

# Bede Academy

## Engineering Curriculum Map

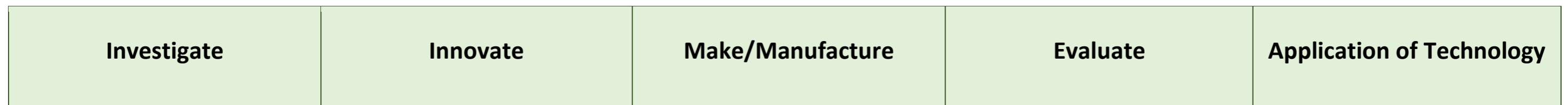


Our ambition is for students to be knowledgeable of design and innovations of the past, to inspire to them to creatively engineer solutions to real and relevant problems in the present. We want our students to be inspired by the role our community has played in engineering, design and development throughout history. From Blyth's industrial heritage to current prospects including cutting edge marine technology, renewable energy and manufacturing. We seek to empower students to have the skills, values and vision to continue this progression for the benefit of our local, national or international communities through engineering.

As we identify the key knowledge students should master in **engineering** we think carefully about *how* we want students to think as **engineers**. We want students to:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook

The **engineering** curriculum is sequenced around the following key concepts:



**Our all-through curriculum is:**

**...knowledge-rich** with clearly defined, coherent progression which strengthens schema to enable all students to secure ambitious curriculum goals;

**...enabling** as all students have access to the whole curriculum and students master fundamentals in reading, writing and mathematics;

**...responsive** as assessment identifies security of learning and students are supported to achieve our curriculum goals;

**...inspiring** as it takes students beyond their own experience, offers opportunity for creativity, and enables them to understand their identity in Blyth and beyond;

**...transformative** as by developing character, we build learners who exemplify the Core Virtues and make a positive contribution to their community.

- Curriculum units are built around key concepts that are revisited and developed during KS3,4 and 5
- The key concepts within each curriculum unit is clearly defined and presented to students at the start of a project and used to discuss progress.
- Small steps approach to curriculum progression and mastery with clear learning goals/ objectives.

- Opportunities for extended writing to encourage fluency with Engineering key vocabulary
- Maths skills are built into projects (calculating area of a shape, measuring, Calculating equipment/ materials needed).
- Identifying students that require further support with additional session, directing LSA in lesson time/homework club

- Varied assessment types (Recall quizzes, extended response, end of topic test)
- Assessment that informs feed forward moments to fill in gaps in learning.
- Regular retrieval practice to check prior learning and build long-term memory.

- Links to stem Careers including university visits and further engineering courses at A-Level.
- Problem solving embedded throughout curriculum with local links to community.
- Competition including Green Power, Stem activities, Wool for school, Product in a tin

- Developing Reasoning and problem solving through non-routine problems.
- Engaging students to use metacognition to develop independence and further study.
- Building resilience, particularly through the iterative design process.

Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
N	Exploring construction materials Making instruments (shakers/guitars) Making biscuits		Building with construction – joining pieces together (duplo, sticklebricks) Making playdough		Making picnic snacks Begin to use imagination to make simple 3D models	
R	Construction with 3D shapes Making bread and soup Making cards		Masks and puppets Making houses (3 little pigs)		Making a non-fiction book	
1	Fruit & Veg		Playgrounds		Moving pictures	
2	Puppets		Vehicles	Food technology	Winding mechanisms	
3	Travel games		Shaduf		Kites	
4	Ancient Pneumatic monsters		Buzzer games		Moving books	
5	Helping Hands			Stadiums		
6	Pneumatics and hydraulics		Greenpower Car (* STEM hub)		Controlling Devices (Lego Mindstorms)	
7	Skills Toolkit		Light it up			Food Technology
8	Go Green					
9	Graphics	Textiles	Food Technology	Product design & Electronics	Forces and Mechanisms	
10 DT	Graphics		E-Textiles		Product Design	NEA Section A Identifying & investigating design possibilities
11 DT	Core technical principles		Specialist technical principles		Exam Practice	
	Design and Make Principles					
	NEA Section B Producing a design brief & specification	NEA Section C Generating design ideas	NEA Section D Developing design ideas	NEA Section E Realising design ideas	NEA Section F Analysing & evaluating	Exam Practice

10 NCFE	Workshop skills				Fabricated Lamp			Mock NEA		
11 NCFE	NEA Prep	NEA Task 1 Research	NEA Task 2 Hand drawings	NEA Task 3 CAD	NEA Task 4 Planning	NEA Task 5 Making	Task 6 Evaluation	Exam Prep		
10 H&C	Food Safety		Nutrition		Working in the hospitality and catering industry			Menu planning		Mock NEA
11 H&C	Preparing, cooking and presenting dishes			NEA		Working in the hospitality and catering industry				

		Autumn	Spring	Summer
Early Years Links	Nursery	<p>Exploring construction materials Making instruments (shakers/guitars) Making biscuits</p> <p><b>Design</b> To explore construction materials that they would like to use. To use construction pieces as something else – a block for a car etc To identify simple instruments, such as shakers To think about how to make their instrument make a sound To identify which shape they will choose to make their biscuit</p> <p><b>Make</b> To hold the construction pieces and play with them as part of their exploration/play. To use containers to hold the rice etc. To find a way of stopping the rice coming out To take part in adult led baking activities – stirring, mixing, measuring etc</p> <p><b>Evaluate</b> To adapt their use of construction to fit their play To say if their instrument make a sound To taste the biscuits and say if they like them</p>	<p>Building with construction – joining pieces together (duplo, sticklebricks) Making playdough</p> <p><b>Design</b> To select the construction materials that they would like to use. To have a design idea which matches their play, e.g. 'I'm building a house for the bear' etc To name playdough and say which colour they would like</p> <p><b>Make</b> To hold and manipulate the construction piece. To join construction pieces together To use the provided ingredients, mix them and make playdough in an adult directed task.</p> <p><b>Evaluate</b> To make changes to their model as they play, talking about what they are doing. To play with their play and say if they like the playdough they have made</p>	<p>Making picnic snacks Begin to use imagination to make simple 3D models</p> <p><b>Design</b> To identify picnic snacks in the story. To say which picnic snacks they would like to make, e.g. what filling for their sandwich etc To think about what they would like to make and choose a specific construction material to do this.</p> <p><b>Make</b> To take part in adult directed tasks making sandwiches and snacks. To name the ingredients and the filling. To use appropriate cooking utensils with support To independently join and rejoin together construction pieces. To create a desired outcome, such as a pen for the animals, a house for the teddy etc</p> <p><b>Evaluate</b> To say what they liked about their snack. To notice the snacks that others have made and possibly attempt to replicate the ones they like. To change their model as they play. To break their model and start again, based on what they notice about the models others have made.</p>
	Reception	<p>Construction with 3D shape Making bread and soup Making cards</p> <p><b>Design</b> <b>Make</b> To make house, buildings, cars etc with construction materials to support their play To join construction pieces together and break them apart To use knives safely to cut vegetables</p>	<p>Making houses (3 little pigs) Masks and puppets</p> <p><b>Design</b> To look at pictures of houses and identify some features of them To look at pictures of characters and identify key features</p> <p><b>Make</b> To explore the properties of materials To think about the story and identify which material was strong and which was not.</p>	<p>Making books</p> <p><b>Design</b> To look at a range of non-fiction books and talk about the key features they see</p> <p><b>Make</b> To fold paper effectively to make pages To create each page of their own book with features of a real book – front cover, title, pictures, words etc</p> <p><b>Evaluate</b></p>

	<p>To mix ingredients together          To follow a recipe          To fold card  <b>Evaluate</b>          To talk about changes they see during the process of baking.          To taste the food they have helped to make          To say if they enjoyed tasting the food they had made.</p>	<p>To recreate the houses using different materials          To draw a face shape and complete key features          To hold scissors correctly and hold paper/card effectively to cut out shapes  <b>Evaluate</b>          To explain how they have made something and what they have used.          To talk about what worked and what did not</p>	<p>To talk about what they could do well and what they would do differently          To talk about the parts of their book they like          To talk about what they like about others work</p>
ELG	<p>By the end of Reception, children should be able to:  <b>Creating with materials</b>          Safely use and explore a variety of materials. Tools and techniques, experimenting with colour, design, texture, form and function. Share their creations, explaining the processes they have used. Make use of props and materials when role playing characters in narratives and stories</p>		

Year 1	Unit	Fruit & Veg	Playgrounds	Moving pictures
	Key Concepts	<p><b>Design</b> - Knowledge of materials, processes that make up a balanced diet.  <b>Make</b> - Practical and technical skills and hygiene processes.  <b>Evaluation</b> – Subject specific vocabulary and self-evaluation</p>	<p><b>Design</b> - Knowledge of materials, processes and aesthetics.  <b>Innovate</b> – Problem solving with the use of shape.  <b>Make</b> - Practical and technical skills and construction processes.  <b>Evaluation</b> – Subject specific vocabulary and self-evaluation</p>	<p><b>Design</b> - Knowledge of materials, processes, and aesthetics.  <b>Innovate</b> – Problem solving with the use of a mechanism.  <b>Make</b> - Practical and technical skills and motion processes.  <b>Evaluation</b> – Subject specific vocabulary and self-evaluation</p>
	Prior Learning		<p><b>Year 1: Fruit and Veg</b>  How to self-evaluate work</p>	<p><b>Year 1: Playgrounds</b>  To identify different materials used  How to assemble and join materials  How to make a structure more stable  How to self-evaluate work</p>
	Key Knowledge	<p><b>Substantive</b>  Fruit and vegetables are healthy foods  Healthy foods are an important part of a balanced diet  Hygiene means keeping clean  I can show good hygiene by washing my hands  Good hygiene is important when preparing food  Different equipment such as knives, peelers, graters can be used to prepare food.</p> <p><b>Discipline</b>  How to group and label food correctly  How to wash hands correctly  How to design a healthy fruit salad  How to prepare vegetables carefully  How to self-evaluate work</p>	<p><b>Substantive</b>  Swings are made in an A-Frame  Nuts and bolts join frames together  Triangles are used to make playground equipment stronger  Multiple joints make it stronger at the top  The playground frame is buried underground to make it stronger</p> <p><b>Discipline</b>  To identify features of a playground  To identify the purpose of a playground  To identify different materials used  How to assemble and join materials  How to make a structure more stable  To design and make a playground model</p>	<p><b>Substantive</b>  A level is a sliding mechanism which creates movement  A pivot holds a lever/sliding mechanism in place  A slider moves forwards and backwards in a straight line  A split pin can act as a pivot</p> <p><b>Discipline</b>  How to push a lever to create movement.  How to cut materials safely and accurately using scissors  How to stick sliders in place</p>
	Next Steps	Year 2: Food Technology	Year 2: Puppets	Year 2: Winding Mechanisms
	Enrichment/ Careers		<p><b>STEM week</b>  Local Playground Park – school grounds play equipment</p>	

