مدرسة جيمس فيرست بوينت
GEMS FirstPoint School
THE VILLA

Edexcel Design and Technology- Design Technology AS/A Level
Long Term Plan
GEMS FirstPoint School 2018-2019

Term 1	Subject: Edexcel Product Design	Year Group: 10

This document provides a sample scheme of work for teaching A Level Design and Technology that can be adapted by centres to fit their timetabling and staffing arrangements. It is meant as an example approach only and is not intended to be prescriptive.

This scheme of work matches the course planner and broadly follows the order in which the content is set out in the specification. (An A level course planner is provided separately that integrates the themes across the specification and is a suggested approach for those intending not to co-teach the AS level qualification.)

The suggested resources at times are specific but they are intended to demonstrate the type of resources which can be found on the internet. References have not been made to specific textbooks.

This scheme of work is based upon a two-year course for the teaching of the full A level, with examinations taking place in year 2 only and coursework submitted for A level at the end of year 2. The projects suggested in year 1 of the course are intended to support the teaching of skills and give experience of the practical application of the theory being taught. These projects are not assessed as any part or full submission of the NEA. The scheme is based around a course that has four lessons/week, each week structured into blocks that could be divided/redesigned to reflect the centre needs. This is an example of how it could be taught. Suggested projects are just that, suggestions. Individual centre facilities and interests should be taken into account when designing these mini projects or practical tasks.

Unit Topic	Learning Outcomes	Real World / UAE Application	Assessment Methods
Term 1			
1.1 Hardwoods/ Softwoods	Students must be able to apply a knowledge and understanding of working properties, characteristics, applications, advantages and disadvantages of the following types of materials to discriminate between them and select appropriately. Woods: a) hardwoods – Oak, Mahogany, Beech, Jelutong, Balsa b) softwoods – pine, cedar, larch, redwood. http://www.diffen.com/difference/Hardwood_vs_Softwood NEA Explain the use of media to convey design decisions, to record to recognised standards, explain and communicate information and ideas using the following methods and techniques: a) pictorial drawing methods for representing 3D forms – isometric.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.

	INPUT: Use this technique to draw a product related to the intended focused practical task, in this case the theme of healthy lifestyle. Start with orthographic drawings of the product to be made and use these to gain information to convert the drawing to a sketch. Then demonstrate formal isometric drawing.		
3.1 Processes techniques and specialist tools	Processes, applications, characteristics, advantages and disadvantages of the following, to discriminate between them and select appropriately, including the selection of specific and relevant tools to be used for domestic, commercial and industrial products and systems, and use safely when experimenting, improving and refining in order to realise a design: h) marking out techniques – woods, metals, polymers, paper and boards (including use of specialist tools). https://davidneat.wordpress.com/2014/01/31/tools-for-measuring-and-marking-out/ **FPT (focused practical task)** This time is dedicated to the teaching and application of practical skills – the theme of healthy lifestyle The submission of a short presentation booklet will accompany the lamp for final marking, which could include work that relates to the drawing techniques being taught in these lessons – final presentation of lamp, exploded views, component drawings, sketches of jigs, schematic drawings for electronic components. **INPUT:** Focus on the application of the metal marking out tools; demonstrate the use of odd leg callipers, scriber, centre punch in marking out the sheet metal shade, in preparation for drilling and shaping. Application of specialist measuring tools and equipment to determine and apply the accuracy and precision required for products to perform as intended. a) marking, cutting and mortise gauges b) odd leg, internal and external callipers c) squares (set, try, engineers and mitre) d) micrometer and vernier callipers e) densitometer f) dividers g) jigs and fixtures h) go and no-go gauges https://ict2011dnt.wordpress.com/working-with-materials/marking-out-and-measuring-materials/ Time may be available for the use of the centre lathe for facing off tasks – spacer tubes (to fixed length) and the main body.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. Work marked with written feedback.

Unit 2: Topic 8.1 **Moral, social and cultural issues**	Homework task with extended writing tasks.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	
3.3a/3.3b Additional specification content	Composites a) composites – manufactured board, Medium Density Fibre Board (MDF), hardboard, chipboard, plywood. https://dtengineeringteaching.org.uk/2016/02/23/materials-and-components-composites/ a) pictorial drawing methods for representing 3D forms: two-point perspective **INPUT:** The lamp itself is a difficult product to draw in two-point. Also the lamp has already been drawn in 3D using isometric, so it may be more useful to draw the body of the lamp, exploding the lid so the construction detail of the lid switch connector is clearly shown. This is likely to be as a demonstrated task that is followed by the students – extension work would perhaps be exploding the shade and spacers. g) lamination (including use of specialist tools). http://www.bbc.co.uk/schools/gcsebitesize/design/graphics/mechanismfinishprintrev3.shtml Possible links here to the practical work, with sheet bending of aluminium and bending acrylic. Lamp manufacture; aluminium rolling and acrylic bending. **NEA:** The bending of the aluminium shade needs to be demonstrated on a set of rollers. It may be necessary to talk about annealing the aluminium at this point too. Allow class to continue practical activity and set the task of designing a shade decoration to be engraved on the acrylic at this point. Practical tasks from previous lessons need to be processed as equipment becomes available.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
1.2 Metals	a) ferrous metals – mild steel, carbon steels, cast iron b) non-ferrous metals – aluminium, copper, zinc, tin c) alloys (ferrous and non-ferrous) – stainless steel, duralumin, brass. http://www.slideshare.net/fjpwhelan/metals-ferrous-and-non-ferrous?next_slideshow=1 Rendering techniques suitable for the materials chosen for the product. Coloured pencils Watercolour pencils	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.

