Cessnock High School

9 iSTEM Outcomes Matrix	Aeronaut	iBot	Sense-sational	Up & Beyond
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
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 teams	x			x
5.5.1 applies a range of communication techniques in the presentation of research and design solutions	x	x		x
5.5.2 critically evaluates innovative, enterprising and creative solutions	x	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	x
1.2 the use of STEM in developing solutions to problems (hardware & software)	x	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
2.3 problem solving (nature of, strategies to solve, evaluation & collaboration)		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
4.2 programming & computations (algorithms, calculating distance, trigonometry, circle geometry & input/output systems)				x
4.3 design mechatronic solutions for a range of applications				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)	x			x
5.2 technologies related to aerodynamics (wind tunnels, smoke tunnels, computational fluid dynamics (CFD))	x			
5.3 aerodynamics principles (dynamic, static friction, drag ratios, lift, drag, weight, thrust, Finite Element Analysis (FEA) & flight)	x			
5.4 aerodynamics forces (lift, drag, weight, thrust, simple vectors & efficiency)	x			x
5.5 aerodynamics design solutions	x			x

ELECTIVE 6: Motion (X = completed, ? = optional)				
6.1 electronics (circuitry, motors & generators, fault detection, prototypes, making models & practical applications)		x		
6.2 technologies related to motion (gyroscopes, accelerometers & sensors)		x		
6.3 energy (energy sources, motors, electric vehicles & motion)		x		
6.4 motion calculations (velocity, acceleration, inertia, circular motion & momentum)		x		
6.5 developing projects related to motion		x		
ELECTIVE 7: 3D/CAM 1 (X = completed, ? = optional)				
7.1 CAD / CAM (3D drawing on an x, y & z axes in planes, basic commands in a 3D CAD package, CAM processes & engineering drawing)			x	
7.2 technologies related to CAM (Additive and Subtractive manufacturing, Computer Numerical Controls, CNC, mills, routers & lathes & LEAN Manufacturing processes)			x	
7.3 CAD / CAM operations - reading and interpreting engineering drawings, rapid prototyping, 3D CAD operations, Computer Aided Manufacturing (CAM) & 3D modelling			x	
7.4 3D environments (vectors, 3D Shapes, Computer Numerical Control, spatial comprehension & 3D Surface Modelling)			x	
ELECTIVE 9: STEM Project Based Learning Minor Task (X = completed, ? = optional)				
9.1 processes of design (identifying problems, project management, developing solutions to problems & generating ideas)			x	
9.2 presentation and communication technologies			x	
9.3 realisation, evaluation, research methods and experimentation			x	
9.4 mechanical knowledge			x	
9.5 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)				x
12.2 technologies related to coding and space (microcontrollers, electronics, computer software, satellites and rockets & radio communication)				x
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)				x
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)				x
13.4 analyse, interpret, evaluate statistical information & communicate statistical findings				x
13.5 creative and innovative approaches to solve practical research problems				