Year 2	Unit	Puppets	Vehicles	Food technology	Winding mechanisms
	Key Concepts	<b>Design</b> - Knowledge of textiles materials, processes, and aesthetics. <b>Innovate</b> – Problem solving to join fabric together. <b>Make</b> - Practical and technical skills and Health and safety. <b>Evaluation</b> – Subject specific vocabulary	<b>Design</b> - Knowledge of materials, processes. <b>Innovate</b> – Problem solving and testing prototypes. <b>Make</b> - Practical and technical skills and impact of friction. <b>Evaluation</b> – Subject specific vocabulary and self-evaluation	<b>Design</b> - Knowledge of materials, processes that make up a balanced diet. <b>Make</b> - Practical and technical skills and hygiene processes. <b>Evaluation</b> – Subject specific vocabulary and self-evaluation	<b>Design</b> - Knowledge of materials, processes, and aesthetics. <b>Innovate</b> – Problem solving with the use of a mechanism. <b>Make</b> - Practical and technical skills and motion processes. <b>Evaluation</b> – Subject specific vocabulary and self-evaluation
	Prior Learning	<b>Year 1: Playgrounds</b> To identify different materials used How to assemble and join materials  <b>Year 1: Fruit and Veg</b> How to self-evaluate work	<b>Year 1: Playgrounds</b> Triangles are used to make playground equipment stronger To identify different materials used How to assemble and join materials How to self-evaluate work	<b>Year 1: Fruit and Veg</b> Healthy foods are an important part of a balanced diet Hygiene means keeping clean I can show good hygiene by washing my hands Good hygiene is important when preparing food	<b>Year 1: Playgrounds</b> To identify different materials used How to assemble and join materials  <b>Year 1: Fruit and Veg</b> How to self-evaluate work
	Key Knowledge	<b>Substantive</b> There are many different types of puppets; hand, finger, shadow, rod and string. Puppets are made by joining materials together Puppets can be controlled by movement from the person holding them Felt is a type of fabric Felt can be joined together by sewing You use a needle and thread to sew  <b>Discipline</b> How to cut felt accurately How to hold a needle and thread safely How to sew a running stitch	<b>Substantive</b> A vehicle can travel from one place to another A vehicle transports goods or people There are different types of vehicles with different purposes An axle, cab and chassis are parts of vehicles An axle is a bar on which a pair of wheels turn A cab is the driver's compartment in a lorry, bus or train A chassis is a rectangular frame attached to the axle which holds the body of the vehicle  Friction is created by the force of one surface against another The more friction created the slower the vehicle will travel The less friction the faster or smoother the vehicle will travel  <b>Discipline</b> To label parts of a vehicle To choose suitable materials to build a moving vehicle To join wheels and axles together To test a vehicle's movement and investigate friction To measure distance travelled accurately in m and cm	<b>Substantive</b> A balanced diet includes protein, carbohydrates and fruit and vegetables Meat and Dairy products provide protein Grains provide carbohydrates Protein helps our muscles grow Carbohydrates give our body energy Fruit and vegetables keep us healthy  <b>Discipline</b> I can describe different foods and their properties I can follow instructions accurately I can use equipment safely I can show good hygiene when preparing food.	<b>Substantive</b> A pulley is a mechanism which is used to change direction. A winding mechanism is a wheel, axle, lever that changes direction  <b>Discipline</b> How to draw and label a winding mechanism How to use a winding mechanism How to build a winding mechanism from a range of materials
	Next Steps	Year 3: Kites	Year 4: Moving Books	Year 4: Making Pizzas	Year 4: Moving Books
	Enrichment /Careers	The Story Telling Puppet Show – event in school displaying a range of puppets	<b>STEM week</b> Showcase Event – testing moving vehicles		

Year 3	Unit	Travel games	Shaduf	Kites
	Key Concepts	<p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met</p>	<p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met.</p> <p><b>Application of Technology:</b> Understanding trends and applications</p>	<p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met</p>
	Prior Learning	<p><b>Year 2: Vehicles</b></p> <p>To identify different materials used</p> <p>How to assemble and join materials</p> <p>How to self-evaluate work</p> <p>How to design</p> <p>How to evaluate</p>	<p>To identify different materials used</p> <p>How to assemble and join materials</p> <p>How to self-evaluate work</p>	<p>To identify different materials used</p> <p>How to assemble and join materials</p> <p>How to self-evaluate work</p>
	Key Knowledge	<p><b>Substantive</b></p> <p>Games need rules so that everyone can understand</p> <p>A lid can protect a game and make it easier to carry.</p> <p><b>Discipline</b></p> <p>How to measure pieces of wood accurately</p> <p>How to use a saw carefully</p> <p>How to use a hammer carefully</p> <p>How to attach nails to a baseboard accurately</p>	<p><b>Substantive</b></p> <p>A shaduf is a hand operating device used for lifting water</p> <p>Folding layers of paper will make a roll tube stronger</p> <p>A fulcrum is a pole balanced upright on a structure</p> <p>A counterweight is the opposite force which provides balance and stability</p> <p>Origami is the Japanese art of folding paper into shapes</p> <p><b>Discipline</b></p> <p>How to fold paper into a stable structure</p> <p>How to design and operate a shaduf</p>	<p><b>Substantive</b></p> <p>Homan Walsh successfully flew his kite over Niagara Fall</p> <p>Parts of a Kite;</p> <p>A Tow Point is the connection point from the line to bridle</p> <p>A Line prevents the kite flying away</p> <p>The Bridle keeps the kite at the proper angle to the wind</p> <p>Spars give the kits structure</p> <p>Keel acts like a rudder and acts in a similar way to the bridle</p> <p>Sail directs the air to give the kite lift</p> <p>Tail adds drag to keep the kite pointed into the wind</p> <p>Kites need to have a large area that catches the wind. This is called the body, cover or wind receiving plane</p> <p>Lift and drag are forces which lift the kite and push it back</p> <p><b>Discipline</b></p> <p>To label and describe parts of a kite</p> <p>How to strengthen a kite and make it stable</p> <p>To design a kite</p> <p>To measure and cut materials accurately</p> <p>To investigate and test my product</p>
	Next Steps	Year 5: Helping Hands	Year 5: Helping Hands	Year 4: Moving Books
	Enrichment/ Careers		STEM week	

Year 4	Unit	<b>Ancient Pneumatic monsters</b>	<b>Buzzer games</b>	<b>Moving books</b>	<b>Pizzas (Bede North)</b>
	Key Concepts	<p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met.</p> <p><b>Application of Technology:</b> Understanding trends and applications</p>	<p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met</p>	<p><b>Design</b> - Knowledge of materials, processes, and aesthetics.</p> <p><b>Innovate</b> – Problem solving with the use of a mechanism.</p> <p><b>Make</b> - Practical and technical skills and motion processes.</p> <p><b>Evaluation</b> – Subject specific vocabulary and self-evaluation</p>	<p><b>Design</b> - Knowledge of materials, processes that make up a balanced diet.</p> <p><b>Make</b> - Practical and technical skills and hygiene processes.</p> <p><b>Evaluation</b> – Subject specific vocabulary and self-evaluation</p>
	Prior Learning	<p><b>Year 3: Shaduf</b> How to design To identify different materials used How to assemble and join materials How to self-evaluate work</p>	<p><b>Year 3: Travel Games</b> How to design To identify different materials used How to assemble and join materials How to self-evaluate work</p>	<p><b>Year 1: Moving Pictures</b> a lever is a simple mechanism that rests on a pivot; like a seesaw A pivot is a rod or pin which moves another part. <b>Year 3: Shaduf</b> Origami is the Japanese art of folding paper into shapes How to design How to self-evaluate work</p>	<p><b>Year 2: Food technology</b> I must wash my hands before preparing food. Fruit and vegetables are part of a healthy diet A balanced diet includes protein, carbohydrates and fruit and vegetables Meat and Dairy products provide protein Grains provide carbohydrates Protein helps our muscles grow Carbohydrates give our body energy Fruit and vegetables keep us healthy</p>
	Key Knowledge	<p><b>Substantive</b> Air can be used as a force to create a movement Mechanisms which operate using air are called pneumatic systems Compressed air is lots of air squeezed together into a small space</p> <p><b>Discipline</b> Identify pneumatic systems. Explain how air is used to make a simple pneumatic mechanism 'work'. Test and investigate pneumatic systems Build a pneumatic system with a lever mechanism Follow instructions to create a pneumatic system</p>	<p><b>Substantive</b> Electricity is an energy Electricity travels in a current around a circuit A source of electricity can be provided by a battery A switch controls the source of electricity</p> <p><b>Discipline</b> How to measure, cut and strip a section of electrical wire How to use a wire cutter How to use a wire stripper How to follow instructions to create a working circuit How to follow instructions and make a switch</p>	<p><b>Substantive</b> A lift up flap or pop up are types of lever mechanisms. A slider mechanism can move through the application of a force. Mechanisms in moving books help bring stories to life.</p> <p><b>Discipline</b> To make a box fold and mouth by cutting card To make a slider mechanism To make a lift up flap mechanism To make a rotating lever To make a spring pop up To measure and cut accurately</p>	<p><b>Substantive</b> Fruit and vegetables are part of a healthy diet A balanced diet contains a mix of protein, carbohydrates and dairy products.</p> <p><b>Discipline</b> How to wash my hands thoroughly before preparing food</p>
	Next Steps	Year 6: Pneumatics and hydraulics	Year 6: Controlling Devices	Year 8: Graphics	Year 7: Food Technology
	Enrichment/ Careers		STEM week		

Year 5	Unit	Helping Hands	Stadiums (10-12 weeks)
	Key Concepts	<p><b>Innovate:</b> Problem Solving; Consideration of ergonomics and anthropometrics</p> <p><b>Design:</b> Interpreting briefs</p> <p><b>Make:</b> Health and safety; practical and technical skills with materials, tools and processes</p> <p><b>Evaluate:</b> Analysis of product and process</p> <p><b>Application of Technology:</b> Understanding trends and applications</p>	<p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met</p>
	Prior Learning	<p><b>Year 3: Shaduf</b>  A lever is a simple mechanism that rests on a pivot; like a seesaw  A pivot is a rod or pin which moves another part.  To identify different materials used  How to assemble and join materials  How to self-evaluate work  How to design</p>	<p><b>Year 4: Moving Books</b>  To identify different materials used  How to assemble and join materials  How to design  How to self-evaluate work</p>
	Key Knowledge	<p><b>Substantive</b>  An arm is a simple mechanism with a pivot (elbow)  Biceps and Triceps make your arm move up and down  Biceps and Triceps are muscles in your arm  Bones are held together by ligaments  Tendons attach muscles to your bones  When the arm is straight the bicep is relaxed and the tricep contracts  When the arm is bent the tricep is relaxed and the bicep contracts</p> <p><b>Discipline</b>  How to measure and saw wood carefully and accurately.  How to drill holes to specific measurements  How to build and construct a helping hand</p>	<p><b>Substantive</b>  A stadium is a sports ground or arena with tiers of seats for spectators.  A cantilever is strong structure which is used in the construction of a modern stadium.  A tier is a row of seats  The tier and cantilever link together to form a stand  The cantilever works by transferring the force exerted on it by the weight of the roof or seating down a main tower which is firmly seated in a foundation around the outside part of the stadium.  Steel tubes and wires are bolted together to make the cantilevers in a real stadium.</p> <p><b>Discipline</b>  How to assemble a tower on a wooden base  How to fit foam blocks to the tower using dowels  How to construct the cantilever using paper tubes</p>
	Next Steps	Year 7: Product Design	Year 7: Graphics
	Enrichment /Careers	Tharsus input Modelling of electronic hands – classroom visit	<b>STEM week</b> Possible trip to St James Park or Blyth Spartans Croft Park which have examples of Cantilever stands and structures.

