



Technology – V Cert Engineering

Key Stage 4 Framework for Learning

Year 9 2017-2018: Happy Foundations

Syllabus:

NCFE Level 2 Certificate in Engineering Studies 601/4532/8
 75% of the qualification’s content is internally assessed
 25% of the qualification’s content is externally assessed

Autumn 1	
Knowledge	<p>Students will complete a project based task, that allows students to develop the knowledge, understanding and skills in the following four areas:</p> <ul style="list-style-type: none"> • What engineering is • Engineering drawings • The tools and equipment used for engineering • Engineering materials and their properties <p>Students will focus on the Engineering drawing types commonly used by engineers. (Specific examples are highlighted below)</p> <p>During this half term students will focus on what engineering is and engineering drawings. In relation to these topics students’ knowledge will center around:</p> <p>What engineering is</p> <ul style="list-style-type: none"> • Sectors: from a variety of industries both locally and nationally • Organisations: local <p>Engineering drawings</p> <ul style="list-style-type: none"> • Systems: pre- and post-decimalisation • Measuring devices: manual • 2D and 3D engineering drawings: • 2D: first angle projection, third angle projection, layout drawings, • 3D: oblique, perspective, drawings, freehand sketch
Skills	<p>Students will:</p> <ul style="list-style-type: none"> • Know what engineering is • Understand the advantages and disadvantages of engineering on society • Understand the use of science, technology and maths in engineering • Know systems of measurement, measuring devices, scale and proportion in engineering drawing • Be able to use measurement and scale to produce 2D and 3D engineering drawing
Assessment	<p>Work produced by students will be marked on a regular basis in accordance with the school policy. Work will be graded using a performance descriptor;</p> <ul style="list-style-type: none"> • distinction • merit • pass <p>Three pieces of work will be assessed during the term.</p> <p><i>Marking point 1</i> A piece of classwork: Students will undertake a research task on local engineering organisations.</p> <p><i>Marking point 2</i> A piece of classwork: Students will complete a design task- Final third angle projection</p> <p><i>Marking point 3</i></p>



	<p>A piece of classwork: Students will complete a piece of work into manual measuring devices to demonstrate accurate measurements, scale and proportions.</p>
Cultural enrichment	Look at the work of engineers and local engineering companies to show the impact of designs upon the development of products and spaces in the local area – Manchester. Visits to local engineering companies and construction sites.
Character	<p>Q of S Optimism</p>  <p>CV – Self-Help, Self-Responsibility</p> <p>Optimism: Students will be participating in a subject where they have no prior knowledge and they will need to be optimistic about their abilities to undertake and understand the topics covered.</p> <p>Self-help: Students will be encouraged to access the self- help sheets that will be provided each lesson. This will allow students to manage their own learning.</p> <p>Self-responsibility: As homework learning tasks are set during each half term, students will show self-responsibility in managing their time and showing organizational skills to hand work in on time to be marked.</p>

Autumn 2

Knowledge	<p>Students will complete a project based task, that allows students to develop the knowledge, understanding and skills in the following four areas:</p> <ul style="list-style-type: none"> • What engineering is • Engineering drawings • The tools and equipment used for engineering • Engineering materials and their properties <p>Students will focus on the metal based engineering products commonly designed and manufactured within the engineering sector.</p> <p>During this half term students will focus on tools and equipment used for engineering and engineering materials and their properties. In relation to these topics students' knowledge will center around:</p> <p><u>Engineering materials and their properties</u></p> <p>Materials- Metals and Alloys:</p> <p>Ferrous metals and alloys:</p> <ul style="list-style-type: none"> • cast iron • low and high carbon steels • steel alloys (stainless steel) <p>Non-ferrous metals and alloys:</p> <ul style="list-style-type: none"> • aluminum • copper • lead • zinc • alloys (brass and bronze) <ul style="list-style-type: none"> • Properties: strength, durability, conductivity, weight • Purpose: functional, aesthetic, cost <p><u>The tools and equipment used for engineering</u></p> <ul style="list-style-type: none"> • Found: relevant to the engineering discipline
------------------	--



