Scheme of learning

The following scheme of learning is designed to be a guide for the delivery of the theory content alongside suggested types of practical activities. This will help to develop and reinforce specialist practical skills simultaneously. This scheme is designed to be adapted to suit individual schools as a number of assumptions have been made that will not apply to all schools.

The Department for Education recommends 120 guided learning hours for GCSE courses. Year 10 has been allocated 37 weeks and Year 11 has 29 weeks, making 66 weeks in total. Most schools have between 2 hours and 2h40m per week. Topics vary in length but can usually be covered in approximately one week over one to two theory lessons depending on delivery method and style and the ability of the group.

The suggested practical activities are not necessarily linked to the theory lessons running concurrently but where possible, they have been. Teachers should use their professional judgement and be aware of the facilities in their own departments as well as their specialist skill set and the specialism of their cohort, when adapting the suggested practical activities. Links to websites, videos, articles and case studies are included in the individual unit content. Some additional resources are added in this scheme of learning for interest and further extension.

**Term 1**

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** | **Practical activities** |
| **Materials and their working properties** | **Section 3** | **Unit 3** | **Suggested tasks** |
| **1** | 3.1.6 | **Introduction to material properties**Although each of the material sections covered in Unit 3 go through the individual physical and working properties that relate to the material area, it is worth starting off with a general lesson that covers the meaning of each of the physical and working properties. **Papers and boards*** Know the primary sources of materials for producing papers and boards
* Be able to recognise and characterise different types of papers and boards
* Understand how the physical and working properties of a range of paper and board products affect their performance
 | Understand the physical properties of: absorbency, density, fusibility, electrical and thermal conductivity.Understand the working properties of: strength, hardness, toughness, malleability, ductility and elasticity.PowerPoint Guide: T1 Papers and boardWorksheet 1 Papers and boardsHomework 1 Papers and boards | Page 80Chapter 14 | Topic 1 | Use a handling collection of various materials to familiarise students with a variety of specific material properties. Use of basic tools to test materials and understand propertiesUse a handling collection of papers and boards.Conduct an absorbency test using differently size papers. Try different media on them to test bleed and smudge resistance etc. |
| **2** | 3.1.6 | **Timbers*** Know the primary sources of materials for producing natural and manufactured timbers
* Be able to recognise and characterise different types of natural and manufactured timbers
* Understand how the physical and working properties of a range of natural and manufactured timbers products affect their performance
 | PowerPoint Guide: T2 TimbersWorksheet 2 TimbersHomework 2 TimbersLink Video Industrial felling [1m37s] | Chapter 15  | Topic 2 | Use a handling collection of hard and softwoods and manufactured boards.Close inspection and testing of a range of timbers to include stress tests and cutting along and across the grain, indentation and compare to boards. |
| **3** | 3.1.6 | **Metals*** Know the primary sources of materials for producing metals and alloys
* Be able to recognise and characterise different types of metals and alloys
* Understand how the physical and working properties of a range of metals and alloys affect their performance
 | PowerPoint Guide: T3 Metals and alloysWorksheet 3 Metals and alloysHomework 3 Metals and alloys | Chapter 16 | Topic 3 | Use a handling collection of metals including ferrous non-ferrous and alloys. Show how quickly rust can occur on mild steel. Conduct magnetic testing for identification and weight testing for density. |
| **4** | 3.1.6 | **Polymers*** Know the primary sources of materials for producing polymers
* Be able to recognise and characterise different types of polymers
* Understand the physical and working properties of a range of thermoforming and thermosetting polymers
 | PowerPoint Guide: T4 PolymersWorksheet 4 PolymersHomework 4 Polymers | Chapter 17  | Topic 4 | Use a handling collection of thermoplastics and thermosets also examples of biopolymers and manmade fabrics such as acrylic and nylon.Where possible demo or mini-project using vacuum forming or line bending process |
| **5** | 3.1.6 | **Textiles*** Know the primary sources of materials for producing textiles
* Be able to recognise and characterise different types of textiles
* Understand how the physical and working properties of a range of textiles affect their performance
 | PowerPoint Guide: T5 TextilesWorksheet 5 TextilesHomework 5 Textiles | Chapter 18  | Topic 5 | Use a handling collection of textiles including plant based, animal based and man-made.A series of tests can be set up with samples including strength, stretch, drape, crease resistance, stain resistance, absorbency / drying time, fraying etc. |
|  |  | **Unit 3 Materials and their working properties** | **Unit assessment** |  |  | Autumn 1 assessment with practical grades from materials testing  |

