

Cessnock High School

10 iSTEM Outcomes Matrix	REMIX	Bio-Design	Let's Get Moving	WICKED Futures
5.1.1 develops ideas and explores solutions to STEM based problems	x	x	x	x
5.1.2 demonstrated initiative, entrepreneurship, resilience and cognitive flexibility through the completion of practical STEM based activities	x	x	x	x
5.2.1 describe how scientific and mechanical concepts relate to technological and engineering practice	x	x	x	x
5.2.2 applies cognitive processes to address real world STEM based problems in a variety of contexts	x	x	x	x
5.3.1 applies a knowledge and understanding of STEM principles and processes	x	x	x	x
5.3.2 identifies and uses a range of technologies in the development of solutions to STEM based problems		x		x
5.4.1 plans and manages projects using an iterative and collaborative design process	x	x	x	x
5.4.2 develops skills in using mathematical, scientific and graphical methods whilst working as a team	x	x	x	x
5.5.1 applies a range of communication techniques in the presentation of research and design solutions	x	x	x	x
5.5.2 critically evaluates innovative, enterprising and creative solutions	x	x	x	?
5.6.1 selects and uses appropriate problem solving and decision making techniques in a range of STEM contexts	x	x	x	x
5.6.2 will work individually or in teams to solve problems in STEM contexts	x	x	x	x
5.7.1 demonstrates an appreciation of the value of STEM in the world in which they live	x	x	x	x
5.8.1 understands the importance of working collaboratively, cooperatively and respectfully in the completion of STEM activities	x	x	x	x
CORE 1: STEMfundamentals 1 (X = completed, ? = optional)				
1.1 STEM investigations (systematic observation, measurement, experiment formulation, testing and modification of hypotheses)		x	x	x
1.2 the use of STEM in developing solutions to problems (hardware & software)		x	x	x
CORE 2: STEMfundamentals 2 (X = completed, ? = optional)				
2.1 STEM principles (strength of materials, material properties, fluid mechanics, electricity & magnetism and thermodynamics)	x	x	x	x
2.2 fundamental mechanics (basic units, prefixes, statics, dynamics & modelling)	x	x		x
2.3 problem solving (nature of, strategies to solve, evaluation & collaboration)	x	x	x	x
CORE 3: Mechatronics 1 (X = completed, ? = optional)				
3.1 mechatronics (building mechatronic components, programming logic, writing macros & fault finding)	x	x		?
3.2 technologies related to robotic sensors and transducers, manipulators, PLC's, actuators (pneumatic & hydraulic)	x	x		?
CORE 4: Mechatronics 2 (X = completed, ? = optional)				
4.1 mechatronics and control technology (logic gates, mechanical and electrical actuation systems & motors)	x	x		?
4.2 programming & computations (algorithms, calculating distance, trigonometry, circle geometry & input/output systems)	x	x		?
4.3 design mechatronic solutions for a range of applications	x	x		?
ELECTIVE 5: Aerodynamics (X = completed, ? = optional)				
5.1 research and exploration (interpreting and analysing data, quantitative and qualitative research, surveys, interviews, observation & testing and experimenting)				?
5.2 technologies related to aerodynamics (wind tunnels, smoke tunnels, computational fluid dynamics (CFD))				?
5.3 aerodynamics principles (dynamic, static friction, drag ratios, lift, drag, weight, thrust, Finite Element Analysis (FEA) & flight)				?
5.4 aerodynamics forces (lift, drag, weight, thrust, simple vectors & efficiency)	x			?
5.5 aerodynamics design solutions	x			?
ELECTIVE 6: Motion (X = completed, ? = optional)				
6.1 electronics (circuitry, motors & generators, fault detection, prototypes, making models & practical applications)	x		x	?
6.2 technologies related to motion (gyroscopes, accelerometers & sensors)	x		x	?
6.3 energy (energy sources, motors, electric vehicles & motion)	x		x	?
6.4 motion calculations (velocity, acceleration, inertia, circular motion & momentum)	x		x	?

6.5 developing projects related to motion	x		x	?
ELECTIVE 8: 3D CAD / CAM 2 (X = completed, ? = optional)				
8.1 CAD / CAM (3D drawing on an x, y & z axes in planes. CAM processes)	?	x	?	?
8.2 technologies related to CAM (Additive and Subtractive manufacturing, Computer Numerical Controls, CNC, mills, routers & lathes)	?	x	?	?
8.3 CAD / CAM operations (rapid prototyping, 3D CAD operations, Computer Aided Manufacturing (CAM), 3D modelling)	?	x	?	?
8.4 3D environments Computer Numerical Control	?	x	?	?
8.5 CAD / CAM	?	x	?	?
ELECTIVE 10: STEM Project Based Learning Major Task (X = completed, ? = optional)				
10.1 processes of design (identifying problems, project management, developing solutions to problems, generating ideas)				x
10.2 presentation and communication technologies				x
10.3 realisation, evaluation, research methods and experimentation				x
10.4 mechanical knowledge				x
10.5 creative and innovative approaches to solve problems				x
ELECTIVE 11: Surveying (X = completed, ? = optional)				
11.1 site risk management and WHS in surveying (common surveying workplace hazards and associated risk control, site safety plan, PPE equipment & surveying software)				x
11.2 technologies related to surveying (Total Station Theodolite (TST), GPS, digital terrain models & laser scanning)				x
11.3 fundamental surveying principles (cadastral surveyors, engineering surveyors, mining engineers, hydrographic engineers, geodetic surveyors, GIS & photogrammetry)				x
11.4 spatial data (appreciation of spatial skills, calculating distance, trigonometry, geometry & mapping)				x
11.5 problem solving (design surveying solutions to a range of applications)				x
ELECTIVE 12: Design for Space (X = completed, ? = optional)				
12.1 Coding for Space (basic coding to manipulate wireless devices, manipulate sensors, actuators, remote sensing space, history and future, impact on daily life & space applications)				?
12.2 technologies related to coding and space (microcontrollers, electronics, computer software, satellites and rockets & radio communication)				?
12.3 space vehicles and experiments using STEM design methodologies (engineering requirements, circuit diagrams, electricity, radio and other waves, thermal conductivity, spectra & motion in 3D)	x			?
12.4 data analysis and modelling (modelling data using software, analysing and drawing useful conclusions from data & efficiency)				?
12.5 experimental design solutions to space related applications	x			?
ELECTIVE 13: Statistics (X = completed, ? = optional)				
13.1 research methods using 3Rs (randomisation, replication and ARRR), blocking, understanding variation, survey design, bias and precision & visualisation				?
13.2 technologies related to statistical analysis (computer software for simulations & computer software for design and analysis)	x			?
13.3 fundamental statistical analysis (basic statistical key figures concepts describing society, product comparisons, consumer behaviour, inflation, gross domestic product, data sources & evaluation of data sources)				?
13.4 analyse, interpret, evaluate statistical information & communicate statistical findings	x			?
13.5 creative and innovative approaches to solve practical research problems				?
ELECTIVE 14: Biomedical Innovation (X = completed, ? = optional)				
14.1 biomedical innovation (applying processes, designing, researching, investigating, communicating, managing projects, evaluating)		x		?
14.2 biotechnologies (range of technologies used in biotechnology)		x		?
14.3 biomedical innovation concepts (biomedical innovations, design and engineering, processes, environmental health, molecular biology, forensics, bioengineering, scope and nature of biomedicine)		x		?
14.4 analysis (statistics, using data to develop, evidence based arguments and conclusions)		?		?
14.5 designing solutions to biomedical problems		x		?