	<ul style="list-style-type: none"> • Operations: the best/most appropriate technique (industry standard) to use tools and equipment that will maximise performance, whilst minimising effort and risk. • Maintenance techniques: pre- and post-use
Skills	<p>Students will:</p> <ul style="list-style-type: none"> • Be able to use common hand tools for an identified purpose • Be able to use common power/portable tools for an identified purpose • Be able to use common fixed equipment for an identified purpose • Be able to maintain a safe working environment throughout • Be able to select a range of engineering materials for an identified purpose • Be able to use a variety of processes to prepare, modify and finish the engineering materials for an identified purpose • Be able to maintain a safe working environment throughout
Assessment	<p>Work produced by students will be marked on a regular basis in accordance with the school policy. Work will be graded using a performance descriptor;</p> <ul style="list-style-type: none"> • distinction • merit • pass <p>Two pieces of work will be assessed during the term. <i>Marking point 1</i> A piece of classwork: Students will carry out an investigation task into the properties of metals and alloys.</p> <p><i>Marking point 2</i> A practical assessment: Students will be assessed in their ability to use a selection of tools correctly and safely</p> <p><i>Marking point 3</i> Progress Test: At a time determined by the leadership of the school students will undertake a formal progress test on the topics covered during Autumn term 1 and Autumn term 2. This will be in the form of a written paper of 1 hour in length.</p>
Cultural enrichment	<p>Investigation into steel mills in the UK and how these are being closed down as manufacturing is moved overseas. Students to explore how this impacts local employment and economic downfalls in areas. A trip to a steel mill/ production facility. (Deeside)</p>
Character	<p>Q of S Empathy</p>  <p>CV –Solidarity & Social Responsibility</p> <p>Empathy – when working with materials and considering materials students are required to consider the social moral, cultural, ethical and environmental issues</p> <p>Solidarity: Tasks set during the course of the term will frequently ask the students to work as small groups. During these times it is expected that the students show solidarity towards one another and work as a cohesive group rather than separate individuals.</p> <p>Social responsibility: Students can investigate the social responsibility of engineers when selecting materials.</p>
Spring 1	
Knowledge	<p>Students will complete a project based task, that allows students to develop the knowledge, understanding and skills in the following four areas:</p> <ul style="list-style-type: none"> • What engineering is • Engineering drawings • The tools and equipment used for engineering • Engineering materials and their properties <p>Students will focus on the Engineering drawing types commonly used by engineers. (Specific examples are highlighted below)</p>



	<p>During this half term students will focus on what engineering is and engineering drawings. In relation to these topics students' knowledge will center around:</p> <p>What engineering is</p> <ul style="list-style-type: none"> • Sectors: from a variety of industries both locally and nationally • Organisations: national <p>Engineering drawings</p> <ul style="list-style-type: none"> • Systems: pre- and post-decimalisation • Measuring devices: semi-automatic • 2D and 3D engineering drawings: • 2D: circuit diagrams, schematic diagrams, freehand sketch • 3D: isometric, exploded isometric
Skills	<p>Students will:</p> <ul style="list-style-type: none"> • Know what engineering is • Understand the advantages and disadvantages of engineering on society • Understand the use of science, technology and maths in engineering • Know systems of measurement, measuring devices, scale and proportion in engineering drawing • Be able to use measurement and scale to produce 2D and 3D engineering drawing
Assessment	<p>Work produced by students will be marked on a regular basis in accordance with the school policy. Work will be graded using a performance descriptor;</p> <ul style="list-style-type: none"> • distinction • merit • pass <p>Three pieces of work will be assessed during the term.</p> <p><i>Marking point 1</i></p> <p>A piece of classwork: Students will carry out a research task on national engineering organisations.</p> <p><i>Marking point 2</i></p> <p>A piece of classwork: Students will undertake a design task- exploded isometric view.</p> <p><i>Marking point 3</i></p> <p>A piece of classwork: Students will produce a piece of work which explains the use of semi- automatic measuring devices to demonstrate accurate measurements, scale and proportions.</p>
Cultural enrichment	<p>Look into the different careers available within the Engineering industry. Possible opportunities for industry visits within and around the local area- Manchester.</p> <p>Careers events within the local area, local colleges and universities.</p>
Character	<p>Q of S Creativity & Curiosity</p> <div style="display: flex; align-items: center; gap: 10px;">   </div> <p>CV – Openness & Honesty</p> <p>Creativity: During the completion of both class and home learning tasks students will need to demonstrate their creativity as they complete a selection of drawings and plans for a variety of engineering products.</p> <p>Curiosity: Several of the tasks set during this term require the students to carry out independent research. When this is completed it is hoped that students will develop an additional curiosity into finding out more about local and national engineering companies and the work that they do.</p> <p>Openness and Honesty: students will be encouraged to develop skills in self-reflection and giving opinion about topics and activities being studied, this could form critical reflection and evaluation tasks which might at times relate to personal skill and performance levels.</p>