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| **Common specialist technical principles** | **Section 4** | **Unit 4** |  |
| **6** | 3.2.2 | **Forces and stresses*** Be able to recognise and characterise tension, compression, binding, torsion and shear forces and stresses
* Understand the impact of different forces and stresses on materials
 | PowerPoint Guide: T1 Forces and stresses on materialsWorksheet 1 Forces and stressesHomework 1 Forces on stresses | Chapter 19  | Topic 1 | Many of the concepts of this lesson will have been touched upon during the testing of the materials in Unit 3 and can be referred to.Using a selection of materials in the chosen specialism(s), compare how different stock forms resist different forces and stresses. |
| **7** | 3.2.2 | **Improving functionality*** Understand how materials may be enhanced to resist and work with forces and stresses to improve functionality
 | PowerPoint Guide: T2 Improving functionalityWorksheet 2 Improving functionalityHomework 2 Improving functionality | Chapter 20 | Topic 2 | Using a material from the chosen specialism(s), show how lamination or another form of reinforcement increases types of strength. Folding of card is a quick and simple way to show how structures are produced through shaping. |
| **8** | 3.2.3 | **Ecological and social footprint*** Understand that greenhouse gases and carbon are produced during the manufacture of products
* Understand the impact that a consumer society has on natural resources and the environment including deforestation, mining, drilling, farming and product miles
* Be aware of the need for social and governmental responsibility to address safe working conditions and pollution
 | PowerPoint Guide: T3 Ecological and social footprintWorksheet 3 Ecological and social footprintHomework 3 Ecological and social footprintLink Carbon footprint calculator | Chapter 21 | Topic 3 | Start a 4-7 week mini project in the chosen material area that has a sustainable brief. Suggest the use of upcycling, using recycled or reclaimed materials such as pallets, old clothes and other textiles, cardboard, household items turned into LED lighting projects etc. This can be delivered individually or pairs. It is aimed at developing material knowledge and basic processing tool skills and not too heavily design based. |
| **9** | 3.2.3 | **The 6 Rs*** Be aware of the role that consumers play in reducing waste and the demand on finite resources
* Understand the hierarchy of options in responsible and sustainable designs
 | PowerPoint Guide: T4 The 6RsWorksheet T4 The 6RsHomework T4 The 6RsLink Video Nike | Chapter 22 | Topic 4 | Continue with mini project 2.While covering the 6 Rs relate to the use of sustainable design within the mini project. |
| **10** | 3.2.7 | **Scales of production*** Understand how products are produced in different volumes
* Explain when and why different manufacturing methods are used for different production volumes
* Be able to link the use of relevant specialist processes to the appropriate level of production
 | PowerPoint Guide: T5 Scales of productionWorksheet T5 Scales of productionHomework T5 Scales of production | Chapter 23  | Topic 5 | Continue with mini project 3.Alternative to pause the mini project and conduct single lesson on a batch production activity. These take some setting up but once in place can be used year on year. Successful projects are simple automata, screen printed bags, LED touch with coin cell or super capacitor.Break the project into stations with very simple instructions. Each task to take 1-3 minutes maximum. After a few have been produced at each station rotate the workforce. Good to link to Christmas fair or similar. |
|  |  | **Unit 4 Common specialist technical principles** | **Unit assessment** |  |  | Autumn 2 assessment to be combined with practical grade from ongoing mini project |

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| **Designing principles** | **Section 6** | **Unit 6** |  |
| **11** | 3.3.13.3.2 | **Investigation, primary and secondary data*** Understand how primary and secondary data can be collected to assist the understanding of client and user needs
* Know how to write a design brief and produce a manufacturing specification
* Understand how the environment, and social and economic challenges influence designing and making
 | PowerPoint Guide: T1 Investigation, primary and secondary dataWorksheet 1 Investigation, primary and secondary data Homework 1 Investigation, primary and secondary data | Chapter 42 | Topic 1 | Continue with mini project 4.Alternative opportunity to collect data for a given task such as |
| **12** | 3.3.3 | **The work of others – designers*** Know how to investigate, analyse and evaluate the work of others
* Understand how investigating the work of other designers can inform designing
 | PowerPoint Guide: T2A The work of others - designersWorksheet 2A The work of others - designersHomework 2A The work of others – designersCase study | Chapter 43 | Topic 2A | Continue with mini project 5.Alternative opportunity to run through a case study of the work of a designer through a product analysis and a brief look at their life. This will reinforce the technique to be used for their own case studies. |
| **13** | 3.3.3 | **The work of others – companies*** Know how to investigate, analyse and evaluate the work of others
* Understand how investigating the work of other design companies can inform designing
 | PowerPoint Guide: T2B The work of others - companiesWorksheet T2B The work of others - companies Homework T2B The work of others - companies | Chapter 43 | Topic 2B | Complete mini project 6. |
| **14** | 3.3.4 | **Design strategies*** Be able to use a range of design strategies to help produce imaginative and creative design ideas
* Understand how to explore and develop design ideas
 | PowerPoint Guide: T3 Design strategiesWorksheet 3 Design strategiesHomework 3 Design strategies | Chapter 44 | Topic 3 | Complete mini project 7. |