Year 6	Unit	<b>Pneumatics and hydraulics</b>	<b>Greenpower Car (* STEM hub)</b>	<b>Controlling Devices (Lego Mindstorms)</b>
	Key Concepts	<p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met.</p> <p><b>Application of Technology:</b> Understanding trends and applications</p>	<p><b>Design:</b> Interpreting briefs and specifications; knowledge of materials, processes</p> <p><b>Innovate:</b> Appreciation of design exponents past and present; artistic and design influences; Design iterations and prototypes</p> <p><b>Make:</b> Practical and technical skills with materials, tools and processes; health and safety; Working design refinement</p> <p><b>Evaluate:</b> Quality control; Extent to which brief met.</p> <p><b>Application of Technology:</b> Understanding trends and applications, electronics, systems and control and Eco design</p>	<p><b>Innovate:</b> Problem Solving; Consideration of ergonomics and anthropometrics</p> <p><b>Design:</b> Interpreting briefs</p> <p><b>Make:</b> Health and safety; practical and technical skills with materials, tools and processes</p> <p><b>Evaluate:</b> Analysis of product and process</p> <p><b>Application of Technology:</b> Understanding trends and applications, CAD CAM</p>
	Prior Learning	<p><b>Year 4: Pneumatic Monsters</b> Mechanisms that use air to push objects are called pneumatic systems</p> <p>Compressed air is lots of air squeezed into a small space</p> <p>To identify different materials used How to assemble and join materials How to design How to self-evaluate work</p>		<p><b>Year 4: Buzzer Games</b> Identify a clear design need. Follow a guided design process. Iterate and improve design solutions. Save a file from the shared to the home drive. Confidently retrieve saved work from either drive.</p>
	Key Knowledge	<p><b>Substantive</b> Pneumatic means containing or operate by air/gas under pressure Hydraulics relates to liquid moving in a confined space Hydro-electric power stations make electricity Brakes and drills are examples of pneumatics Trapped air and water produce great forces The Hydraulic crane was invented in 1845 in Newcastle by William Armstrong</p> <p><b>Discipline</b> To test and investigate hydraulics and record notes To assemble a hydraulic crane made from foam blocks Attach a hook or magnet for the crane to lift a weight</p>		<p><b>Cross curricular Computing and Engineering project.</b></p> <p>This unit involves students showcasing their computer science skills by building and programming a Lego robot.</p> <p><b>Disciplinary</b> Use all known computational thinking and coding skills within the context of the Mind Storms software to program a robot to carry out a specific task. Follow Mind Storms instructions to build a robot.</p>
	Next Steps	<b>Year 7: Product Design</b>	<b>Year 7: Systems and Electronics</b>	<b>Year 7: Systems and Electronics</b>
	Enrichment/ Careers	Visit to Port of Blyth to watch Hydraulic cranes and other hydraulic machines operating	<b>STEM week</b> Greenpower Car – STEM HUB	

Unit	Skills toolkit and Light it up				
	Graphics	Textiles	Food Technology	Product design	Systems and Electronics
Key Concepts	<p><b>Innovate:</b> Knowledge of Graphical communication concept, drawing, rendering, isometric</p> <p><b>Manufacture:</b> Practical skills using CAD software to enhance communication techniques.</p> <p><b>Evaluate:</b> Analyse the use of using CAD against hand drawn communication skills. Identifying advantages and disadvantages.</p> <p><b>Application of Technology:</b> CAD CAM, Tech Soft Designs</p>	<p><b>Investigate:</b> Knowledge of materials understanding the materials and components, their properties and how they work together.</p> <p><b>Innovate:</b> Research a range of design movements to aid creation of design ideas.</p> <p><b>Manufacture:</b> Practical and technical skills with materials, tools, and processes fitting product to specific measurements and applying different decorative techniques.</p> <p><b>Evaluate:</b> Analysis of product and processes using peer and self-assessment</p>	<p><b>Investigate:</b> Knowledge of food and the Eatwell guide.</p> <p><b>Manufacture:</b> Practical and technical skills with materials, tools and processes within the food room.</p> <p><b>Evaluate:</b> Subject specific terminology, evaluate dishes against dietary guidelines</p>	<p><b>Investigate:</b> Knowledge of materials, properties (soft woods, hard woods)</p> <p><b>Innovate:</b> Design iterations and prototypes</p> <p><b>Manufacture:</b> MDF sawing, sanding and shaping</p> <p><b>Evaluate:</b> Evaluate against specification</p>	<p><b>Innovate:</b> Circuit design, component functions</p> <p><b>Manufacture:</b> PCB layout and soldering of components, Health and Safety</p> <p><b>Application of Technology:</b> Electronics, systems and control</p>
Prior Learning	<p><b>Year 5: Stadiums</b> Design: Spatial awareness and construction constraints.</p> <p><b>Year 6: Controlling Devices (Lego Mindstorms)</b> Technology: Coding, Iteration of designs, saving and management of files</p>	<p><b>Year 2: Puppets</b> Make: How to cut felt accurately, hold a needle and thread safely and how to sew a running stitch Design: Understanding that felt is a type of bonded fabric applying knowledge of how the material works with movement.</p> <p><b>Year 4: Buzzer games</b> Make: Use and understanding of key components and how they work together Technology: Circuit designs and diagrams</p>	<p><b>Year 2: Healthy lifestyles</b> Design: Knowledge of a balanced diet includes carbohydrate, fruit, and vegetables. Meat and dairy products contain protein. Make: Technical skills creating their own healthy plate of food.</p> <p><b>Year 4: Pizzas</b> Make: Health and safety producing food that is safe to eat and prepared safely. Evaluate: Analysis of product and process and understanding of a healthy lifestyle.</p>	<p><b>Year 3: Travel Games</b> Design: game mechanics, rules and aesthetics Make: Use of wood tools, assembly, H &amp; S Evaluate: Self-evaluation of design</p> <p><b>Year 5: Helping Hands</b> Design: Levers, mechanisms Make: Use of saw, drill, H and S</p>	<p><b>Year 4: Buzzer games</b> Make: Use of tools, H &amp; S (wire stripper, wire cutter) Technology: Circuit designs and diagrams</p> <p><b>Year 6: Green Power</b> Design: Car components and factors affecting performance Make: Construction and fixings and fittings</p>
Key Knowledge	<p><b>Substantive</b> Mastering the 2D Design CAD program to be able to use a significant number of commands successfully: Drawing tools, select, proportion lock, grid locking, grid formatting, attach lock, 3D Effect tools, Boundary Filling, Step Locking, delete any and segment tools. Hand Drawing: Students should be able to sketch and formally communicate using isometric to create basic shapes. Students should also be able to render and apply colour and tone to drawings creating a material effect/finish.</p> <p><b>Disciplinary</b> Students will apply understanding of CAD Program and apply to other activities such as creating furniture design. Substantive knowledge from Maths will also be applied. Moving forward, students will apply the substantive knowledge learnt here to CAD work throughout their Bede Curriculum in Engineering.</p>	<p><b>Substantive</b> Identify the origin of fibres and how they are produced into fabrics. Master the use of a variety of decorative textile techniques Be able to communicate design ideas using drawings with pattern and annotations. Be able to create a final textile product that represents a different design movement</p> <p><b>Disciplinary</b> Apply understanding of Textiles to everyday life – fixing school uniform, making the home more comfortable. Understand the significance of Textiles across the globe and how it is essential to a variety of different life experiences.</p>	<p><b>Substantive</b> Use the bridge and claw method safely to produce vegetable cuts including batons and paysanne. Be able to use the grill, oven and hob safely and produce predominantly savoury dishes Be able to reproduce the Eatwell Guide and apply the principles to their own diet, or that of others.</p> <p><b>Disciplinary</b> Apply knowledge of healthy eating concepts to adapt a recipe. Apply knowledge of health and safety, food hygiene to new recipes.</p>	<p><b>Substantive</b> To understand the correct names of tools and equipment, their uses and how they are used safely and correctly to ensure a high-quality accurate finish. To understand the properties of timbers, their uses and how they can be used sustainably. To understand how material can be fixed/fastened together using a range of suitable temporary and permanent joining methods. To understand the design process and this is an iterative process which can be guided by client feedback/ a specification / design brief and analysis of existing products to help produce a high-quality practical outcome.</p> <p><b>Disciplinary</b> To choose the correct hand tool for a range of different projects and tasks throughout Engineering and be able to use them accurately and safely to ensure a high-quality finish. To make well informed sustainable choices when selecting materials for a range of different projects and tasks throughout Engineering. To be able to explain why they have selected the most suitable material and its impact on the planet. To research and manufacture new methods of joining materials together other than halving joints and to explore ways in which joining methods can be temporary and permanent. To experiment with ways of strengthening a joining method, such as adding an additional dowel. To use the taught joining method of a halving joint with or without dowel to evolve their picture frame project to hold more than one single image.</p>	<p><b>Substantive</b> Be able to describe how voltage, current and resistance interact within a circuit and how they are measured Be able to identify common electronic components, such as resistors, LEDs, Switches and capacitors, including their relative values and polarity. Be able to position and join components accurately and safely into a circuit by soldering</p> <p><b>Disciplinary</b> Be able to apply a methodical approach to manufacture and testing to improve quality. To develop an understanding of a systems approach to analysing and designing products, which can be applied to many other disciplines.</p>
Next Steps	Year 8: Go Green - Graphics	Year 8: Go Green - Textiles	Year 8: Go Green - Food Technology	Year 8: Go Green - Product design	Year 8: Go Green - Electronics

Unit	Go Green				
	Graphics	Textiles	Food Technology	Product design	Systems and Electronics
Key Concepts	<p><b>Innovate:</b> Text and shape formatting, Interpret calendar brief, paper properties, nets</p> <p><b>Manufacture:</b> Craft knife skills, Health and Safety, paper crafting 3D forms</p> <p><b>Application of Technology:</b> PowerPoint formatting,</p> <p><b>Evaluate:</b> Final product evaluation</p>	<p><b>Innovate:</b> Client's needs, brief, knowledge of materials Textile artist references: Lucy Sparrow, Holly Levell</p> <p><b>Manufacture:</b> Decorative techniques, sewing machine use, Health and Safety</p> <p><b>Evaluate:</b> Terminology for sewing machines, decorative techniques, ACCESS FM</p>	<p><b>Innovate:</b> Connected range of dishes with healthy eating, dietary issues considered, seasonality</p> <p><b>Investigation:</b> Selection of dishes to consider food provenance.</p> <p><b>Manufacture:</b> Practical and technical skills with materials, tools and processes within the food room, health and safety</p> <p><b>Evaluate:</b> Assessment review, self-evaluation of skills</p>	<p><b>Investigation:</b> Knowledge of materials, properties (soft woods, hard woods, thermosetting and thermo-forming plastics)</p> <p><b>Innovate:</b> Design iterations and prototypes</p> <p><b>Manufacture:</b> Create halving joint and dowel joint.</p> <p><b>Evaluate:</b> Against specification</p>	<p><b>Innovate:</b> Circuit design, component functions/uses</p> <p><b>Manufacture:</b> PCB layout and soldering of components, Health and Safety</p> <p><b>Application of Technology:</b> CAD design 2D design, Circuit Wizard, Eco design (recycling/upcycling), sustainability</p> <p><b>Evaluate:</b> Quality assurance, quality control checks</p>
Prior Learning	<p><b>Year 4: Moving Books</b> <b>Application of Technology:</b> CAD CAM, 2D Design <b>Make:</b> Box fold, paper crafting</p> <p><b>Year 7: Graphics</b> <b>Manufacture:</b> Isometric CAD Drawings, rendering textures <b>Application of Technology:</b> CAD CAM, 2D Designs</p>	<p><b>Year 2: Puppets</b> <b>Make:</b> How to cut felt accurately, hold a needle and thread safely and how to sew a running stitch <b>Design:</b> Understanding that felt is a type of bonded fabric applying knowledge of how the material works with movement.</p> <p><b>Year 7: Textiles</b> <b>Innovate:</b> Knowledge of materials understanding the materials and components, their properties and how they work together. <b>Manufacture:</b> Practical and technical skills with materials, tools, and processes fitting product to specific measurements and applying different decorative techniques. <b>Evaluate:</b> Analysis of product and processes using peer and self-assessment</p>	<p><b>Year 4: Pizzas</b> <b>Make</b> – Health and safety producing food that is safe to eat and prepared safely. <b>Evaluate</b>- Analysis of product and process and understanding of a healthy lifestyle.</p> <p><b>Year 7: Food and Nutrition</b> <b>Innovate:</b> Knowledge of food and the Eatwell guide. <b>Manufacture:</b> Practical and technical skills with materials, tools and processes within the food room. <b>Evaluate</b> - Subject specific terminology</p>	<p><b>Year 5: Helping Hands</b> <b>Design- Measure</b> and saw wood carefully and accurately and drill holes to specific measurements. <b>Innovate</b> – Solving problems to build and construct a helping hand.</p> <p><b>Year 7: Picture frame</b> <b>Investigate:</b> Knowledge of materials, properties (soft woods, hard woods) <b>Innovate:</b> Design iterations and prototypes <b>Evaluate:</b> Against specification</p>	<p><b>Year 7: Graphics</b> <b>Make:</b> Isometric CAD Drawings, Rendering textures <b>Technology:</b> CAD CAM, 2D Designs</p> <p><b>Year 7: Electronics</b> <b>Innovate:</b> Circuit design, component functions <b>Manufacture:</b> PCB layout and soldering of components, Health and Safety <b>Application of Technology:</b> Electronics, systems and control</p>
Key Knowledge	<p><b>Substantive</b> Mastering the variety of formatting tools using PowerPoint. Being able to ungroup and group objects successfully. Add shape/text effects, transform tools, line/fill options and the formatting menus that apply to all text, shape and imagery. Detailed use of boundary/fill command is increased. (x/y axis, proportion, scale, pattern &amp; graduated fills, island fills) Modelling in 3D using compliant materials</p> <p><b>Disciplinary</b> Students will apply knowledge and understanding of the 2D Design Tools program. Utilising boundary fill, grid and step locking, attach locking, shape drawing tools and the delete any/segment tools. Apply their knowledge of communication techniques.</p>	<p><b>Substantive</b> Master the use of fabric scissors and a sewing machine. Be able to realise design ideas into a final product. Be able to create and construct a final textile cushion that represents a food product.</p> <p><b>Disciplinary</b> Apply understanding of different textile techniques to make everyday life more comfortable. Understand the significance of the design process in the design industry. Build upon knowledge learnt in Year 7.</p>	<p><b>Substantive</b> Know concept of food provenance and potential impact the environment How to use knives and utensils safely for a range of ingredients Know how to handle raw meat, and high-risk ingredients safely</p> <p><b>Disciplinary</b> Suggest ways to reduce food miles and select ingredients with minimal environmental impact Apply a range of knife skills to prepare dishes safely Apply knowledge of health and safety, food hygiene to new ingredients including raw meat when preparing dishes, using food probes safely Create a range of dishes utilising skills inc. breadmaking, rubbing in, skewering, marinating.</p>	<p><b>Substantive</b> Understand the correct names of tools and equipment, their uses and how they are used safely and correctly to ensure a high-quality accurate finish. Understand the properties of polymers, their uses and how they can be used sustainably. Understand how material can be fixed/fastened together using a range of suitable temporary and permanent joining methods. Understand the terms addition, wastage and redistribution and be able to explain a range of different processes as examples for each. Understand the design process and this is an iterative process which can be guided by client feedback/ a specification / design brief and analysis of existing products to help produce a high-quality practical outcome.</p> <p><b>Disciplinary</b> Choose the correct tools and machinery for a range of different projects and tasks throughout Engineering and be able to use them accurately and safely to ensure a high-quality finish. Make well informed sustainable choices when selecting materials for a range of different projects and tasks throughout Engineering. To be able to explain why they have selected the most suitable material and its impact on the planet. This will allow students to further explore their geographical and scientific knowledge of materials in a practical way. Explain the origin of polymers and the effect using them has on the planet. Create detailed and annotation diagrams of a range of manufacturing processes including manufacturing a housing joint, vacuum forming, laser cutting and line bending. Modify a given design proposal to ensure suitability for the user. Adopt a range of drawing techniques including isometric and perspective skills to illustrate design ideas.</p>	<p><b>Substantive</b> Be able to describe the key issues surrounding 'design for the dump'/ planned obsolescence. Be able to identify common electronic components, such as resistors, speakers, connectors and capacitors, including their relative values and polarity. Be able to position and join components accurately and safely into a circuit by soldering</p> <p><b>Disciplinary</b> Be able to apply a methodical approach to manufacture and testing to improve quality. Be able to produce clear instructions for manufacturing processes including quality assurance points and quality control checks To understand the need for ethical and sustainable design principles To be able to analyse existing products and the evolution of products throughout history, to aid future designs.</p>
Next Steps	Year 9: Graphics Specialism	Year 9: Textiles specialism	Year 9: Food specialism	Year 9: Product design	Year 9: Forces and Mechanisms