Knowledge	<p>Students will complete a project based task, that allows students to develop the knowledge, understanding and skills in the following four areas:</p> <ul style="list-style-type: none">• What engineering is• Engineering drawings• The tools and equipment used for engineering• Engineering materials and their properties <p>Students will focus on the <u>plastic based</u> engineering products commonly designed and manufactured within the engineering sector. During this half term students will focus on tools and equipment used for engineering and engineering materials and their properties. In relation to these topics students' knowledge will center around:</p> <p><u>Engineering materials and their properties</u></p> <p>• Materials- Polymers: Thermoplastics:</p> <ul style="list-style-type: none">• ABS• acrylic• nylon• polycarbonate• polystyrene <p>Thermosetting Plastics:</p> <ul style="list-style-type: none">• epoxy• polyester and melamine resins• polyurethanes• vulcanised rubber. <p>• Properties: strength, durability, conductivity, weight • Purpose: functional, aesthetic, cost</p> <p><u>The tools and equipment used for engineering</u></p> <p>• Found: relevant to the engineering discipline • Operations: the best/most appropriate technique (industry standard) to use tools and equipment that will maximise performance, whilst minimising effort and risk. • Maintenance techniques: pre- and post-use</p>
Skills	<p>Students will:</p> <ul style="list-style-type: none">• Be able to use common hand tools for an identified purpose• Be able to use common power/portable tools for an identified purpose• Be able to use common fixed equipment for an identified purpose• Be able to maintain a safe working environment throughout• Be able to select a range of engineering materials for an identified purpose• Be able to use a variety of processes to prepare, modify and finish the engineering materials for an identified purpose• Be able to maintain a safe working environment throughout
Assessment	<p>Work produced by students will be marked on a regular basis in accordance with the school policy. Work will be graded using a performance descriptor;</p> <ul style="list-style-type: none">• distinction• merit• pass <p>Two pieces of work will be assessed during the term.</p> <p><i>Marking point 1</i> A piece of classwork: Students will carry out an investigation task into thermoplastics and thermosetting plastics properties.</p> <p><i>Marking point 2</i> A practical assessment Students will be assessed on their selection and use of tools, correctly demonstrating Health and Safety procedures.</p> <p><i>Marking point 3</i></p>



	<p>Progress Test: At a time determined by the leadership of the school students will undertake a formal progress test on the topics covered during Autumn term 1 and Autumn term 2. This will be in the form of a written paper of 1 hour in length.</p>
Cultural enrichment	STEM Fest- Students will take part in the schools STEM Fest (Engineering) which will allow them to speak with industry professionals and take part in activities.
Character	<p>Q of S Responsibility and Reflection CV – Equality & Equity</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>Responsibility: It is expected that students will demonstrate personal responsibility as they complete both written and practical activities to ensure task completion and their own and others safety.</p> <p>Reflection: Prior to the completion of the progress test, students will be asked to reflect on their learning and identify areas where they consider they are weak so as to inform their revision. In addition at regular intervals throughout the term, students will be asked to reflect on work they have completed and respond to teacher questioning.</p> <p>Equality & equity: As student undertake testing of materials and look at their properties students can be encouraged to establish fair testing principles to ensure that results are balanced and fair. This could be linked to the testing and application of materials and finishes but also the elements such as stress/force testing etc.</p>
Summer 1	
Knowledge	<p>Students will complete a project based task, that allows students to develop the knowledge, understanding and skills in the following four areas:</p> <ul style="list-style-type: none"> • What engineering is • Engineering drawings • The tools and equipment used for engineering • Engineering materials and their properties <p>Students will focus on the Engineering drawing types commonly used by engineers. (Specific examples are highlighted below)</p> <p>During this half term students will focus on what engineering is and engineering drawings. In relation to these topics students' knowledge will center around:</p> <p><u>What engineering is</u></p> <ul style="list-style-type: none"> • Sectors: from a variety of industries both locally and nationally • Organisations: international <p><u>Engineering drawings</u></p> <ul style="list-style-type: none"> • Systems: pre- and post-decimalisation • Measuring devices: automatic • 2D and 3D engineering drawings: • 2D: assembly drawings, plan views • 3D: planometric, assembly drawings
Skills	<p>Students will:</p> <ul style="list-style-type: none"> • Know what engineering is • Understand the advantages and disadvantages of engineering on society • Understand the use of science, technology and maths in engineering • Know systems of measurement, measuring devices, scale and proportion in engineering drawing • Be able to use measurement and scale to produce 2D and 3D engineering drawing
Assessment	<p>Work produced by students will be marked on a regular basis in accordance with the school policy. Work will be graded using a performance descriptor;</p> <ul style="list-style-type: none"> • distinction • merit • pass <p>Three pieces of work will be assessed during the term.</p>