**Term 2**

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Designing principles** | **Section 6** | **Unit 6** |  |
| **15** | 3.3.53.3.6 | **Communication of design ideas*** Understand how to develop, communicate, record and justify design ideas
* Be aware of a range of techniques to support clear communication of design ideas
* Know how to design and develop prototypes in response to client wants and needs
* Be able to critically evaluate prototypes and suggest modifications
 | PowerPoint Guide: T4 Communication of design ideasWorksheet 4 Communication of design ideasHomework 4 Communication of design ideasLink Video Two-point perspective [1m07s] | Chapter 45 | Topic 4 | Complete a series of drawing activities to help develop an understanding of the benefits and limitations of the various drawing styles including freehand sketching, oblique, isometric, two-point perspective, exploded and third-angle orthographic projection.Ensure students are aware of how to be selective and know how to record data for use in their portfolios.Demonstrate different portfolio techniques including digital format if appropriate. |
|  |  | **Unit 6 Designing principles** | **Unit assessment** |  |  | 1st part of Spring 1 assessment added to practical grades from Mini NEA up to assessment point  |

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| **Making principles** | **Section 7**  | **Unit 7** |  |
| **16** | 3.3.7 | **Selection of materials and components*** Be able to select and use materials and components appropriate to a specific task
* Understand how functionality, availability and cost affect the selection of materials and components
 | PowerPoint Guide: T1 Communication of design ideasWorksheet 1 Communication of design ideasHomework 1 Communication of design ideas | Chapter 46  | Topic 1 | NEA skills project 12-14 wks.In the chosen specialist material area, students are to produce a prototype product and a portfolio of supporting evidence similar to the NEA. The design context can be chosen from, but not limited to the following:1. An aid or adaptation to an existing product for the very young, the elderly or those with special needs. 2. A prototype product to enhance road safety.3. A storage or transportation device that protects valuable or fragile contents from theft or damage and breakage. |
| **17** | 3.3.8 | **Tolerances*** Understand and use tolerances to ensure accuracy is considered when making a product
* Understand how a range of materials are formed to designated tolerances
* Understand why tolerances are applied during making activities
* Understand how additional material may be required or removed by a cutting method, seam allowance or joint overlap
 | PowerPoint Guide: T2 TolerancesWorksheet 2 TolerancesHomework 2 Tolerances | Chapter 47 | Topic 2 | NEA skills project 2Alternative opportunity to make a small artefact to a given tolerance in the chosen specialist material. A good method for getting students to self-check their work is to create a go/no go template for the given task.Ideas may include: One half of a wood joint that needs to fit the other half that is pre-made. Create a replacement pocket to exactly cover the one on a school blazer.Create a parallel turned shaft to a specific diameter.Devise a LDR circuit with a potential divider which switches on a LED at a given LUX level.Construct a small trinket box from card where the base interference fits into the lid. |
| **18** | 3.3.9 | **Material management*** Understand how effective design planning can minimise waste
* Be aware of how design adaptations and use of tessellation can save time and materials
* Understand the value of using measurement and marking out to create an accurate prototype
* Be able to recognise and characterise the appropriate tools and methods to mark out a range of materials to create prototypes
 | PowerPoint Guide: T3 Material managementWorksheet 3 Material managementHomework 3 Material management | Chapter 48 | Topic 3 | NEA skills project 3Opportunity to investigate tessellation and nesting with a simple design layout task such as fitting a given number of parts on an A4 or A3 page in the most efficient way. Students can than calculate the waste.  |
| **19** | 3.3.10 | **Tools, equipment, techniques and finishes*** Understand how to select and use specialist tools, equipment, techniques and processes
* Be aware of relevant health and safety issues when using specialist tools, equipment, techniques and processes to protect yourself and others from harm
 | PowerPoint Guide: T4 Tools, equipment, techniques and finishesWorksheet 4Tools, equipment, techniques and finishesHomework 4 Tools, equipment, techniques and finishes Link Tensol 12 Safety data sheetLink Video How NOT to use a disc sander | Chapter 49 | Topic 4 | NEA skills project 4Opportunity to reinforce health and safety requirements in the workshop and link signage and PPE to the legislation and HES requirements |
| **20** | 3.3.11 | **Surface treatments and finishes*** Know and understand that surface treatments and finishes are applied for functional and aesthetic purposes
* Understand how to prepare different surfaces for treatments and finishes
* Understand how to select and apply appropriate surface treatments and finishes to a range of surfaces
 | PowerPoint Guide: T5 Surface treatments and finishesWorksheet 5 Surface treatments and finishesHomework 5 Surface treatments and finishes | Chapter 50 | Topic 5 | NEA skills project 5Opportunity to demonstrate and use a variety of surface finishes relating to the chosen specialist area  |
|  |  | **Unit 7 Making principles** | **Unit assessment** |  |  | 2nd part of Spring 1 assessment added to practical grades from Mini NEA so far |

