario. Students will be able to recognise different types of cams and followers and understand that pulleys can change the magnitude of force required to lift mass and how the action of forces, levers and gears transmit and transform the effects of forces.
Autumn 2	Specialist technical principles	Students will be able to name and describe each of the different forces and stresses and understand the impact they have on different materials and objects. They will be able to recognise and explain how materials have been stiffened or reinforced using a range of techniques and give examples of the use of bending, lamination, folding, webbing and interfacing and explain how it affects the strength of a material. They will understand ecological and social footprint and be able to describe the ecological and social footprint left by designers. Students will understand how deforestation, mining, drilling and farming affect our ecological footprint and that carbon dioxide is produced during the manufacture of products and its influence on global warming. They will be able to summarise the product mileage accumulated during the sourcing of raw materials, manufacture, distribution, user location and final disposal of a given product. They will know how each of the six Rs can be applied to a given product. They will be able to explain the ethical and the social footprint of materials used in products, and how the footprint may be reduced at the design stage. They will understand how safe working conditions and pollution impact on others. Students will know how products are produced in each of the four main scales of production and suggest appropriate scales of production related to specific materials and components and manufacturing techniques. They will also be able to describe the relationship between production volumes and methods and explain the factors involved in selecting an appropriate manufacturing method.

Design & Technology: Product Design

Key Stage 4 – Year 11

In Year 11 you will learn about ……..

Term	Topic	Knowledge, Skills and Understanding
Spring 1	Timbers	Students will know the main processes involved in producing workable forms of timber and the processes of conversion and seasoning. They will recognise common faults in natural timber and explain how they can be reduced or avoided. They will be able to explain sustainability and ethical factors in timber production and in use and describe the consequences of illegal logging, as well as identify FSC and PEFC timber. They will know the common commercial stock forms, types and sizes of timber based materials and be able to identify different types of knock-down fittings. They will explore school based cutting, forming and processing techniques, tools and equipment. They will know how timbers and boards are selected and processed for commercial products and how materials are cut, shaped and formed to a tolerance. Students will be able to identify techniques for preparation and application of treatments and finishes to enhance functional and aesthetic properties. They will know the advantages and disadvantages of manufactured board compared with natural wood and why it is suitable for flat pack furniture. They will be able to describe the production and use of veneer, identify and explain the comparative advantages of different wood joints and calculate quantities of timber and board based on stock forms and sizes. Students will learn about the mileage of a product from raw material source, manufacture, distribution, user location and final disposal. They will know the different sources and origins of plastic and how polymers are made by refining crude oil through factional distillation. They will understand the purpose of adding stabilisers to polymers to resist UV degradation. Students will learn how to cut, drill, cast, deform, print and weld polymers and understand that polymers come in different stock forms, types and sizes. They will look at the specialist techniques and processes for forming polymers and a range of different surface treatments and finishes (polishing, printing and vinyl decals), as well as how a range of surface treatments and finishes affect the functional and aesthetic properties of plastics. They will understand the different plastic processes of vacuum forming, line bending, blow moulding, injection moulding and extrusion and why different polymers (thermoplastics and thermosets) are appropriate for different commercial applications.
Spring 2	Polymers	
Summer 1	Exam prep	Students will re cap on all prior learning and spend time looking at exam techniques and how to answer exam style questions.

Design & Technology: Engineering and Manufacturing

Key Stage 4 – Year 11

In Year 11 you will learn about ……..

Term	Topic	Knowledge, Skills and Understanding
Autumn 1	Scales of manufacture	Manufacturing in scale will be covered both theoretically and practically through planning for and performing computer-controlled machining operations.
Autumn 2	CAD / CAM	Manufacturing in scale will require the use of Computer Aided Design (CAD)/Computer Aided Manufacture (CAM) software to programme a CNC machine. Students will develop their skills at interpreting engineering drawings to program, set up and operate a CNC machine. This will prepare them to undertake the NEA assessment in R016.
Spring 1	NEA	Most products are produced for a commercial environment. This often means that they will need to be produced in large quantities to a consistent standard. To help achieve this, manufacturing in quantity will make use of Computer Aided Design/Computer Aided Manufacture (CAD/CAM) facilities. In this unit students will learn how to manufacture and use simple jigs and templates to support manufacturing in volume. By using CAD software you will learn about the information needed to facilitate manufacture, and apply this in order to program Computer Numerical Control (CNC) equipment. In addition, they will learn how to set up and operate the CNC equipment and monitor the quality of the manufactured products.
Spring 2	CNC setup and operation Assessing quality	Manufacturing in scale will require the use of Computer Aided Design (CAD)/Computer Aided Manufacture (CAM) software to programme a CNC machine. Students will develop their skills at interpreting engineering drawings to program, set up and operate a CNC machine. This will prepare them to undertake the NEA assessment in R016. Students will be required to apply their knowledge of quality control techniques and methods to check the quality of components manufactured in scale production. They will use measuring instruments to check and compare critical dimensions with expected values and will perform a statistical process control check. This will prepare them for the NEA assessment in R016.
Summer 1	Exam prep	Students will re cap on all prior learning and spend time looking at exam techniques and how to answer exam style questions.

Design & Technology: Hospitality and Catering

Key Stage 4 – Year 11

In Year 11 you will learn about ……..

Term	Topic	Knowledge, Skills and Understanding
Autumn 1	Health and safety in hospitality and catering provision of the kitchen and front of house	Learners should know and understand: Food Safety; Food related causes of ill health; Symptoms and signs of food-induced ill health; Preventative control measures of food-induced ill health; and Health and safety in hospitality and catering provision
Autumn 2	Customer requirements in hospitality and catering The Environmental Health Officer (EHO)	Learners should know and understand how hospitality and catering provision meets the requirements of: customer needs (catering, equipment, accommodation); customer rights and inclusion (disability); and equality. Learners should know and understand the role of the Environmental Health Officer (EHO) and that responsibilities include: collecting evidence including samples for testing, photographs, interviews; enforcing environmental health laws follow up complaints; follow up outbreaks of food poisoning; inspecting business for food safety standards; giving evidence in prosecutions; maintaining evidence; and submitting reports.
Spring 1	Controlled Assessment	Leaners will produce a portfolio of evidence to cover the following in exam conditions1: Understanding the importance of nutrition; How cooking methods can impact on nutritional value; Factors affecting menu planning; How to plan production; How to prepare and make dishes; Presentation techniques; Food safety practices; Reviewing of dishes; and Reviewing own performance.
Spring 2	Exam Revision	Students will re cap on all prior learning and spend time looking at exam techniques and how to answer exam style questions.
Summer 1	Exam Revision	Students will re cap on all prior learning and spend time looking at exam techniques and how to answer exam style questions.