Year 9	Unit	Graphics Products	Textiles	Food Technology	Product design & Electronics	Forces and Mechanisms
	Key Concepts	<p><b>Investigate:</b> a variety of drawing techniques including, Perspective drawing, Isometric, Orthographic, Informal drawing and CAD.</p> <p><b>Manufacture:</b> To create engineering drawings to demonstrate a variety of drawing techniques.</p> <p><b>Evaluate:</b> Self assess against success criteria.</p>	<p><b>Innovate:</b> Interpret a brief, identify target market, repeat patterns.</p> <p><b>Manufacture:</b> Tie dye, iron transfer, fabric paint, block printing, applique, embroidery, health and safety, follow pattern markings and construction of bucket hat.</p> <p><b>Investigate:</b> Product analysis, iterative design, material knowledge, prototypes</p> <p><b>Evaluate:</b> ACCESS FM, quality control</p> <p><b>Application of Technology:</b> Sewing machine, sublimation printer</p>	<p><b>Investigate:</b> Connected range of dishes with macronutrients fat, protein and carbohydrates</p> <p><b>Innovation:</b> Menu design informed by nutritional requirements, hygiene and safety</p> <p><b>Manufacture:</b> Practical and technical skills with materials, tools and processes within the food room, health and safety</p> <p><b>Evaluate:</b> Assessment review, evaluation, Subject specific terminology</p>	<p><b>Innovate:</b> Interpret a brief, identify target market</p> <p><b>Manufacture:</b> Material qualities, Health and Safety, manufacture and quality control, metal work</p> <p><b>Innovate:</b> Design iterations, SCAMPER</p> <p><b>Evaluate:</b> Product analysis</p> <p><b>Application of Technology:</b> Tech soft design CAD</p>	<p><b>Investigate:</b> Structures and forces, Mechanisms</p> <p><b>Innovate:</b> Cam and follower toy</p> <p><b>Manufacture:</b> Gear mechanisms, model linkages</p> <p><b>Evaluate:</b> Product analysis using ACCESSFM</p> <p><b>Application of Technology:</b> Use of CAD programs to create design ideas.</p>
	Prior Learning	<p><b>Year 7: Graphics</b>  <b>Innovate:</b> Graphic communication concept, drawing, rendering, isometric  <b>Manufacture:</b> Rendering textures</p> <p><b>Year 8: Graphics</b>  <b>Innovate:</b> Text and shape formatting, Interpret calendar brief, paper properties, nets  <b>Manufacture:</b> Craft knife skills, Health and Safety, paper crafting 3D forms  <b>Application of Technology:</b> PowerPoint formatting, Use of CAD  <b>Evaluate:</b> Final product evaluation</p>	<p><b>Year 7: Textiles</b>  <b>Investigate:</b> Knowledge of materials understanding the materials and components, their properties and how they work together.  <b>Innovation:</b> Artistic and design influences looking at culture of the celebration.  <b>Manufacture:</b> Practical and technical skills with materials, tools, and processes fitting product to specific measurements and applying different decorative techniques.  <b>Evaluate:</b> Analysis of product and processes using peer and self-assessment</p> <p><b>Year 8: Textiles</b>  <b>Investigate:</b> Client's needs, brief, knowledge of materials  <b>Innovate:</b> Textile artist references: Lucy Sparrow, Holly Levell  <b>Manufacture:</b> Decorative techniques, sewing machine use, Health and Safety  <b>Evaluate:</b> Terminology for sewing machines, decorative techniques, ACCESS FM</p>	<p><b>Year 7: Food technology</b>  <b>Innovate-</b> Knowledge of food and the Eatwell guide.  <b>Manufacture-</b> Practical and technical skills with materials, tools and processes within the food room.  <b>Evaluate-</b> Subject specific terminology</p> <p>Year 9: Food technology  <b>Investigate:</b> Connected range of dishes with healthy eating, dietary issues considered, seasonality  <b>Innovate:</b> Selection of dishes to consider food provenance.  <b>Manufacture:</b> Practical and technical skills with materials, tools and processes within the food room, health and safety  <b>Evaluate:</b> Assessment review, self-evaluation of skills</p>	<p><b>Year 7: Product Design</b>  <b>Investigate:</b> Knowledge of materials, properties (soft woods, hard woods)  <b>Innovate:</b> Design iterations and prototypes  <b>Evaluate:</b> Against specification</p> <p><b>Year 8: Product Design</b>  <b>Investigate:</b> Knowledge of materials, properties (soft woods, hard woods, thermosetting and thermo forming plastics)  <b>Innovate:</b> Design iterations and prototypes  <b>Manufacture:</b> Use of vacuum former and strip heater  <b>Evaluate:</b> Against specification</p>	<p><b>Year 4: Moving books</b>  <b>Investigate:</b> Knowledge of materials, processes, and aesthetics.  <b>Innovate:</b> Problem solving with the use of a mechanism.  <b>Manufacture :</b> Practical and technical skills and motion processes.  <b>Evaluation:</b> Subject specific vocabulary and self-evaluation</p> <p><b>Year 8: Electronics</b>  <b>Innovate:</b> Circuit design, component functions/uses  <b>Manufacture:</b> PCB layout and soldering of components, Health and Safety  <b>Application of Technology:</b> CAD design 2D design, Circuit Wizard, Eco design (recycling/upcycling), sustainability  <b>Evaluate:</b> Quality assurance, quality control checks</p>
	Key Knowledge	<p><b>Substantive</b>  Understand a variety of communication techniques and when and how they are used in industry.</p> <p><b>Disciplinary</b>  Students must properly apply and correctly use industrial style drawing techniques as instructed.</p>	<p><b>Substantive</b>  Understand the properties of fibres.  Master the use of the heat press and dye sublimation.  Be able to realise design ideas into a logo design using repeat patterns.  Be able to create and construct a garment of clothing which incorporates their own design idea.</p> <p><b>Disciplinary</b>  Apply understanding of how the textile industry prints patterns onto garments.  Understand the significance of using specific machinery to achieve an industrial quality product.  Build upon knowledge learnt in Year 7 &amp; 8</p>	<p><b>Substantive</b>  Know the main characteristics of the three macronutrients  Know the functional characteristics of ingredients including sugar, eggs, fats and flour.  Understand the process of lamination and how to create layers in pastry and pasta.  Use a range of small equipment safely  Know how to garnish and decorate dishes to a high standard</p> <p><b>Disciplinary</b>  Apply understanding of the macronutrients when selecting ingredients  Apply knowledge of ingredients to their functional properties  Demonstrate safe use of pasta machine and electric hand whisk  Demonstrate skills in making to produce a range of predominantly savoury dishes successfully (fresh pasta, pasties, chicken goujons etc)</p>	<p><b>Substantive</b>  Understand the correct names of tools and equipment, their uses and how they are used safely and correctly to ensure a high-quality accurate finish.  Understand the properties of timbers, polymers, manmade boards and metals, their uses and how they can be used sustainably.  Understand how material can be fixed/fastened together using a range of suitable temporary and permanent joining methods, including rivets.  Understand the terms addition, wastage and redistribution and be able to explain a range of different processes as examples for each.  Understand the design process and this is an iterative process which can be guided by client feedback/ a specification / design brief and analysis of existing products to help produce a high-quality practical outcome.</p> <p><b>Disciplinary</b>  Choose the correct tools and machinery for a range of different projects and tasks throughout Engineering and be able to use them accurately and safely to ensure a high-quality finish.  Make well informed sustainable choices when selecting materials for a range of different projects and tasks throughout Engineering. To be able to explain why they have selected the most suitable material and its impact on the planet.  Explain the origin of metals and the effect using them has on the planet. .  To be able to create detailed and annotation diagrams of a range of manufacturing processes including laminating materials using rivets.  To be able to modify a given design proposal to ensure suitability for the user and inclusive design through careful consideration of anthropometrics and ergonomics.  To adopt a range of drawing techniques including isometric and orthographic skills to illustrate design ideas.</p>	<p><b>Substantive</b>  Be able to identify forces and mechanisms and understand their uses in everyday life.</p> <p><b>Disciplinary</b>  Be able to apply a methodical approach to manufacture and testing to improve quality.  To develop a deeper understanding of CAD software  Apply knowledge if forces and mechanisms to design a cam and follower toy.</p>
Next Steps	<p>Year 10: GCSE D&amp;T  Year 10: NCFE Engineering</p>	<p>Year 10: GCSE D&amp;T  Year 10: NCFE Engineering</p>	<p>GCSE Food Preparation and Nutrition (Eduquas)</p>	<p>Year 10: GCSE D&amp;T  Year 10: NCFE Engineering</p>	<p>Year 10: GCSE D&amp;T  Year 10: NCFE Engineering</p>	