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| **Specialist Units - 1**  | **Section 5A-5F** | **Unit** **5A-5F** |  |
| **21** |  | **Sources, origins and properties****Specific content detail for all specialist units can be found at the end of this document.** |  |  | Topic 1 | NEA skills project 6Opportunity for demonstration of or practice using specialist materials, techniques, equipment and machinery not previously covered |
| **22** |  | **Working with specialist materials** |  |  | Topic 2 | NEA skills project 7Further specialist investigation |
| **23** |  | **Commercial manufacturing, surface treatments and finishes** |  |  | Topic 3 | NEA skills project 8Further specialist investigation |
|  |  | **Unit 5A-5F Specialist Units** | **Unit assessment** |  |  | Spring 2 assessment to be added to practical grades from Mini NEA so far at assessment point |
| **New and emerging technologies** | **Section 1** | **Unit 1** |  |
| **24** | 3.1.1 | **Industry and enterprise*** Understand the impact of new and emerging technologies on the design and organisation of the workplace and tools and equipment
* Be aware of how computers and automation have changed manufacturing through the use of robotics
* Understand how innovation can drive product development and enterprise including the use of crowd funding and virtual marketing
* Understand co-operative and fair trade organisation
 | PowerPoint Guide: T1 Industry and enterpriseLink Video BMW Car Manufacture [3m49s]Link Fully automated warehouse [1m59s]Worksheet 1 Industry and enterpriseLink Augmented reality [2m38s]Homework 1 Industry and enterprise | Chapter 1  | Topic 1 | NEA skills project 9 |
| **25** | 3.1.1 | **Sustainability and the environment*** Understand that new technologies need to be developed and produced in a sustainable way
* Be aware of the impact that excessive use of certain materials has on the environment
* Understand how the environment can be protected by responsible design and manufacturing
* Understand how waste can be disposed of with the least impact on the planet
* Understand the positive and negative impacts new products have on the environment
 | PowerPoint Guide: T2 Sustainability and the environmentLink Video Kaizen [4m16s]Link Video Plastic entering food chain [0m59s]Worksheet 2 Sustainability and the environmentHomework 2 Sustainability and the environment | Chapter 2 | Topic 2 | NEA skills project 10 |
| **26** | 3.1.1 | **People, culture and society*** Understand how technology push and market pull affect consumer choice and employment
* Understand changes in job roles due to the emergence of new ways of working
* Be aware of changes in fashion and trends and how they affect designers and manufacturers
* Understand how new products can have both a positive and negative impact on society
 | PowerPoint Guide: T3 People, culture and societyLink Video Ford Cobots [1m04s]Link Video HSBC Cultural Adverts [6m27s]Worksheet 3 People, culture and societyHomework 3 People, culture and society | Chapter 3 | Topic 3 | NEA skills project 11 |