	Felt pen **NEA:** Use the application of the listed techniques to demonstrate the rendering possibilities. Set worksheets could be used. Set a homework task of producing the final lamp in a chosen 3D presentation style in colour. This will form part of a short graphic presentation booklet that will accompany the lamp in the final submission.	outcome in each lesson.	
Term 2			•
3.1 Processes techniques and specialist tools	b) alloying (including specialist tools). http://www.technologystudent.com/joints/alloys1.html Project manufacture; screw threading, using taps and dies. **INPUT:** Demonstrate threading and preparation for internal screw cutting as used in the attaching of the spacers on the project. As machine screws will be used for the male thread, dies are not needed in practical, but should be demonstrated. Continue with practical tasks; those from previous lessons need to be processed as equipment becomes available.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
1.3 Polymers:	a) thermoplastics – acrylic, polyethylene, polyethylene terephthalate (PET), polyvinyl chloride (PVC), polypropylene (PP), acrylonitrile butadiene styrene (ABS). http://www.ruthtrumpold.id.au/destech/?page_id=83 Working drawings for communicating 2D technical information – 3rd angle orthographic projection. Cutting list, quantities costing. Demonstrate how to present a cutting list and use simple calculations to work out how to price component parts. Use of area and division should be included. Explain the term standard parts and how this can affect the cost. Set homework task to produce a series of component drawings to BS (British Standards) and submit a cutting list with cost calculations.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
3.1 Processes techniques and specialist tools	f) moulding – blow moulding, injection moulding, vacuum forming, extrusion, rotational moulding (including use of specialist tools). Lamp manufacture; laser cutting and drape forming. **NEA:** Demonstrate the use of the laser cutter and the processing of acrylic through it. All candidates need to engrave and cut an individual shade out for the lamp. Then continue with practical tasks. Those from previous lessons need to be processed as equipment becomes available.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
1.4 Composites	b) thermosetting plastics – epoxy resins (ER), urea formaldehyde (UF), polyester resin (PR) c) elastomers – rubber.	• Links to industry.	• Extended writing homework assignment.

	Composites- carbon fibre (CFRP), glass fibre (GRP). **NEA** The theme of healthy lifestyle /drawing portfolio. This is an ideal opportunity to develop iterative manufacturing skills and working independently. Encourage students to plan and structure their own practical work sessions – use homework time to add to the set drawing portfolio – deadline half term. **INPUT:** Demonstrate the vacuum former and show how it can be used to envelop the MDF base. Revise draft angles and vent holes as well as the main process.	• Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Assessment with revision materials. • Work marked with written feedback.
5 Factors influencing the development of products	5.4 Design theory through the influences and methods of the following key historical movements and figures: Arts and Crafts – William Morris. http://www.artyfactory.com/art_appreciation/graphic_designers/william_morris.html The teaching of FORM and FUNCTION will be undertaken as part of the designer's study. 5.3 The influence of aesthetics, ergonomics and anthropometrics on the design, development and manufacture of products: a) form over function b) form follows function. Power point presentation explaining the underlying principles of form over function possible group presentation versus form follows function (counter group). https://www.guggenheim.org/arts-curriculum/topic/form-follows-function Example might be Juicy Salif https://www.youtube.com/watch?v=QSk4nC2hjgM or Hot Bertaa Kettle. https://www.youtube.com/watch?v=DL4BmtoKReg Introduce the next assignment. This will be a passive speaker for a standard iPhone. Free apps are available for down load to iPhones that will enable simple measurement of sound. This may be useful to have in order to measure any improvements made with the passive speaker. This assignment will focus on designing and making, but students should be directed towards the use of wood as a primary material. https://itunes.apple.com/gb/ Models can be quickly made in card to enable basic improvements of sound. Working in groups/pairs, investigate passive speakers on the internet and construct a model in card of a simple design to see if sound output can be improved.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.

