Engineering @ WBS Year 10 Roadmap

Subject Aim: Students will build upon prior knowledge of theory concepts and the practical workshop skills that they have covered at KS3 to provide additional experience of engineering hand tools and processes and experience of the full range of computer aided manufacturing processes.
The structure of the Year 10 course is centred around project-based learning activities which aim to cover key theoretical and practical aspects of the syllabus.

	TOPIC 1	ASSESSMENT IN YEAR 10
AUTUMN TERM	Project 1—Working with metals Students manufacture a peg from sheet and box-section mild steel which includes the following processes: - Marking-out using scriber & centre punch - Cutting using hacksaw and powered hacksaw - Milling machine to cut slot - Pillar drill, hand-drill and counter-sinking holes - Cold-working a 90-degree bend into mild steel - Pop-riveting to join components - Brazing to join end-plate - Cleaning and spray-painting to prevent corrosion	Each practical project will be assessed as follows: Photographic evidence of the completed project outcomes uploaded to Brightspace portfolio Self-assessment evaluation comments and student feedback in the Portfolio comments Overall grade for each project on Brightspace portfolio and entered into Brightspace gradebook Theory knowledge will be assessed by Brightspace quizzes for each aspect of the syllabus which will output marks to Brightspace gradebook
	TOPIC 2	**HOMEWORK IN YEAR 10**
SPRING TERM	Project 2—Robotics & Mechanisms Students learn to program electronic systems using flow-chart, blocky and Basic programming methods Systems used include: LEGO Mindstorms—Robotics kits programmed using LEGO NXT software PICAXE microcontroller—simulation of prototype PCBs programmed using Logicator flowchart software Aduino hardware simulation using the TinkerCAD GUI Demonstration of pneumatic double-acting cylinder system controlled using the VEX EDR robotics platform Theory: Block systems diagrams, Programming languages, sensors, mechanical systems including pinions, spur gears, crown wheels, bevel gears, belts & pulleys	Homework is integrated into each project and will cover vital aspects of the syllabus. Instuctions for homework are posted in assignments and are either submitted on paper or to Brightspace assignments depending on the outcome. Grading for the homework assignments is in the Brightspace gradebook
	TOPIC 3	**REVISION FOR ASSESSMENTS IN YEAR 10**
SUMMER TERM	Project 3—Structures & Bridge building Theory: FoS, Failures due to torsion, buckling, bending Analysis of structures Small groups to build trussed bridge structure & destructively test. Limited materials and fixing materials including bolts and masking tape Bridge structures to span a fixed distance of 30cm	Content in the form of revision textbook chapters for each of the theory aspects of the syllabus can be found on Brightspace and is intended to support students when revising for the Brighspace quizzes.

and minimum width of toy car. Structure must be able to convey the vehicle via an unobstructed roadway Analyse the structures for maximum static load strength by testing to failure	
TOPIC 4	**ENRICHMENT THEMES IN YEAR 10**
Project 5—Electronics systems project Simple components +Timers, counters, comparators, logic. PCB design . Prototyping timing circuits using Livewire software Breadboard/Arduino + TinkerCAD Use Logic boards to work through logic gate problems APC –punk console PCB build including container 2 x CNC control dials designed and manufactured on Boxford	SMSC and British Values: Please see The Creative Designs Department's SMSC Document. Throughout the course students will discuss various Product Design related careers and what skills are linked to real jobs in the industry. This will be driven by certain aspects of the specification content. Cultural Capital: Cultural Capital: Students will study a wide range of designers from a variety of backgrounds, and will also view and study different social, economic and cultural groups from a variety of backgrounds so that they can be encouraged to emphasise and relate to others demonstrating that they can also achieve their aspirational dreams irrespective of their own background. Extra-curricular lessons will also run every week to help support students with their theory, NEA and practical work and it is essential students use these facilities to reach their potential grades.
TOPIC 5	**TOPIC 6 - NEA**
Project 5—Aerodynamics Making aerofoils and testing in CFD simulation software and also in the wind tunnel Drag, thrust, lift, weight forces acting on an aerofoil	Introduction to the NEA coursework project Analysing the design context set by the exam board Researching engineered systems related to the context Developing a direction and personal brief for the project Outlining Ideas for systems solutions in the form of block systems diagrams

Where Next?

The following year of the course concentrates on the completion of the NEA project in which will demonstrate their knowledge of a range of engineering skills and techniques to build a functioning system in response to a brief set by the exam board.
Assessment of key maths and science skills and knowledge required for the exam will also be revised and assessed in parallel with the completion of the NEA