**Term 3**

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **New and emerging technologies** | **Section 1** | **Unit 1** |  |
| **27** | 3.1.1 | **Production techniques and systems*** Understand contemporary and potential future use of automation, Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)
* Be able to recognise and characterise the use of Flexible Manufacturing Systems (FMS)
* Understand how Just in Time (JIT) and Lean Manufacturing contribute to manufacturing efficiencies
 | PowerPoint T4: Production techniques and systemsWorksheet 4 Production techniques and systems Homework 4 Production techniques and systems | Chapter 4 | Topic 4 | NEA skills project 12 |
| **28** | 3.1.1 | **Informing design decisions*** Be able to evaluate the advantages and disadvantages of planned obsolescence from different perspectives
* Understand how products can be designed to be repaired and recycled
 | PowerPoint T5: Informing design decisionsLink Built in obsolescenceLink Swedish repair billsWorksheet 5 Informing design decisionsHomework 5 Informing design decisions | Chapter 5 | Topic 5 | NEA skills project 13 |
|  |  | **Unit 1 New and emerging technologies** | **Unit assessment** |  |  | Summer 1 assessment added to final practical grades for NEA skills project |
| **Energy, materials, systems and devices** | **Section 1** | **Unit 1** |  |
| **29** | 3.1.2 | **Energy generation*** Understand how power is generated from fossil and nuclear fuels
* Understand how power is generated from renewable energy sources such as: wind, solar, tidal, hydroelectric and biomass
* Be aware of the arguments for and against the selection of fossil fuels, renewable energy and nuclear power
 | PowerPoint T1: Energy generationWorksheet 1 Energy generationHomework 1 Energy generation | Chapter 6 | Topic 1 | Complete NEA skills project 14 |
| **30** | 3.1.2 | **Energy storage*** Be able to identify mechanical power and understand how it is stored
* Understand pneumatics and hydraulics as examples of kinetic pumped storage systems
* Understand the functional properties of alkaline and re-chargeable batteries
 | PowerPoint T2: Energy storageLink Cryogenic energy storageLink UK Battery farmsLink Video Energy conversion [2m34s]Worksheet 2 Energy storageHomework 2 Energy storage | Chapter 7 | Topic 2 | Review of NEA skills porject.Analysis of former GCSE projects to foster expectations at various levels and to develop an awareness for the quality of presentation, ideas generation, modelling and the quality of finish achievable. |
| **31** | 3.1.3 | **Modern materials*** Be able to recognise a range of modern materials
* Describe developments made through the invention of new or improved processes involving modern materials
* Explain how modern materials can be used to alter functionality
 | PowerPoint T3: Modern materialsWorksheet 3 Modern materialsHomework 3 Modern materials | Chapter 8 | Topic 3 | NEA 1 |
| **32** | 3.1.3 | **Smart materials*** Be able to recognise a range of smart materials
* Understand how the functional properties of a range of smart materials can be changed by external stimuli
 | PowerPoint T4: Smart materialsWorksheet 4 Smart materialsHomework 4 Smart materials | Chapter 9 | Topic 4 | NEA 2 |
| **33** | 3.1.3 | **Composite materials and technical textiles*** Understand how material properties can be enhanced by combining two or more materials
* Recognise a range of composite materials and technical textiles
* Understand how fibres can be manipulated to create technical textiles
 | PowerPoint T5: Composite materials and technical textilesLink Video Fibreglass mould [8m13s]Link Video Problem with microfibres [2m47s]Worksheet 5 Composite materialsHomework 5 Composite materials | Chapter 10  | Topic 5 | NEA 3 |
| **34** | 3.1.4 | **Systems approach to designing*** Understand the principles of electronic systems
* Use systems diagrams and flowcharts to analyse and solve a given problem
* Understand the use of open and closed loop systems and subsystems
* Recognise and understand common electronic input and output components
 | PowerPoint T6: Systems approach to designingWorksheet 6 Systems approach to designingHomework 6 Systems approach to designing | Chapter 11 | Topic 6 | NEA 4 |
| **35** | 3.1.4 | **Electronic systems processing*** Understand the difference between analogue and digital signals
* Understand how microcontrollers are programmed as counters, timers and for decision making to provide functionality to products and processes
* Understand the use of buzzers, speakers and lamps to provide functionality to products and processes
 | PowerPoint T7: Electronic systems processingWorksheet 7 Electronic systems processingHomework 7 Electronic systems processing | Chapter 12 | Topic 7 | NEA 5 |
| **36** | 3.1.5 | **Mechanical devices*** Be able to recognise and identify a range of movements
* Understand the functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements
* Understand how mechanisms can be used to change magnitude and direction of force, including levers, linkages and rotary systems
 | PowerPoint T8: Mechanical devicesWorksheet 8 Mechanical devicesHomework 8 Mechanical devices | Chapter 13 | Topic 8 | NEA 6 |
| **37** |  | **Exam week will be allocated during the Summer term** |  |  |  |  |