	INPUT: Now working individually, sketch ideas using the collected data of phone ergonomics to establish designs for a passive speaker which is intended to be made from wood or plastics. Use the sketching techniques already learnt to enhance drawings and represent materials. **NEA** Introduce the concept of a specification, which will then be used to test the product at the end. Homework: write the specification, include performance, aesthetic criteria and ergonomic data.		
5 Factors influencing the development of products	b) Art Nouveau – Charles Rennie Mackintosh. • The teaching of FORM and FUNCTION will be undertaken as part of the designer's study. **INPUT:** Demonstrate the use of a router (CNC or manual). Discuss possibilities for cutting recesses in the wood for sound channelling. NEA Continue the work on their project. Use appropriate modelling materials to establish a possible solution.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	•
3.1 Processes techniques and specialist tools	d) casting – sand (to include investment), die, resin, plaster of Paris (including use of specialist tools). • https://www.youtube.com/watch?v=gBK0P4ASZ0o **INPUT:** Demonstrate the use of the wood lathe (CNC or manual) to turn small symmetrical components in wood should they feature in any designs. Complete the designing process with final presentation drawings for homework, submit cutting list.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	•
5 Factors influencing the development of products	c) Bauhaus Modernist – Marianne Brandt. The teaching of FORM and FUNCTION will be undertaken as part of the designer's study. https://www.bauhaus100.de/en/past/people/masters/marianne-brandt/ **NEA** Begin the construction of their project. This is designed to be a simple prototype involving perhaps only one significant manufacturing task of any real difficulty. The processing and manipulation of wood as a material is important and students will need inputs as and when necessary, depending upon the designs that have been developed. Encourage an iterative manufacturing/development process, changing as needs arise or develop.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	

3.1 Processes techniques and specialist tools	e) machining – turning, (including use of specialist tools). et up, safe and accurate operation, advantages and disadvantages of the following digital technologies. b) computer-aided manufacture (CAM) and rapid prototyping – CNC lathes, CNC routers, CNC milling machine, CNC laser, CNC vinyl cutters, rapid prototyping. *Link to the speaker project with practical application of design needs to programming.* The theme of healthy lifestyle; continue with practical work. **INPUT:** Demonstrate the use of wood marking out tools, revising theory learnt already. Then continue with practical activities.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
Term 3			•
5 Factors influencing the development of products	d) Art Deco – Eileen Gray. The teaching of FORM and FUNCTION will be undertaken as part of the STUDY, e) machining - stamping, pressing (including use of specialist tools). Joining components. Construction of the speaker boxes will be taking place by now and some knowledge of how to join wood with box/frame slab construction etc. **INPUT:** Demonstrate the use of different glues and fastening devices for wood; screws, pins, PVA, impact adhesive, epoxy resin. **NEA** Then continue with practical activities.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
5 Factors influencing the development of products	f) Streamlining – Raymond Loewy. The teaching of FORM and FUNCTION will be undertaken as part of the designer's study. http://www.raymondloewy.com/ **NEA** Joining components. Continue with the practical work needed for the speaker construction. Add demonstrations as required; it may be useful to show a simple wood lamination process to show how to bend basic wood shapes. **INPUT:** Moulds, jigs and formers – show how these can be used to create simple structures with plastic, metal and wood. Then continue with practical activities.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
7.1 Safe working practices, potential hazards and risk assessment	Adopting safe working practices, recognise and react to potential hazards: a) understanding safe working practices for yourself and others when designing and making, including when selecting and	• Links to industry. • Lesson big question to focus on Dubai.	• Extended writing homework assignment. • Assessment with revision materials.

	safely using machinery, equipment and tools to ensure safe working environments b) understanding the need for risk assessments – identification of potential hazards, identification of people at risk, evaluation of risks, implement control measures, recording and storing of risk assessment documentation.	• Work related learning and designing in the real world as learning outcome in each lesson.	• Work marked with written feedback.
5 Factors influencing the development of products	g) Memphis – Ettore Sottsass. The teaching of FORM and FUNCTION will be undertaken as part of the designer's study. http://designmuseum.org/designers/ettore-sottsass Continue with The theme of healthy lifestyle manufacture. Independent processing. **INPUT:** Finishing techniques: varnishes, polish/waxes, paints, modelling materials. Then continue with speaker manufacture. Independent processing. Principles, applications and the influence on design of anthropometrics and ergonomics: a) sources and applications of anthropometric data b) ergonomic factors for a designer to consider when developing products and environments with which humans react. e) Post Modernism – Philippe Starck. The teaching of FORM and FUNCTION will be undertaken as part of the designer's study http://www.tate.org.uk/learn/online-resources/glossary/p/postmodernism http://www.starck.com/en	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.
5 Factors influencing the development of products	The importance and influence of user-centred design in ensuring products are fit-for-purpose and meet the criteria of specifications when designing, making and evaluating in relation to: a) user needs, wants and values b) purpose c) functionality d) innovation e) authenticity. **NEA** Use the app mentioned previously to check on improvements to the project with the theme of healthy lifestyle. Discuss how aesthetic related spec points can be assessed and what other physical tests can be undertaken.	• Links to industry. • Lesson big question to focus on Dubai. • Work related learning and designing in the real world as learning outcome in each lesson.	• Extended writing homework assignment. • Assessment with revision materials. • Work marked with written feedback.

Consolidation lessons using past paper questions and revision techniques			

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