	<p><i>Marking point 1</i> A piece of classwork: Students will carry out a research task on international engineering organisations.</p> <p><i>Marking point 2</i> A piece of classwork: Students will undertake a design task- assembly drawings</p> <p><i>Marking point 3</i> A piece of classwork: Students will produce a piece of work on the use of automatic measuring devices to demonstrate accurate measurements, scale and proportions.</p>
Cultural enrichment	Look into how engineering drawings (assembly drawings) are used within the construction of household objects/ furniture. A factory visit to a local furniture company.
Character	<p>Q of S Practice & Resiliency</p> <div style="display: flex; align-items: center;">   <div style="margin-left: 10px;"> <p>CV – Caring for Others, Self-Help & Self Responsibility</p> <p>Practice: Regularly in lessons, students will be shown and led through answering example examination questions in order for them to practice question answering techniques in preparation for the official written board prepared and set assessment.</p> <p>Caring for others: Students will occasionally be asked to work in groups and pairs to complete tasks. This may be a student that they would not usually work with but can offer support.</p> <p>Self-help & Self responsibility: during each term, students will be taking an assessment end of each term. Students will be taught methods and techniques for revision to aid independent learning and revision at home or after school to help develop progress.</p> </div> </div>

Summer 2

Knowledge	<p>Students will complete a project based task, that allows students to develop the knowledge, understanding and skills in the following four areas:</p> <ul style="list-style-type: none"> • What engineering is • Engineering drawings • The tools and equipment used for engineering • Engineering materials and their properties <p>Students will focus on the <u>composite materials</u> and composite based engineering products commonly designed and manufactured within the engineering sector. During this half term students will focus on tools and equipment used for engineering and engineering materials and their properties. In relation to these topics students' knowledge will center around:</p> <p><u>Engineering materials and their properties</u></p> <p>• Materials- Composites:</p> <ul style="list-style-type: none"> • Fibre reinforced polymers (FRP): • carbon-fibre reinforced polymer • glass reinforced plastic (GRP). • Plywood. • Medium Density Fibre board • (MDF). • Oriented Strand Board (OSB). • Structural concrete. <p>Other Materials:</p> <ul style="list-style-type: none"> • Timber • Ceramics <p>• Properties: strength, durability, conductivity, weight • Purpose: functional, aesthetic, cost</p>
------------------	--



	<p><u>The tools and equipment used for engineering</u></p> <ul style="list-style-type: none"> • Found: relevant to the engineering discipline • Operations: the best/most appropriate technique (industry standard) to use tools and equipment that will maximise performance, whilst minimising effort and risk. • Maintenance techniques: pre- and post-use
<p>Skills</p>	<p>Students will:</p> <ul style="list-style-type: none"> • Be able to use common hand tools for an identified purpose • Be able to use common power/portable tools for an identified purpose • Be able to use common fixed equipment for an identified purpose • Be able to maintain a safe working environment throughout • Be able to select a range of engineering materials for an identified purpose • Be able to use a variety of processes to prepare, modify and finish the engineering materials for an identified purpose • Be able to maintain a safe working environment throughout
<p>Assessment</p>	<p>Work produced by students will be marked on a regular basis in accordance with the school policy. Work will be graded using a performance descriptor;</p> <ul style="list-style-type: none"> • distinction • merit • pass <p>Two pieces of work will be assessed during the term</p> <p><i>Marking point 1</i> A piece of classwork: Students will carry out an investigation task on the properties of composites.</p> <p><i>Marking point 2</i> A practical assessment Students will be assessed on their selection and use of tools, correctly demonstrating Health and Safety procedures</p> <p><i>Marking point 3</i> Progress Test: At a time determined by the leadership of the school students will undertake a formal progress test on the topics covered during Autumn term 1 and Autumn term 2. This will be in the form of a written paper of 1 hour in length.</p>
<p>Cultural enrichment</p>	<p>STEM trip to The Manchester Museum of Science and Industry. Research into how industry and Engineering has progressed.</p>
<p>Character</p>	<p>Q of S Motivation</p>  <p>CV –Self-Help & Self Responsibility</p> <p>Motivation: Students will throughout the course be required to show motivation during the completion of tasks. They will frequently be given the opportunity to challenge themselves and complete tasks that further their expected attainment level.</p> <p>Self-help & Self responsibility: Students will be encouraged to attend after school clinic sessions in order to consolidate learning on topics covered earlier in the year where they feel their learning has not been as detailed as it could have been.</p>