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Specialist Units – 2 if applicable (2 recommended)** | **Section** **5A-5F** | **Unit** **5A-5F** |  |
| **1** |  | **Sources, origins and properties** |  |  | Topic 1 | NEA 7 |
| **2** |  | **Working with specialist materials** |  |  | Topic 2 | NEA 8 |
| **3** |  | **Commercial manufacturing, surface treatments and finishes** |  |  | Topic 3 | NEA 9 |
|  |  | **Unit 5A-5F Specialist Units** | **Unit assessment** |  |  |  |
| **4** |  |  |  |  |  | NEA 10-11 |
| **5** |  |  |  |  |  | NEA 12-13 |
| **6** |  |  |  |  |  | NEA 14-15 |
| **7** |  |  |  |  |  | NEA 16-17 |
| **8** |  |  |  |  |  | NEA 18-19 |
| **9** |  |  |  |  |  | NEA 20-22 |
| **10** |  |  |  |  |  | NEA 23-24 |
| **11** |  |  |  |  |  | NEA 25-26 |
| **12** |  | Revision |  |  |  |  |
| **13** |  | Revision  |  |  |  |  |
| **14** |  | **Mock examination week 1** |  |  |  |  |

**Term 4**

**Term 5**

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **NEA completion and revision starts** | **Section** **5A-5F** | **Unit** **5A-5F** |  |
| **15** |  | **Mock examination week2** |  |  |  |  |
| **16** |  |  |  |  |  | NEA 27-28 |
| **17** |  |  |  |  |  | NEA 29-30 |
| **18** |  |  |  |  |  | NEA 31-32 |
| **19** |  |  |  |  |  | NEA 33-34 |
| **20** |  |  |  |  |  | NEA Practical deadline |
| **21** |  |  |  |  |  | NEA Testing and evaluation |
| **22** |  |  |  |  |  | NEA Final hand-in |
| **23** |  | Revision |  |  |  | Revision 1-2 |
| **24** |  | Revision |  |  |  | Revision 3-4 |
| **25** |  | Revision |  |  |  | Revision 5-6 |
| **26** |  | Revision |  |  |  | Revision 7-8 |

**Term 6**

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Revision** | **Section** **5A-5F** | **Unit** **5A-5F** |  |
| **26** |  | Revision |  |  |  | Revision9-10 |
| **27** |  | Revision |  |  |  | Revision 11-12 |
| **28** |  | Revision |  |  |  | Revision 13-14 |
| **29** |  | Revision |  |  |  | Revision15-16 |

**Specialist units**

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Specialist material areas – Papers and Boards** | **Section 5A** | **Unit 5A** |  |
| **1** | 3.2.13.2.4 | **Sources, origins and properties*** Learn how the primary sources of materials for producing papers and boards are converted into products
* Understand the ecological issues in the manufacture and recycling of paper and board products
* Learn how different properties of papers and boards make them suitable for use in commercial products
 | PowerPoint Guide: T1 Sources, origins and propertiesWorksheet 1 Sources, origins and propertiesHomework 1 Sources, origins and propertiesLink Video Making paper [13m21s] | Chapter 24  | Topic 1 | Complete a basic folding, scoring and cutting activities, such as pull tab or V-fold mechanisms |
| **2** | 3.2.53.2.63.2.8 | **Working with paper and board*** Know and understand the commercial stock forms, types and sizes of materials in order to calculate quantities
* Understand how to cut, crease, score, fold and perforate card
* Be aware of school-based cutting, forming and processing techniques, tools and equipment
 | PowerPoint Guide: T2 Working with paper and boardWorksheet 2 T2 Working with paper and boardHomework 2 T2 Working with paper and boardBox netPop-up card | Chapter 25 | Topic 2 |  |

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| **3** | 3.2.9 | **Commercial manufacturing, surface treatments and finishes*** Understand how the properties of different papers and boards affect their use in commercial applications
* Be aware of commercial processing techniques
* Understand why registration marks are used to enhance quality control
* Understand how the application of surface treatments and finishes can modify the functional and aesthetic properties of paper and board products
 | PowerPoint Guide: T3 Commercial manufacturingWorksheet 3 Commercial manufacturingHomework 3 Commercial manufacturing | Chapter 26 | Topic 3 |  |
|  |  | **Unit 5A Paper and Boards** | **Unit assessment** |  |  |  |