Year 10 DT	Unit	<b>Graphics</b>	<b>Product Design</b>	<b>E-Textiles</b>	<b>NEA Section A- Identify, investigate, and outline design possibilities</b>
	Key Concepts	<p><b>Investigate:</b> Appreciation of design exponents past and present</p> <p><b>Innovate:</b> Consideration of ergonomics and anthropometrics to accurately manufacture a commercially viable product</p> <p><b>Manufacture:</b> Working with CAD/CAM safely and refining design work to get maximum effect.</p> <p><b>Evaluate:</b> Evaluate against specification</p> <p><b>Application of Technology:</b> Utilise CAD CAM technology such as 2D Design Tools, Vinyl and Laser Cutters.</p>	<p><b>Investigate:</b> Composition of own design brief and specification for a client. Investigation of both primary and secondary data with a good understanding of the work of others.</p> <p><b>Innovate:</b> Consider material properties and existing products when designing</p> <p><b>Manufacture:</b> Demonstrating a range of methods for the communication of design ideas.</p> <p><b>Evaluate-</b> Critically evaluate a product against its specification Technology- Eco Design, understanding of ecological and social footprint</p>	<p><b>Investigate:</b> Biomimicry and key designers. Create and follow design brief and specifications</p> <p><b>Innovate:</b> Design an e-textile product including electronic circuit.</p> <p><b>Manufacture:</b> Work safely with a variety of Textile and electronic equipment. Hand embroidery, applique.</p> <p><b>Evaluate:</b> Evaluate product against specification,</p> <p><b>Application of Technology-</b> Smart and modern materials</p>	<p><b>Investigate:</b> Composition of own design brief and specification for a client</p> <p><b>Innovate:</b> Investigation of both primary and secondary data with a good understanding of the work of others.</p> <p><b>Manufacture:</b> Demonstrating a range of methods for the communication of design ideas.</p> <p><b>Evaluate:</b> Critically evaluate a product against its specification</p> <p><b>Technology:</b> Eco Design, understanding of ecological and social footprint</p>
	Prior Learning	<p><b>Year 8: Graphics</b> <b>Investigate:</b> a variety of drawing techniques including, Perspective drawing, Isometric, Orthographic, Informal drawing and CAD. <b>Manufacture:</b> To create engineering drawings to demonstrate a variety of drawing techniques. <b>Evaluate:</b> Self assess against success criteria.</p> <p><b>Year 9: Graphics</b> <b>Investigate:</b> a variety of drawing techniques including, Perspective drawing, Isometric, Orthographic, Informal drawing and CAD. <b>Manufacture:</b> To create engineering drawings to demonstrate a variety of drawing techniques. <b>Evaluate:</b> Self assess against success criteria.</p>	<p><b>Year 8: Product Design</b> <b>Investigate</b> - Understanding the difference between renewable/non-finite and non-renewable/ finite resources. <b>Manufacture</b> - Understanding of the design, housing joint, Line bending and vacuum forming process. <b>Evaluate-</b> Understanding of how ACCESS FM can be used to help then throughout the design process.</p> <p><b>Year 9: Product design</b> <b>Investigate:</b> Composition of own design brief and specification for a client. Investigation of both primary and secondary data with a good understanding of the work of others. <b>Innovate:</b> Consider material properties and existing products when designing <b>Manufacture:</b> Demonstrating a range of methods for the communication of design ideas. <b>Evaluate:</b> Critically evaluate a product against its specification Technology- Eco Design, understanding of ecological and social footprint</p>	<p><b>Year 8: Textiles</b> <b>Investigate:</b> Client’s needs, brief, knowledge of materials <b>Innovate:</b> Textile artist references: Lucy Sparrow, Holly Levell <b>Manufacture:</b> Decorative techniques, sewing machine use, Health and Safety <b>Evaluate:</b> Terminology for sewing machines, decorative techniques, ACCESS FM</p> <p><b>Year 9 Textiles</b> <b>Innovate:</b> Interpret a brief, identify target market, repeat patterns. <b>Manufacture:</b> Tie dye, iron transfer, fabric paint, block printing, applique, embroidery, health and safety, follow pattern markings and construction of bucket hat. <b>Investigate:</b> Product analysis, iterative design, material knowledge, prototypes <b>Evaluate:</b> ACCESS FM, quality control <b>Application of Technology:</b> Sewing machine, sublimation printer</p>	<p><b>Year 9</b> <b>Investigate:</b> Interpreting the brief to ensure products produced match the needs of the target market. Focusing on a specialist area to focus knowledge of materials and processes. <b>Manufacture:</b> Development of practical and technical skills and a deeper understanding of processes within specialist areas. <b>Innovate</b> – Creating design iterations from the understanding of the technical skills and a deeper understanding of processes within specialist areas. <b>Evaluate</b> – Using ACCESSFM to analysis of product and processes to fully develop design ideas. Test product against Specification.</p>
	Key Knowledge	<p><b>Substantive</b> Utilising CAD CAM technology in the design and manufacture of a product. Be able to set up and operate both laser and vinyl cutter. Creating a range of design ideas that appeal to a variety of audience. Effectively create pictograms.</p> <p><b>Disciplinary</b> Analysing and understanding the work of others. Students will apply understanding of annotation to explain and justify ideas. Communication techniques of ideas and products.</p>	<p><b>Substantive</b> To know how to write a design brief for your desk tidy and produce a manufacturing specification. To know and understand the commercial stock forms, types and sizes of timber-based materials and components in order to calculate quantities. Know the primary sources of material for producing natural and manmade timbers. Be able to recognise and characterise different types of natural and manufactured timbers. Know the primary sources of material for producing Metals and alloys. Be able to recognise and characterise different types of metals and alloys. Know the primary sources of material for producing polymers. Be able to recognise and characterise different types of polymers. Know how to investigate, analyse and evaluate the work of others. Know how to design and develop prototypes of your desk tidy in response to client wants and needs To be able to use the correct tools, materials and equipment safely with a good level of skill. To be able to show a good level of making/finishing skills that are largely consistent and appropriate to the desk tidy outcome. To be able to critically evaluate your desk tidy prototype and suggest modifications.</p> <p><b>Disciplinary</b> To understand that greenhouse gasses and carbon are produced during the manufacture of products. To understand the impact that a consumer society has on natural resources and the environment including deforestation, mining, drilling, farming and product miles. Understand how products are produced in different volumes. To understand that materials and components are available in standard forms and sizes. To understand the commercial stock forms, types and sizes of materials to calculate quantities. To understand how to develop, communicate and justify design ideas of your desk tidy.</p>	<p><b>Substantive</b> Master the use of the Over-locker Be able to realise the need to help other countries in need. Be able to create and construct a garment of clothing for a specific purpose.</p> <p><b>Disciplinary</b> To be able to form a design brief and specification in response to an identified problem. Be able to apply a methodical approach to manufacture and testing to improve quality. To develop a deeper understanding of a systems approach to analysing and designing products, which can be applied to many other disciplines.</p>	<p><b>Substantive</b> Demonstrate your understanding that all design and technological activity takes place within contexts that influence the outcomes of design practice To develop realistic design proposals because of the exploration of design opportunities and users’ needs, wants and values <b>Disciplinary</b> Investigation of design possibilities has taken place throughout the project with justification and understanding of possibilities identified. Identified a user/client that is to the contextual challenge and student has undertaken a comprehensive investigation of their needs and wants, with a clear explanation and justification of all aspects of these.</p>
	Next Steps	AQA A-Level Product design BTEC Nationals Level 3 Engineering	AQA A-Level Product design BTEC Nationals Level 3 Engineering	AQA A-Level Product design BTEC Nationals Level 3 Engineering	AQA A-Level Product design BTEC Nationals Level 3 Engineering

Year 11 DT		<b>Core Technical Principles</b>						<b>Specialist technical principles</b>
	<b>Unit</b>	<b>Theory: Unit 3.1.1 New and emerging technologies</b>	<b>Theory: Unit 3.1.2 Energy generation and storage</b>	<b>Theory: unit 3.1.3 Developments in New Technologies</b>	<b>Theory: unit 3.1.4 Systems approach to design</b>	<b>Theory: unit 3.1.5 Mechanical Devices</b>	<b>Theory: unit 3.1.6 Materials and their working properties</b>	<b>Theory: Specialist Technical principles</b>
	<b>Key Concepts</b>	<p><b>Investigate:</b> Understand the impact of new and emerging technologies on Industry, Enterprise, Sustainability, People, Culture, Society and the Environment.</p> <p><b>Evaluate:</b> How the critical evaluation of new and emerging technologies informs design decisions</p> <p><b>Application of Technology:</b> Understand the production techniques and systems of CAD and CAM</p>	<p><b>Investigate:</b> understand how energy is generated and stored and how this is used as the basis for the selection of products and power systems.</p> <p><b>Evaluate:</b> Understand the advantages and disadvantages of using current and developing energy sources.</p> <p><b>Application of Technology:</b> Eco Design, understanding of ecological and social footprint and how energy is generated and stored and how this is used as the basis for the selection of products and power systems</p>	<p><b>Investigate:</b> Be aware of developments in new materials, such as Modern Materials, Smart materials, Composite materials and Technical Textiles</p>	<p><b>Application of Technology:</b> consider electronic systems including programmable components to provide functionality to products and processes and enhance and customise their operation.</p>	<p><b>Investigate:</b> The functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements.</p> <p><b>Innovate:</b> represent 2D and 3D objects including 2D diagrams of mechanisms/ mechanical movement.</p>	<p><b>Investigate:</b> understand the categorisation of the types and properties of the following materials.</p> <p><b>Evaluate:</b> Understand the advantages and disadvantages of using different materials, processes and equipment.</p> <p><b>Application of Technology:</b> Eco Design, understanding of ecological and social footprint</p>	<p><b>Investigate &amp; Application of Technology:</b> develop an in-depth knowledge and understanding of the following specialist technical principles:</p> <ul style="list-style-type: none"> <li>• selection of materials or components</li> <li>• forces and stresses</li> <li>• ecological and social footprint</li> <li>• sources and origins</li> <li>• using and working with materials</li> <li>• stock forms, types and sizes</li> <li>• scales of production</li> <li>• specialist techniques and processes</li> <li>• surface treatments and finishes.</li> </ul>
	<b>Prior Learning</b>	<p><b>Year 10 GCSE Design technology subject rotations</b></p> <p><b>Investigate:</b> Composition of own design brief and specification for a client</p> <p>Investigation of both primary and secondary data with a good understanding of the work of others.</p> <p><b>Innovate:</b> Demonstrating a range of methods for the communication of design ideas.</p> <p><b>Evaluate:</b> Critically evaluate a product against its specification</p> <p><b>Application of Technology:</b> Eco Design, understanding of ecological and social footprint</p>	<p><b>Year 11: Unit 3.1.1 New and emerging technologies</b></p> <p><b>Investigate:</b> Understand the impact of new and emerging technologies on Industry, Enterprise, Sustainability, People, Culture, Society and the Environment.</p> <p><b>Evaluate:</b> How the critical evaluation of new and emerging technologies informs design decisions</p> <p>Application of Technology: Understand the production techniques and systems of CAD and CAM</p>	<p><b>Year 11: Unit 3.1.2 Energy generation and storage</b></p> <p><b>Investigate:</b> understand how energy is generated and stored and how this is used as the basis for the selection of products and power systems.</p> <p><b>Evaluate:</b> Understand the advantages and disadvantages of using current and developing energy sources.</p> <p><b>Application of Technology:</b> Eco Design, understanding of ecological and social footprint and how energy is generated and stored and how this is used as the basis for the selection of products and power systems</p>	<p><b>Year 11: Theory: unit 3.1.3 Developments in New Technologies</b></p> <p>Investigate: Be aware of developments in new materials, such as Modern Materials, Smart materials, Composite materials and Technical Textiles</p>	<p><b>Year 11: Unit 3.1.4 Systems approach to design</b></p> <p><b>Application of Technology:</b> consider electronic systems including programmable components to provide functionality to products and processes and enhance and customise their operation.</p>	<p><b>Year 11: Unit 3.1.5 Mechanical Devices</b></p> <p><b>Investigate:</b> The functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements.</p> <p><b>Innovate:</b> represent 2D and 3D objects including 2D diagrams of mechanisms/ mechanical movement.</p>	<p><b>Year 11: Unit 3.1.6 Materials and their working properties</b></p> <p><b>Investigate:</b> understand the categorisation of the types and properties of the following materials.</p> <p><b>Evaluate:</b> Understand the advantages and disadvantages of using different materials, processes and equipment.</p> <p><b>Application of Technology:</b> Eco Design, understanding of ecological and social footprint</p>
	<b>Key Knowledge</b>	<p><b>Substantive</b></p> <p>Understand that new technologies need to be developed and produced in a sustainable way</p> <p>Be aware of the impact that excessive use of certain materials has on the environment</p> <p>Understand how the environment can be protected by responsible design and manufacturing</p> <p>Understand how waste can be disposed of with the least impact on the planet</p> <p>Understand how technology push and market pull affect consumer choice and employment</p> <p>Be aware of changes in fashion and trends and how they affect designers and manufacturers</p> <p>Understand contemporary and potential future use of automation, Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM).</p> <p>Be able to recognise and characterise the use of Flexible Manufacturing Systems (FMS)</p> <p>Understand how Just In Time (JIT) and Lean Manufacturing contribute to manufacturing efficiencies.</p> <p><b>Disciplinary</b></p> <p>Understand the positive and negative impacts new products have on the environment</p> <p>Understand changes in job roles due to the emergence of new ways of working</p> <p>Understand how new products can have both a positive and negative impact on society</p>	<p><b>Substantive</b></p> <p>To understand how power is generated from fossil fuels and nuclear power.</p> <p>To understand how power is generated from renewable energy such as wind, solar, tidal, hydroelectricity and Biomass.</p> <p>How Power can be stored.</p> <p><b>Disciplinary</b></p> <p>Be aware of the arguments for and against fossil fuels, renewable energy, and nuclear power</p>	<p><b>Substantive</b></p> <p>To be able to recognise a range of modern, smart and technical materials.</p> <p>To be able to identify and understand the properties of materials and their characteristics.</p> <p><b>Disciplinary</b></p> <p>Know developments of new modern materials.</p> <p>Know which material is most suitable for the product taking into consideration their properties.</p>	<p><b>Substantive</b></p> <p>Understand the principles of electronic systems.</p> <p>Use systems diagrams and flowcharts to analyse and solve a given problem.</p> <p>Understand the use of open and closed loop systems and subsystems.</p> <p>Recognise and understand common electronic input and output components.</p> <p><b>Disciplinary</b></p> <p>Identify a variety of electrical components and systems and identify them in everyday products.</p>	<p><b>Substantive</b></p> <p>Be able to recognise and identify a range of movements.</p> <p>Understand the functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements.</p> <p>Understand that mechanisms can be used to change magnitude and direction of force, including levers, linkages, and rotary systems</p> <p><b>Disciplinary</b></p> <p>To understand the key principles: Mechanical Movement</p> <p>Gears</p> <p>Bevel Gears</p> <p>Cranks</p> <p>Levers - Order 1, 2 and 3</p> <p>Cams and Followers</p> <p>Rack and pinion</p> <p>Chain and sprocket</p>	<p><b>Substantive</b></p> <p>To understand the main properties and types of papers and boards.</p> <p>Recognise types and properties of a range of material including physical properties of materials.</p> <p><b>Disciplinary</b></p> <p>Describe the different types of papers like bleed proof, cartridge paper, grid, layout paper, tracing paper.</p> <p>Apply knowledge of properties of material including physical properties when designing and making.</p>	<p><b>Substantive</b></p> <p>Understand how to select and use specialist techniques and processes appropriate for the material and/or task and use them to the required level of accuracy to complete quality outcomes.</p> <p>Demonstrate the value of using measurement and marking out to create an accurate and quality prototype.</p> <p><b>Disciplinary</b></p> <p>Students should know and understand that surface treatments and finishes are applied for functional and aesthetic purposes</p> <p>Apply SI units eg measurement of materials and components using standard units as appropriate in other subjects.</p> <p>Be able to evaluate prototypes effectively.</p>
<b>Next Steps</b>	Theory: unit 3.1.2 Energy generation and storage	Theory: unit 3.1.3 Developments in New Technologies	Theory: unit 3.1.4 Systems approach to design	Theory: unit 3.1.5 Mechanical Devices	Theory: unit 3.1.6 Materials and their working properties	Theory: 3.2 Specialist Technical principles Specialist principles	AQA A-Level Product design T Levels Engineering	

