# Robotics & Mechatronic Systems Value: 1.0

Robotics & Mechatronic Systems a Value 0.5

Robotics & Mechatronic Systems b Value 0.5

## Unit Description

This unit of study provides opportunities for students to investigate the development of robotics and mechatronic systems. Students critically analyse the effect that robotics and mechanised systems have on human society, built and natural environments and general well-being. Student will use the design process to create, test and control a product or solution incorporating mechanical, electrical and control systems.

## Specific Unit Goals

This unit should enable students to:

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| A Course | T Course | M Course |
| * analyse and use technologies in a range of contexts | * evaluate and use technologies in a range of contexts | * use technologies in a range of contexts |
| * produce or create solutions or products to address a need, problem or challenge | * produce or create solutions or products to address a need, problem or challenge | * produce or create solutions or products to address a need, problem or challenge |

## Content Descriptions

All knowledge, understanding and skills below must be delivered:

|  |  |  |
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| A Course | T Course | M Course |
| Design process | | |
| * create a mechatronic or robotic system using electronic and mechanical control system with input and output, for example, a lolly dispenser | * create a mechatronic or robotic system using electronic and mechanical control system with input and output, for example, a lolly dispenser | * create electronic, mechanical interfaces with input and output systems |
| * apply a design process to solve a problem or address a need | * apply a design process to solve a problem or address a need | * apply the design process to solve a problem or address a need |
| * understand that a design process is a method that is used to solve technological challenges to change and improve products for the way we live | * understand that a design process is a method that is used to solve technological challenges to change and improve products for the way we live |  |

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| A Course | T Course | M Course |
| Strategies, methodologies and procedures | | |
| * analyse and apply project management tools and WH&S concepts in work environments | * analyse and apply project management tools and WH&S concepts in work environments |  |
| * use design methodologies to prototype a mechatronic system | * use design methodologies to prototype a mechatronic system | * use simple design methodologies |
| * investigate strategies to program and control robotic or mechanised systems, for example, using sensors and components | * investigate strategies to program and control robotic or mechanised systems, for example, using sensors and components |  |
| * analyse features of the system by troubleshooting and providing contingencies features to ensure safety of life and natural environment | * evaluate features of the system by troubleshooting and providing contingencies features to ensure safety of life and natural environment |  |
| * apply strategies, methodologies and procedures to produce a system that incorporates mechanical, electrical and control | * apply strategies, methodologies and procedures to produce a system that incorporates mechanical, electrical and control |  |
| * create a prototype for a mechanical and electrical system using actuators, effectors, gears, motors, levers and control systems programmed to respond to input | * create a prototype for a mechanical and electrical system using actuators, effectors, gears, motors, levers and control systems programmed to respond to input |  |
| * understand that all real-world design solutions are created in a context of parameters and special considerations: most of these parameters concern a human element | * understand that all real-world design solutions are created in a context of parameters and special considerations: most of these parameters concern a human element |  |
| Theories, concepts and materials | | |
| * analyse theories on robotic construction and use, for example, Isaac Asimov’s law of robotics | * critically analyse theories on robotic construction and use, including ethical issues for example, Isaac Asimov’s law of robotics and how they apply to contrasting applications | * describe the fundamentals of machines and mechanisms |

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| A Course | T Course | M Course |
| * evaluate materials used in electronic and mechanical systems to construct an operational system | * evaluate materials used in electronic and mechanical systems to construct an operational system |  |
| * investigate the principles of robotic and mechatronic movement, including; force, velocity, acceleration, actuator, power systems and gearing | * investigate the principles of robotic and mechatronic movement, including; force, velocity, acceleration, actuator, power systems and gearing | * describe the principles of robotic and mechatronic movement |
| * apply programming concepts used in microcontroller platforms and tests security and reliability of the system | * apply programming concepts used in microcontroller platforms and tests security and reliability of the system |  |
| * understand ethical and legal implications when creating designs and products, for example, intellectual property, copyright | * understand ethical and legal implications when creating designs and products, for example, intellectual property, copyright |  |
| * understand that robots can be designed and built using software systems that are capable of handling much more information than humans and at a far more rapid pace | * understand that robots can be designed and built using software systems that are capable of handling much more information than humans and at a far more rapid pace |  |
|  | * understand laws of physics: energy cannot be created, but its’ form can be changed |  |
| Contexts | | |
| * investigate ethical use of systems and environmental implications of system construction and deconstruction | * investigate ethical use of systems and environmental implications of system construction and deconstruction |  |
| * analyse ways a system could be improved with innovation incorporating sustainability and ethical standards to reduce e-waste | * analyse ways a system could be improved with innovation incorporating sustainability and ethical standards to reduce e-waste |  |
| * demonstrate cultural understanding, for example, interacting and empathising with others, reflecting on experiences and taking responsibility | * demonstrate cultural understanding, for example, interacting and empathising with others, reflecting on experiences and taking responsibility |  |

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| A Course | T Course | M Course |
| * analyse the role and social implications of intelligent machines in society, for example; manufacturing, the military, civil society, service industries | * critically analyse the role and social implications of intelligent machines in society, for example; manufacturing, the military, civil society, service industries | * describe the role of intelligent machines in society |
| Communication | | |
| * communicate accurately with others using correct terms in an appropriate format, both orally and in writing | * communicate accurately with others using correct terms in an appropriate format, both orally and in writing | * communicate ideas to others using technical terms, both orally and in writing |
| * communicate ideas and insights in a range of appropriate mediums to a variety of audiences | * communicate ideas and insights in a range of appropriate mediums to a variety of audiences |  |
| * apply strategies for collaboration and solving problems in teams | * apply strategies for collaboration and solving problems in teams | * apply strategies for collaboration and solving problems in teams |
| * communicate ideas and justifies construction and design of a purpose-built system | * communicate ideas and justifies construction and design of a purpose-built system |  |
| * justify ideas coherently using appropriate evidence and accurate referencing | * justify ideas coherently using appropriate evidence and accurate referencing | * communicate ideas and describe choices |
| Reflection | | |
| * reflect on own learning style and performance, including planning and time management, to develop strategies to improve own learning | * reflect on own learning style and performance, including planning and time management, to develop strategies to improve own learning | * reflect on how to manage deadlines and improve own learning |
| * present, communicate and reflect on processes to design electronic systems to collect data and measure against a criterion | * present, communicate and reflect on processes to design electronic systems to collect data and measure against a criterion |  |