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Specialist material areas – Timber based materials** | **Section 5B** | **Unit 5B** |  |
| **1** | 3.2.13.2.4 | **Sources, origins and properties*** Understand the main processes involved in producing workable forms of timber including:
	+ Conversion
	+ Seasoning and
	+ The creation of manufactured timbers
* Be aware of sustainability and ethical factors in timber production and use
* Understand the advantages and disadvantages of manufactured board compared with natural wood
 | PowerPoint Guide: T1 Sources, origins and propertiesWorksheet 1 Sources, origins and propertiesHomework 1 Sources, origins and propertiesLink Article Illegal teak loggingLink Video Felling machinery [6m03s]Link Video Timber production [5m21s] | Chapter 27  | Topic 1 |  |
| **2** | 3.2.53.2.63.2.8 | **Working with timbers*** Know and understand the commercial stock forms, types and sizes of materials in order to calculate quantities
* Be aware of school-based cutting, forming and processing techniques, tools and equipment
 | PowerPoint Guide: T2 Working with timbersWorksheet 2 T2 Working with timbersHomework 2 T2 Working with timbersLink video Steam bending [3m26s] | Chapter 28 | Topic 2 |  |
| **3** | 3.2.9 | **Commercial manufacturing, surface treatments and finishes*** Know and understand how timbers and boards are selected and processed for commercial products
* Learn how materials are cut, shaped and formed to a tolerance
* Learn about the preparation and application of treatments and finishes to enhance functional and aesthetic properties
 | PowerPoint Guide: T3 Commercial manufacturingWorksheet 3 Commercial manufacturingHomework 3 Commercial manufacturingLink video Curtain Coater [2m53s] | Chapter 29 | Topic 3 |  |
|  |  | **Unit 5B Timber based materials** | **Unit assessment** |  |  |  |

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Specialist material areas – Metal based materials** | **Section 5C** | **Unit 5C** |  |
| **1** | 3.2.13.2.4 | **Sources, origins and properties*** Know how metals are mined and extracted from raw material
* Understand the processes involved in extraction and refining to produce workable forms of metal
* Be aware of sustainability and ethical issues in metal production, in use and end of life
 | PowerPoint Guide: T1 Sources, origins and propertiesWorksheet 1 Sources, origins and propertiesHomework 1 Sources, origins and propertiesLink Video Recycling fridges [5m10s]Link Video Recycling iron [6m44s] | Chapter 30  | Topic 1 |  |
| **2** | 3.2.53.2.63.2.8 | **Working with metal based materials*** Understand that materials and components are available in standard forms and sizes
* Be aware of school-based cutting, forming and processing techniques, tools and equipment
 | PowerPoint Guide: T2 Working with metal based materialsWorksheet 2 T2 Working with metalsHomework 2 T2 Working with metalsLink video Commercial casting [3m18s]Link video Punching and pressing [4m45s] | Chapter 31 | Topic 2 |  |
| **3** | 3.2.9 | **Commercial manufacturing, surface treatments and finishes*** Know and understand how metals are selected and processed for commercial products
* Explain how aids are used to judge quality and accuracy during processing
* Understand how surface treatments and finishes affect the functional and aesthetic properties of metal based products
 | PowerPoint Guide: T3 Commercial manufacturingWorksheet 3 Commercial manufacturingHomework 3 Commercial manufacturingLink video Aluminium foundry [6m41s] | Chapter 32 | Topic 3 |  |
|  |  | **Unit 5C Metals** | **Unit assessment** |  |  |  |

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Specialist material areas – Polymers** | **Section 5D** | **Unit 5D** |  |
| **1** | 3.2.13.2.4 | **Sources, origins and properties*** Know the primary sources of polymers
* Understand the processes involved in refining, fractional distillation and cracking to produce workable forms of polymers
* Understand how plastics can be modified to enhance their properties
* Be aware of sustainability and ethical issues in plastic production, in use and end of life
 | PowerPoint Guide: T1 Sources, origins and propertiesWorksheet 1 Sources, origins and propertiesHomework 1 Sources, origins and propertiesLink Video Fractional distillation [4m05s]Link Video Plastic roads [1m33s]Link Video Sustainability [3m13s] | Chapter 33  | Topic 1 |  |
| **2** | 3.2.53.2.63.2.8 | **Working with polymers*** Know and understand the commercial stock forms, types and sizes of materials to calculate quantities
* Be aware of school-based cutting, forming and processing techniques, tools and equipment
 | PowerPoint Guide: T2 Working with timbersWorksheet 2 T2 Working with timbersHomework 2 T2 Working with timbersLink video Plastic film [2m14s] | Chapter 34 | Topic 2 |  |
| **3** | 3.2.9 | **Commercial manufacturing, surface treatments and finishes*** Understand how the properties of different polymers influence use and affect performance
* Be aware of commercial processing techniques for plastics
* Understand the application and use of quality control during manufacture
* Understand how preparation and application of treatments and finishes affect the functional and aesthetic properties of polymer-based products
 | PowerPoint Guide: T3 Commercial manufacturingWorksheet 3 Commercial manufacturingHomework 3 Commercial manufacturingLink video Panton Chair [3m06s]Link video Hydrographic printing [5m01s] | Chapter 35 | Topic 3 |  |
|  |  | **Unit 5D Polymers** | **Unit assessment** |  |  |  |