Year 11 DT	Unit	<b>NEA Section – Identifying and investigating design possibilities</b>	<b>NEA Section B- Producing a design brief and specification</b>	<b>NEA Section C- initial ideas</b>	<b>NEA Section D- Developing design ideas</b>	<b>NEA Section E-Realising ideas</b>	<b>NEA Section F- Analysing and evaluating</b>
	Key Concepts	<p><b>Investigate</b> Identify design possibilities, investigate client needs want and factors.</p> <p><b>Evaluate:</b> Analysing the contextual challenge, critically analyse the work of others and the developments throughout history.</p> <p><b>Application of Technology-</b> Eco Design, understanding of ecological and social footprint</p>	<p><b>Investigate:</b> Based on conclusions from investigations an outline of design possibilities will be identified by producing a design brief and design specification.</p>	<p><b>Innovate:</b> Explore a range of possible ideas linking to the contextual challenge selected. These design ideas should demonstrate flair and originality.</p> <p><b>Evaluate:</b> Design ideas against specification.</p> <p><b>Application of Technology:</b> Experimenting with different ideas and possibilities that avoid design fixation.</p>	<p><b>Innovate:</b> Develop and refine design ideas. This may include formal and informal 2D/3D drawing including CAD, systems and schematic diagrams, models and schedules.</p> <p><b>Evaluate:</b> To reflect on developed ideas by looking at their requirements, including how designs meet the design specification.</p> <p><b>Application of Technology:</b> Use a range of appropriate methods, such as measured drawings, control programs, circuit diagrams, patterns, cutting or parts lists.</p>	<p><b>Manufacture:</b> Work with a range of appropriate materials/components to produce prototypes that are accurate and within close tolerances. This will involve using specialist tools and equipment, which may include hand tools, machines or CAM/CNC. The prototypes will be constructed through a range of techniques, which may involve shaping, fabrication, construction and assembly. The prototypes will have suitable finish with functional and aesthetic qualities, where appropriate.</p> <p><b>Evaluate:</b> Evaluate throughout the process using quality assurance and quality control measures.</p> <p><b>Application of Technology:</b> Programme CAM and CNC machines.</p>	<p><b>Evaluate:</b> defining requirements, analysing the design brief and specifications along with the testing and evaluating of ideas produced during the generation and development stages. The final prototype will also undergo a range of tests on which the final evaluation will be formulated. This should include market testing and a detailed analysis of the prototype.</p>
	Prior Learning	<p><b>Year 10 GCSE Design technology subject rotations</b></p> <p><b>Investigate:</b> Composition of own design brief and specification for a client Investigation of both primary and secondary data with a good understanding of the work of others.</p> <p><b>Application of Technology:</b> Eco Design, understanding of ecological and social footprint</p>	<p><b>KS3:</b></p> <p><b>Investigate:</b> Interpreting the brief to ensure products produced match the needs of the target market. Focusing on a specialist area to focus knowledge of materials and processes.</p>	<p><b>KS3:</b></p> <p><b>Innovate:</b> Creating design iterations from the understanding of the technical skills and a deeper understanding of processes within specialist areas.</p>	<p><b>KS3:</b></p> <p><b>Innovate:</b> Development of design ideas using SCAMPER</p>	<p><b>KS3:</b></p> <p><b>Manufacture:</b> Development of practical and technical skills and a deeper understanding of processes within specialist areas.</p>	<p><b>KS3:</b></p> <p><b>Evaluate –</b> Using ACCESSFM to analysis of product and processes to fully develop design ideas. Test product against Specification.</p>
	Key Knowledge	<p><b>Substantive</b> Demonstrate your understanding that all design and technological activity takes place within contexts that influence the outcomes of design practice To develop realistic design proposals because of the exploration of design opportunities and users’ needs, wants and values</p> <p><b>Disciplinary</b> Investigation of design possibilities has taken place throughout the project with justification and understanding of possibilities identified. Identified a user/client that is to the contextual challenge and student has undertaken a comprehensive investigation of their needs and wants, with a clear explanation and justification of all aspects of these.</p>	<p><b>Substantive</b> Understand what a design brief is and clearly justify how their user/client’s needs and wants and links directly to the context selected. Understand what a design specification is and justify linking to the needs and wants of the client/user.</p> <p><b>Disciplinary</b> Know how to create a design brief which clearly justifies how they have considered their user/client’s needs and wants and links directly to the context selected. A comprehensive design specification with very high level of justification linking to the needs and wants of the client/user. Fully informs subsequent design stages.</p>	<p><b>Substantive</b> Understand how to create a variety of imaginative, creative and innovative ideas have been generated, fully avoiding design fixation and with full consideration of functionality, aesthetics and innovation.</p> <p><b>Disciplinary</b> Know through experimentation with different medium to communicate design ideas fully. Imaginative use of different design strategies for different purposes and as part of a fully integrated approach to designing.</p>	<p><b>Substantive</b> Understand the importance of modelling Understand the advantages and disadvantages of using specific techniques for modelling including CAD and CAM.</p> <p><b>Disciplinary</b> To create development work using a wide range of 2D/3D techniques (including CAD where appropriate) in order to develop a prototype. To model, using a wide variety of methods to test their design ideas. Select materials with extensive research into their working properties and availability.</p>	<p><b>Substantive</b> Understand when to use appropriate tools and machinery.</p> <p><b>Disciplinary</b> Use the correct tools, materials, and equipment (including CAM where appropriate) or operated safely. Understand the importance of quality control to ensure the prototype is accurate by consistently applying very close tolerances</p>	<p><b>Substantive</b> Understand what iterations are and as a direct result of considerations linked to testing, analysis, and evaluation of the prototype.</p> <p><b>Disciplinary</b> Evaluate testing of all aspects of the final prototype against the design brief and specification. Suggest any modifications both proposed and undertaken. Iterative analysis and evaluation throughout the project that clearly influences the design brief and the design and manufacturing specifications</p>
Next Steps	NEA Section B- Producing a design brief and specification	NEA Section C- initial ideas	NEA Section D- Developing design ideas	NEA Section E-Realising ideas	NEA Section F- Analysing and evaluating	AQA A-Level Product design T Levels Engineering	

