iSTEM Syllabus Outcomes Matrix - STARLAB

	Python		StarLAB Hardware		Rover Robotics		Mars Rover Competition		Space Prototypes	
	StarLAB	Extension	StarLAB	Extension	StarLAB	Extension	StarLAB	Extension	Optional	Extension
CORE 1: STEM Fundamentals 1 (X = completed, ? = optional) Core module 1 (STEM fundamentals 1) is a pre-requisite for core module 2 (STEM Fundamentals 2); the year 10 StarLAB program approaches the STEM Fundamentals 1 outcomes as a review of prior learning.										
1.1 STEM investigations (systematic observation, measurement, experiment formulation, testing and modification of hypotheses)		?	X	?	X	?		?	?	?
1.2 the use of STEM in developing solutions to problems (hardware & software)	X	?	X	?	X	?	X	?	?	?
CORE 2: STEM Fundamentals 2 (X = completed, ? = optional) Core module 1 (STEM fundamentals 1) is a pre-requisite for core module 2 (STEM Fundamentals 2); the year 10 StarLAB program approaches the STEM Fundamentals 1 outcomes as a review of prior learning.										
2.1 STEM principles (strength of materials, material properties, fluid mechanics, electricity & magnetism and thermodynamics)			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	?	X	?	?	?
CORE 3: Mechatronics 1 (X = completed, ? = optional) Core module 3 (mechatronics 1) is a pre-requisite for core module 4 (Mechatronics 2); the year 10 StarLAB program approaches the Mechatronic 1 outcomes as a review of prior learning.										
3.1 mechatronics (building mechatronic components, programming logic, writing macros & fault finding)		?	X		X		X			
3.2 Technologies related to robotic sensors and transducers, manipulators, PLC's, actuators (pneumatic & hydraulic)			X		X	?	X	?		
CORE 4: Mechatronics 2 (X = completed, ? = optional) Core module 3 (mechatronics 1) is a pre-requisite for core module 4 (Mechatronics 2); the year 10 StarLAB program approaches the Mechatronic 1 outcomes as a review of prior learning.										
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		X	?	X			
4.3 design mechatronic solutions for a range of applications					X		X			
ELECTIVE 6: Motion (X = completed, ? = optional) This unit addresses several outcomes in elective 6 via simulation or theory; optional pair with solar cars, F1, subs or electric vehicle projects										
6.1 electronics (circuitry, motors & generators, fault detection, prototypes, making models & practical applications)		?	X	?	X	?	X	?		
6.2 technologies related to motion (gyroscopes, accelerometers & sensors)		?	X	?	X	?	X	?		
6.3 energy (energy sources, motors, electric vehicles & motion)			X	?	X	?	X	?		
6.4 motion calculations (velocity, acceleration, inertia, circular motion & momentum)			X	?	X	?	X	?		
6.5 developing projects related to motion			X	?	X	?	X	?		
ELECTIVE 7: 3D/CAM 1 (X = completed, ? = optional) This unit does not address all outcomes in elective 7; optional pair with STEM Project Based Minor / Major task; potential to expand skillsets by adding Elective 8										
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)				?		?			?	?
7.2 technologies related to CAM (Additive and Subtractive manufacturing, Computer Numerical Controls, CNC, mills, routers & lathes & LEAN Manufacturing processes)									?	?
7.3 CAD/CAM operations - reading and interpreting engineering drawings, rapid prototyping, 3D CAD operations, Computer Aided Manufacturing (CAM) & 3D modelling				?					?	?
7.4 3D environments (vectors, 3D Shapes, Computer Numerical Control, spatial comprehension & 3D Surface Modelling)				?		?			?	?

	1	2	3	4	5	6	7	8	9	10
ELECTIVE 9: STEM Project Based Learning Minor Task (X = completed, ? = optional) Choose elective 9 or 10; 9 must be completed before 10 with 10 being optional										
9.1 processes of design (identifying problems, project management, developing solutions to problems & generating ideas)		?		?		?			?	?
9.2 presentation and communication technologies		?		?		?			?	?
9.3 realisation, evaluation, research methods and experimentation		?		?		?			?	?
9.4 mechanical knowledge		?	X	?		?			?	?
9.5 creative and innovative approaches to solve problems		?		?		?			?	?
ELECTIVE 10: STEM Project Based Learning Minor Task (X = completed, ? = optional) Choose elective 9 or 10; 9 must be completed before 10 with 10 being optional										
10.1 processes of design (identifying problems, project management, developing solutions to problems & generating ideas)									?	?
10.2 presentation and communication technologies									?	?
10.3 realisation, evaluation, research methods and experimentation									?	?
10.4 mechanical knowledge									?	?
10.5 creative and innovative approaches to solve problems									?	?
ELECTIVE 12: Design for Space (X = completed, ? = optional) This is the primary module for the StarLABs equipment										
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	?	X	?	X	?	X	?		
12.2 technologies related to coding and space (microcontrollers, electronics, computer software, satellites and rockets & radio communication)			X	?	X	?	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		X	?	X	?	?	?
12.4 data analysis and modelling (modelling data using software, analysing and drawing useful conclusions from data & efficiency)			X	?	X		X			
12.5 experimental design solutions to space related applications	X			?	X	?	X	?	?	?
ELECTIVE 13: Statistics in Action This unit does not address all outcomes in elective 13; optional pair with STEM based project Minor/ Major Task or another chosen elective to suit your available equipment or learning interests.										
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)						?				
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				?		?				
13.5 creative and innovative approaches to solve practical research problems				?		?				