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Specialist material areas – Textile based materials** | **Section 5E** | **Unit 5E** |  |
| **1** | 3.2.13.2.4 | **Sources, origins and properties*** Understand the processes involved in obtaining raw material from animal, chemical and vegetable sources
* Be aware of sustainability and ethical issues in plastic production, in use and end of life
 | PowerPoint Guide: T1 Sources, origins and propertiesWorksheet 1 Sources, origins and propertiesHomework 1 Sources, origins and propertiesLink Video Cotton lifestyle [1m50s]Link Video Flame retardant [2m29s]Link Video Recycled polyester [1m09s] | Chapter 36  | Topic 1 |  |
| **2** | 3.2.53.2.63.2.8 | **Working with textiles*** Understand how textiles and components are available in standard forms and sizes
* Be aware of school-based cutting, forming and processing techniques, tools and equipment
 | PowerPoint Guide: T2 Working with timbersWorksheet 2 T2 Working with timbersHomework 2 T2 Working with timbersLink video Draping [5m32s]Link video Haute couture [7m41s] | Chapter 37 | Topic 2 |  |
| **3** | 3.2.9 | **Manufacture and finishing, surface treatments and finishes*** Know and understand how textile based materials are selected and processed for commercial products
* Understand why aids are used to judge quality and accuracy before and during processing
* Understand how preparation and application of treatments and finishes affect the functional and aesthetic properties of textile products
 | PowerPoint Guide: T3 Commercial manufacturingWorksheet 3 Commercial manufacturingHomework 3 Commercial manufacturingLink video Commercial screen printing [3m06s]Link video DyeCoo [2m20s]Link video Jeans manufacturing [6m48s] | Chapter 38 | Topic 3 |  |
|  |  | **Unit 5E Textiles** | **Unit assessment** |  |  |  |

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| **Week** | **Specification reference** | **Objectives and content** | **Teaching unit resources** | **Textbook reference** | **Unit reference** |  |
| **Specialist material areas – Electronic based materials** | **Section 5F** | **Unit 5F** |  |
| **1** | 3.2.13.2.4 | **Sources, origins and properties*** Be able to select materials and components in relation to a range of criterion
* Be able to recognise and characterise types of printed circuit boards
* Understand the functional and aesthetic properties of anodised aluminium
* Be aware of sustainability and ethical issues in PCB production, in use and at end of life
 | PowerPoint Guide: T1 Sources, origins and propertiesWorksheet 1 Sources, origins and propertiesHomework 1 Sources, origins and propertiesLink Video Anodising [2m29s]Link Video Drone flying [2m23s]Link Video Racing grannies [1m27s] | Chapter 39  | Topic 1 |  |
| **2** | 3.2.53.2.63.2.8 | **Working with electronics*** Understand that materials and components are available in standard forms and sizes
* Be aware of school-based soldering, cutting and shaping
 | PowerPoint Guide: T2 Working with electronicsWorksheet 2 T2 Working with electronicsHomework 2 T2 Working with electronics | Chapter 40 | Topic 2 |  |
| **3** | 3.2.9 | **Manufacture and finishing, surface treatments and finishes*** Be aware of commercial processing techniques in PCB production
* Know and understand how the properties of electronic and mechanical systems influence and affect the performance of domestic appliances and motor vehicles
* Understand how surface treatments and finishes affect the functional and aesthetic properties of mechanical and electronic products
 | PowerPoint Guide: T3 Commercial manufacturingWorksheet 3 Manufacturing and finishingHomework 3 Manufacturing and finishingLink video Car production [1m48s]Link video Car Spraying [5m10s]Link video Electric cars [3m02s]Link video Wave soldering [2m19s] | Chapter 41 | Topic 3 |  |
|  |  | **Unit 5F Electronic based materials** | **Unit assessment** |  |  |  |