Unit	Workshop Skills	Fabricated lamp	Practice NEA
Key Concepts	<p><b>Investigate:</b> Properties and characteristics of materials</p> <p><b>Innovation:</b> Hand-drawn engineering drawings</p> <p><b>Application of Technology:</b> Properties, characteristics and selection of engineering materials, Engineering tools, equipment and machines,</p>	<p><b>Investigate:</b> Task 1 - Research into tools, equipment and materials.</p> <p><b>Innovate:</b> Task 2 - Hand drawings, design fabricated lamp.</p> <p><b>Manufacture:</b> Task 4 - Production Plan and Gannt chart, Task 5 – Manufacturing</p> <p><b>Evaluation:</b> Task 6 – Evaluation of final product</p> <p><b>Application of Technology:</b> Engineering disciplines, applied science and mathematics in engineering, Hand-drawn engineering drawings</p>	<p><b>Investigate:</b> Task 1 - Research into tools, equipment and materials.</p> <p><b>Innovate:</b> Task 2 - Hand drawings, design fabricated lamp.</p> <p><b>Manufacture:</b> Task 4 - Production Plan and Gannt chart, Task 5 – Manufacturing</p> <p><b>Evaluation:</b> Task 6 – Evaluation of final product</p> <p><b>Application of Technology:</b> Properties, characteristics and selection of engineering materials, Engineering tools, equipment and machines, hand-drawn engineering drawings, Computer-aided design (CAD) engineering drawings</p>
Prior Learning	<p><b>Year 8: Product Design</b></p> <p><b>Investigate:</b> Understanding the difference between renewable/non-finite and non-renewable/ finite resources.</p> <p><b>Manufacture:</b> Understanding of the design, housing joint, Line bending and vacuum forming process.</p> <p><b>Evaluate:</b> Understanding of how ACCESS FM can be used to help then throughout the design process.</p> <p><b>Year 9:</b></p> <p><b>Investigate:</b> Interpreting the brief to ensure products produced match the needs of the target market. Focusing on a specialist area to focus knowledge of materials and processes.</p> <p><b>Manufacture:</b> Development of practical and technical skills and a deeper understanding of processes within specialist areas.</p> <p><b>Innovate:</b> Creating design iterations from the understanding of the technical skills and a deeper understanding of processes within specialist areas.</p> <p><b>Evaluate:</b> Using ACCESSFM to analysis of product and processes to fully develop design ideas.</p>	<p><b>Year 9:</b></p> <p><b>Investigate:</b> Interpreting the brief to ensure products produced match the needs of the target market. Focusing on a specialist area to focus knowledge of materials and processes.</p> <p><b>Manufacture:</b> Development of practical and technical skills and a deeper understanding of processes within specialist areas.</p>	<p><b>Year 9:</b></p> <p><b>Innovate</b> – Creating design iterations from the understanding of the technical skills and a deeper understanding of processes within specialist areas.</p> <p><b>Evaluate</b> – Using ACCESSFM to analysis of product and processes to fully develop design ideas.</p>
Key Knowledge	<p><b>Substantive</b></p> <p>Know how to mark out</p> <p>Know a variety of modification tools</p> <p>Understand there are a variety of finishing techniques</p> <p>Know the components of hand-drawn engineering drawings</p> <p><b>Disciplinary</b></p> <p>Apply knowledge of Tools, equipment and machines</p> <p>Apply knowledge of using joining tools and equipment</p> <p>Demonstrate safe and correct use of tools and equipment</p> <p>Demonstrate how to create a freehand sketch</p> <p>Demonstrate how to hand-drafted isometric drawing sheet</p> <p>Demonstrate hand-drafted orthographic drawing sheet</p>	<p><b>Substantive</b></p> <p>Know the health and safety legislation governing engineering</p> <p><b>Disciplinary</b></p> <p>Apply knowledge of Tools, equipment and machines</p> <p>Apply knowledge of using joining tools and equipment</p> <p>Demonstrate safe and correct use of tools and equipment</p> <p>Demonstrate how to create a freehand sketch</p> <p>Demonstrate how to hand-drafted isometric drawing sheet</p> <p>Demonstrate hand-drafted orthographic drawing sheet</p> <p>Application of SI units of measurement</p> <p>Application of equations used to calculate energy, force, motion, electrical and geometric shapes</p>	<p><b>Substantive</b></p> <p>Know the Properties and characteristics of materials</p> <p>Engineering tools, equipment and machines</p> <p>Know that there are a variety of finishes for different materials and uses. 5.1.4. Finishing</p> <p>Know the advantages and disadvantages between hand drawing and Computer-aided design</p> <p><b>Disciplinary</b></p> <p>Demonstrate safe and correct use of tools and equipment</p> <p>Apply knowledge of using joining tools and equipment</p> <p>Demonstrate safe and correct use of tools and equipment</p> <p>Demonstrate how to create a freehand sketch</p> <p>Demonstrate how to hand-drafted isometric drawing sheet</p> <p>Demonstrate hand-drafted orthographic drawing sheet</p> <p>Demonstrate the use of CAD to create Isometric and orthographic drawings.</p>
Next Steps	Fabricated lamp	Practice NEA	NEA

Unit	Task 1 Materials selection	Task 2 Hand-drafted engineering drawings	Task 3 CAD produced Engineering drawings	Task 4 Production plan	Task 5 Functioning prototype manufacture – function of product	Task 6 Summative evaluation of the product
Key Concepts	<b>Investigate:</b> An analysis of the brief, showing analytical thinking skills, with highly reasoned justifications and decisions in the choice of materials and tools/machinery. Learner has offered well considered approaches to meet the brief.	<b>Innovate:</b> Meeting the needs of the brief: consideration of all aspects of the brief. The needs of the engineering company are fully met in a sophisticated and effective manner through the creation of appropriate drawing(s).	<b>Innovate &amp; Application of Technology:</b> Meeting the needs of the brief: consideration of all aspects of the brief. The needs of the engineering company are fully met in a sophisticated and effective manner through the creation of appropriate drawing(s).	<b>Manufacture:</b> Planning will contain excellent justification of decisions made. Conclusions will be very clear and detailed with excellent reasoning.  <b>Evaluation:</b> Analyse the requirements, measures and techniques, with reasoning and judgement made.	<b>Innovate:</b> Meeting the needs of the brief: Excellent consideration of all aspects of the brief.  <b>Manufacture:</b> Functionality of the product: Fully functioning prototype with excellent functionality. Product testing is appropriate, detailed and comprehensive. Production/manufacturing choices are appropriate and effective.  <b>Evaluate:</b> The needs of the engineering company are fully met in a sophisticated and effective manner.	<b>Evaluate:</b> Analyse and evaluate the success of the final prototype, its functionality, how well it met the brief and suitability to the specified industry that is comprehensive and highly detailed.
Prior Learning	<b>Year 9: Specialist project</b> <b>Investigate:</b> Interpreting the brief to ensure products produced match the needs of the target market. Focusing on a specialist area to focus knowledge of materials and processes. <b>Manufacture:</b> Development of practical and technical skills and a deeper understanding of processes within specialist areas. <b>Innovate</b> – Creating design iterations from the understanding of the technical skills and a deeper understanding of processes within specialist areas. <b>Evaluate</b> – Using ACCESSFM to analysis of product and processes to fully develop design ideas.	<b>Year 10: Fabricated Lamp</b> <b>Investigate:</b> Task 1 - Research into tools, equipment and materials. <b>Innovate:</b> Task 2 - Hand drawings, design fabricated lamp. <b>Manufacture:</b> Task 4 - Production Plan and Gannt chart, Task 5 – Manufacturing <b>Evaluation:</b> Task 6 – Evaluation of final product <b>Application of Technology:</b> Engineering disciplines, applied science and mathematics in engineering, Hand-drawn engineering drawings	<b>Year 10 Practice NEA</b> <b>Investigate:</b> Task 1 - Research into tools, equipment and materials. <b>Innovate:</b> Task 2 - Hand drawings, design fabricated lamp. <b>Manufacture:</b> Task 4 - Production Plan and Gannt chart, Task 5 – Manufacturing <b>Evaluation:</b> Task 6 – Evaluation of final product <b>Application of Technology:</b> Properties, characteristics and selection of engineering materials, Engineering tools, equipment and machines, Hand-drawn engineering drawings, Computer-aided design (CAD) engineering drawings	<b>Year 10: Fabricated Lamp</b> <b>Investigate:</b> Task 1 - Research into tools, equipment and materials. <b>Innovate:</b> Task 2 - Hand drawings, design fabricated lamp. <b>Manufacture:</b> Task 4 - Production Plan and Gannt chart, Task 5 – Manufacturing <b>Evaluation:</b> Task 6 – Evaluation of final product <b>Application of Technology:</b> Engineering disciplines, applied science and mathematics in engineering, Hand-drawn engineering drawings	<b>Year 10 Practice NEA</b> <b>Investigate:</b> Task 1 - Research into tools, equipment and materials. <b>Innovate:</b> Task 2 - Hand drawings, design fabricated lamp. <b>Manufacture:</b> Task 4 - Production Plan and Gannt chart, Task 5 – Manufacturing <b>Evaluation:</b> Task 6 – Evaluation of final product <b>Application of Technology:</b> Properties, characteristics and selection of engineering materials, Engineering tools, equipment and machines, Hand-drawn engineering drawings, Computer-aided design (CAD) engineering drawings	<b>Practice NEA</b> <b>Investigate:</b> Task 1 - Research into tools, equipment and materials. <b>Innovate:</b> Task 2 - Hand drawings, design fabricated lamp. <b>Manufacture:</b> Task 4 - Production Plan and Gannt chart, Task 5 – Manufacturing <b>Evaluation:</b> Task 6 – Evaluation of final product <b>Application of Technology:</b> Properties, characteristics and selection of engineering materials, Engineering tools, equipment and machines, Hand-drawn engineering drawings, Computer-aided design (CAD) engineering drawings
Key Knowledge	<b>Substantive</b> An ability to research, reflecting a wide range of research sources in relation to the brief. All elements will be researched in a detailed and effective way.  <b>Disciplinary</b> An ability to apply knowledge and understanding to the scenario within the brief. Highly suitable creative selections, very relevant to the engineering piece	<b>Substantive</b> Recall of knowledge and understanding of relevant British standards that is comprehensive.  Recall of knowledge and understanding of how to construct hand drawn engineering drawings that is comprehensive.  <b>Disciplinary</b> Ability to construct drawing(s). Sophisticated and effective technical skills are demonstrated along with the provision of clear and detailed drawing(s).  Demonstration of drawing skills using a highly appropriate structure. Technical terms and layout are used correctly and effectively throughout. The drawing(s) is accurate, sophisticated and conform to all relevant standards.	<b>Substantive</b> Recall of knowledge and understanding of relevant British standards that is comprehensive.  Recall of knowledge and understanding of how CAD drawn engineering drawings are constructed that is comprehensive.  <b>Disciplinary</b> An ability to construct drawing(s). Sophisticated and effective technical skills are demonstrated along with the provision of clear and detailed drawing(s). Excellent demonstration of drawing skills using a highly appropriate structure. Technical terms and layout are used correctly and effectively throughout.  The drawing(s) is accurate and conform to all relevant standards.	<b>Substantive</b> Application of knowledge and understanding of the planning process in a highly appropriate format.  Highly appropriate planning tools will be selected and used effectively.  <b>Disciplinary</b> Prototype manufacturing features are highly relevant and described with strong detail. Requirements, measures and techniques are described with excellent detail and understanding of their use within the production of the product.  Engineering features will also be very well justified and relevant to the brief, as well as in line with their own proposal.	<b>Substantive</b> Know how to translate drawings to the prototype.  <b>Disciplinary</b> An ability to construct a fully functioning prototype.  Technical skills are demonstrated along with the provision of clear and detailed evidence of processing skills and techniques.	<b>Substantive</b> Know how to improve final product.  <b>Disciplinary</b> Demonstrate thoughtful and imaginative and highly relevant examples of ways to improve the engineering prototype.
Next Steps	Task 2: Hand-drafted engineering drawings	Task 3: CAD produced Engineering drawings	Task 4: Production plan	Task 5: Functioning prototype manufacture – function of product	Task 6: Summative evaluation of the product	T- Level Engineering A-Level Product design

Unit	Food Safety	Nutrition	Working in the Hospitality and Catering industry	Menu planning	Mock NEA
<b>Key Concepts</b>	<p><b>Innovate:</b> Identifying hazards and how to minimise cross contamination.</p> <p><b>Manufacture:</b> Producing a range of sweet and savoury dishes safely, with consideration for food safety and hygiene.</p> <p><b>Evaluate:</b> Reflection on safe and hygienic working and identifying improvements.</p>	<p><b>Innovate:</b> Finishing of dishes including food styling and garnishing.</p> <p><b>Investigate:</b> How to meet the needs of customers using a wide range of ingredients.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes.</p> <p><b>Evaluate:</b> Nutritional analysis of dishes based on nutritional knowledge. Develop skills in sensory testing, and how to carry out a controlled tasting session</p>	<p><b>Investigate:</b> Understand how kitchen design and workflow influences customer experience.</p> <p><b>Innovate:</b> Understand recent developments in large and small equipment found in catering kitchens.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes. Dovetailing multiple dishes using a production plan.</p> <p><b>Evaluate:</b> Nutritional analysis of dishes based on nutritional knowledge. Sensory analysis using organoleptic characteristics of dishes.</p>	<p><b>Investigate:</b> Understand nutritional requirements across life stages. Select ingredients based on their functional and nutritional characteristics when menu planning.</p> <p><b>Innovate:</b> Design menus and select dishes based on a wide range of factors and customer needs.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes. Dovetailing multiple dishes using a production plan.</p>	<p><b>Investigate:</b> Identify contingency, storage, hygiene, quality and waste points for production planning.</p> <p><b>Innovate:</b> Create and justify menu choices for a range of customers.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes. Dovetailing multiple dishes using a production plan.</p> <p><b>Evaluate –</b> Review practical performance inc. strengths, weaknesses and suggest areas for improvement.</p>
<b>Prior Learning</b>	<p><b>Year 9: Food</b></p> <p><b>Investigate:</b> Connected range of dishes with macronutrients fat, protein and carbohydrates</p> <p><b>Innovation:</b> Menu design informed by nutritional requirements, hygiene and safety</p> <p><b>Manufacture:</b> Practical and technical skills with materials, tools and processes within the food room, health and safety</p> <p><b>Evaluate:</b> Assessment review, evaluation, Subject specific terminology</p>	<p><b>Year 10 – Food safety</b></p> <p><b>Investigate:</b> Identifying hazards and how to minimise cross contamination</p> <p><b>Manufacture:</b> Producing a range of sweet and savoury dishes safely, with consideration for food safety and hygiene</p> <p><b>Evaluate:</b> Reflection on safe and hygienic working and identifying improvements.</p>	<p><b>Year 10- Nutrition</b></p> <p><b>Investigate:</b> Finishing of dishes including food styling and garnishing</p> <p><b>Innovate-</b> How to meet the needs of customers using a wide range of ingredients</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes</p> <p><b>Evaluate:</b> Nutritional analysis of dishes based on nutritional knowledge. Develop skills in sensory testing, and how to carry out a controlled tasting session</p>	<p><b>Year 10: Working in the H&amp;C industry</b></p> <p><b>Investigate:</b> Understand how kitchen design and workflow influences customer experience.</p> <p><b>Innovate-</b> Understand recent developments in large and small equipment found in catering kitchens.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes. Dovetailing multiple dishes using a production plan.</p> <p><b>Evaluate:</b> Nutritional analysis of dishes based on nutritional knowledge. Sensory analysis using organoleptic characteristics of dishes.</p>	<p><b>Year 10: Menu planning</b></p> <p><b>Investigate:</b> Design menus and select dishes based on a wide range of factors and customer needs.</p> <p><b>Innovate:</b> Understand nutritional requirements across life stages. Select ingredients based on their functional and nutritional characteristics when menu planning.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes. Dovetailing multiple dishes using a production plan.</p>
<b>Key Knowledge</b>	<p><b>Substantive</b></p> <p>Know causes of ill health</p> <p>Know causes of food poisoning</p> <p>Know a range of visible and non-visible symptoms of food poisoning and food-related ill health</p> <p>Know what is meant by cross contamination and preventative control measures</p> <p>Know how to prepare and make dishes using medium and complex preparation skills</p> <p>Know how to prepare dishes using medium and complex knife skills and cooking techniques</p> <p><b>Disciplinary</b></p> <p>Apply knowledge of ill health to produce dishes safely</p> <p>Apply knowledge of food safety and link to potential causes of food poisoning</p> <p>Apply knowledge of health and safety, food hygiene to new recipes.</p> <p>Create dishes using medium and complex preparation, knife and cooking techniques.</p>	<p><b>Substantive</b></p> <p>Know the function of the macronutrients.</p> <p>Know the function of micronutrients including vitamins and minerals.</p> <p>Know the function of dietary fibre (NSP) and water in the diet.</p> <p>Know the needs across life stages inc. adults, babies, toddlers, teenagers</p> <p>Know the needs of individuals based on lifestyle, medical conditions, religious beliefs, cultural beliefs</p> <p>Know how to analyse food samples based on organoleptic properties</p> <p>Know how cooking methods can impact the nutritional value of food</p> <p>Know how to prepare and make dishes using medium and complex preparation skills</p> <p>Know how to prepare dishes using medium and complex knife skills and cooking techniques</p> <p><b>Disciplinary</b></p> <p>Apply knowledge to modify recipes based on special dietary needs.</p> <p>Use knowledge of nutrition to carry out nutritional analysis of recipes.</p> <p>Carry out controlled tasting of a range of ingredients</p> <p>Suggest recipes suitable for a range of dietary needs.</p> <p>Select appropriate cooking methods based on the nutritional requirements of the dish.</p> <p>Create dishes using medium and complex preparation, knife and cooking techniques.</p>	<p><b>Substantive</b></p> <p>Know two different types of H&amp;C provision (commercial and non-commercial)</p> <p>Know a range of services inc. food service and residential services</p> <p>Know the importance of standards and ratings in the H&amp;C industry</p> <p>Know and understand a range of employment roles (inc. front of house, back of house, management)</p> <p>Know personal attributes, qualifications and experience needed to work in the food industry</p> <p>Know employment contracts within the H&amp;C industry</p> <p>Develop awareness of remuneration and benefits within the H&amp;C industry</p> <p>Know the operation of the front and back of house inc. workflow, large and small equipment</p> <p>Know the role of the EHO</p> <p>Know documentation used within a catering kitchen inc. HACCP</p> <p>Know how to prepare and make dishes using medium and complex preparation skills</p> <p>Know how to prepare dishes using medium and complex knife skills and cooking techniques</p> <p><b>Disciplinary</b></p> <p>Be able to suggest most appropriate H&amp;C provider for a range of scenarios.</p> <p>Explain the difference between star ratings for accommodation and restaurant provision.</p> <p>Describe the job responsibilities for a range of job roles and suggest the most appropriate job contract for a range of scenarios.</p> <p>Be able to explain which personal attributes are needed for different job roles inc. BOH and FOH.</p> <p>Discuss the difference financial implications of commercial providers inc. VAT.</p> <p>Discuss the role of the EHO inc. their responsibilities in the H&amp;C industry</p> <p>Justify the range of documentation needed in the catering kitchen, and link to safety.</p> <p>Identify a range of hazards and control points to complete a detailed HACCP document</p> <p>Create dishes using medium and complex preparation, knife and cooking techniques.</p>	<p><b>Substantive</b></p> <p>Know factors affecting menu planning inc. cost, portion control, dietary needs, time of day, customer needs</p> <p>Know a range of other factors affecting menu planning inc. equipment, skills of chef, time available, time of year</p> <p>Know a range of environmental issues to consider when planning menus</p> <p>Know a range of organoleptic qualities when planning menus</p> <p>Know how to plan production</p> <p>Know how to prepare and make dishes using medium and complex preparation skills</p> <p>Know how to prepare dishes using medium and complex knife skills and cooking techniques</p> <p><b>Disciplinary</b></p> <p>Suggest suitable dishes for a range of customers in a range of scenarios</p> <p>Be able to design and adapt menus based on the energy requirements of different groups or health needs,</p> <p>Discuss factors that have affected choice of dishes for a given scenario</p> <p>Create a dovetailed production plan for multiple dishes.</p> <p>Demonstrate advanced skills in food styling and garnishing for dishes, to create balanced textures, tastes, colours and flavours</p>	<p><b>Substantive</b></p> <p>Know how to analyse a scenario</p> <p>Learners should be able to provide a brief review of their planning, preparation and cooking, highlighting areas of success and of potential further development.</p> <p>Know how to identify own strengths and weaknesses following practical activities</p> <p><b>Disciplinary</b></p> <p>Apply knowledge of menu planning to suggest recipes for a given brief</p> <p>Justify choice of dishes using knowledge of nutrition, cooking methods and practical skills in relation to the scenario given</p> <p>Create a written evaluation of their own performance</p>
<b>Next Steps</b>	Year 10: Nutrition	Year 10: Working in the Hospitality and Catering industry	Year 10: Menu planning	Year 10: NEA mock	Year 11: NEA preparation

Unit	Preparing, cooking and presenting dishes	NEA	Working in the hospitality and catering industry
Key Concepts	<p><b>Innovate:</b> Finishing of dishes including portion control garnish and decoration.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes. Dovetailing multiple dishes using a production plan.</p> <p><b>Evaluate:</b> Review practical performance inc. strengths, weaknesses and suggest areas for improvement.</p>	<p><b>Innovate:</b> Create and justify menu choices for a range of customers.</p> <p><b>Investigate:</b> Identify contingency, storage, hygiene, quality and waste points for production planning.</p> <p><b>Manufacture:</b> Create a range of complex level skill dishes. Dovetailing multiple dishes using a production plan.</p> <p><b>Evaluate:</b> Review practical performance inc. strengths, weaknesses and suggest areas for improvement.</p>	<p><b>Innovate:</b> How food safety laws apply to a range of providers.</p> <p><b>Evaluate:</b> Identify risks in H&amp;C provision and plan risk assessment.</p> <p><b>Application of technology:</b> Impact of new technologies used within the H&amp;C industry.</p>
Prior Learning	<p><b>Year 10:</b> How to prepare and make dishes using medium and complex preparation skills How to prepare dishes using medium and complex knife skills and cooking techniques</p>	<p><b>Year 10: Mock NEA and practical skills</b> Know how to analyse a scenario How to review planning, preparation and cooking, highlighting areas of success and of potential further development. Know how to identify own strengths and weaknesses following practical activities</p>	<p><b>Year 10: Working in the Hospitality and Catering industry</b> Know types of H&amp;C provision (commercial and non-commercial) Know a range of services inc. food service and residential services Know the importance of standards and ratings in the H&amp;C industry Know and understand a range of employment roles (inc. front of house, back of house, management) Know personal attributes, qualifications and experience needed to work in the food industry Know employment contracts within the H&amp;C industry Develop awareness of remuneration and benefits within the H&amp;C industry Know the operation of the front and back of house inc. workflow, large and small equipment Know documentation used within a catering kitchen</p>
Key Knowledge	<p><b>Substantive</b> Know how to work safely and hygienically Know a range of basic, medium and complex level skills inc. preparation techniques, cooking techniques and knife skills Know a range of presentation techniques including creativity, garnish and decoration, portion control and accompaniments</p> <p><b>Disciplinary</b> Demonstrate practical skills during which the student works safely and hygienically to produce dishes Select appropriate dishes based on skill level and time available Produce multiple dishes using a production plan Select appropriate accompaniments for main dishes and desserts Select appropriate portion control, garnish and decoration for a range of dishes</p>	<p><b>Substantive</b> Know macronutrients, micronutrients required at different life stages Know the nutritional content of a range of ingredients Know a range of medium and complex level dishes Know how to work safely and hygienically Know how to use a range of cooking skills and techniques Know how to identify strengths and weaknesses in own practical work</p> <p><b>Disciplinary</b> Recommend dishes for identified customers Assess how selected dishes meet the nutritional needs of identified customers Plan sequenced production for multiple dishes Work safely and hygienically to produce two dishes and accompaniments Apply a range of complex level techniques and knife skills to produce multiple dishes successfully Analyse and evaluate their own performance Make reasoned judgements and present conclusions based on their own practical skills</p>	<p><b>Substantive</b> Know costs incurred within the H&amp;C industry Know the basic calculation for gross profit Know how new technology can impact the H&amp;C industry inc. cashless systems, innovative digital technology and software Know how a range of media can impact the H&amp;C industry inc. print, broadcast, internet and competitive Know how a range of H&amp;C providers can meet customer needs, right and equality Know the relevance of safety laws inc. COSSH, HASAWA, MHOR, PPER, RIDDOR Know the details of accident forms and risk assessment Know food labelling laws</p> <p><b>Disciplinary</b> Can explain costs, overheads and VAT for a range of H&amp;C providers Be able to perform simple calculation of profit for a range of scenarios Discuss the impact of new technologies in the H&amp;C industry Explain how H&amp;C providers can meet the needs of a range of customers inc. elderly, disabled, young, families etc. Recall and explain health and safety laws for the H&amp;C industry, with examples. Be able to identify risks in a range of H&amp;C settings, and complete a basic risk assessment form with control measures Complete an accident form Explain the impact of food labelling laws on ill health including allergens and food safety</p>
Next Steps	<p style="text-align: center;">NEA preparation</p>	<p style="text-align: center;">Working in the hospitality and catering industry</p>	<p style="text-align: center;">Exam practice</p>