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| **Unit Outline Semester 1 2021** | | | | |
| Faculty | Sciences | | BSSS Codes | |
| **Course Name** | Robotics and Mechatronics | | **1368** | **1347** |
| **Unit Name** | Robotics Mechatronic Systems | | **15639** | **13020** |
| **Unit Value** | 1.0 | |  | |
| **Teacher Name** | Adam Carter | |  | |
| **Teacher Signature** |  | **Date** |  | |
| **Faculty SLC Signature** |  | **Date** |  | |

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

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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 |  |

Further information on this course can be found at:

http://www.bsss.act.edu.au/\_\_data/assets/word\_doc/0006/454263/Robotics\_and\_Mechatronics\_A-T-M-V\_20-24.docx

**Assessment Tasks**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Task Type** | **Description** | **Weighting** | **Issue Date** | **Due Date** |
| Portfolio | Using the Assignment Rubric as a guide, you will show a portfolio of evidence of your developing competencies in creating Robotics Mechatronic Systems. Your portfolio will be a subset of tasks and challenges that are issued weekly. Your year group and accreditation defines which combination of weekly tasks/challenges you must submit. Furthermore, you are required to write a short report which documents how you solved your most complex challenge. This report will describe how used programming concepts to solve problems and your solution design diagrams to help quantify the problem. | 30 % | 1/01/2020 | 19/03/2020 |
| Exam | Theory Exam. | 20 % | 22/03/2020 | 26/03/2020 |
| Evidence Guide and Showcase | Using the Assignment Rubric, you will address this unit's core goals by developing an Evidence Guide and an Innovation Showcase of your work. An evidence guide is a centrally located resource which holds your notes and progress through the curriculum. The evidence guide itself will be a OneNote document composed of sections with pages which will answer specific questions regarding the unit goals. A showcase is a poster driven presentation which demonstrates your learning on the topic. | 30 % | 29/03/2020 | 11/06/2020 |

**General Assessment Criteria**

Students will be assessed on the degree to which they demonstrate:

* knowledge and understanding
* skills.

ASSESSMENT POLICIES

Assessment policy information can be found on the **UC SSC** **Lake Ginninderra Assessment Policies** document. This document is available on the college website [www.lakeonline.act.edu.au](http://www.lakeonline.act.edu.au), from Student Services or the relevant faculty. All students should read this information.

**Board of Senior Secondary Studies (BSSS) Information**

The ACT BSSS is responsible for oversight of all board approved courses and their assessment in ACT colleges. Detailed information on their policies can be found on their website

<http://www.bsss.act.edu.au/information_for_students>

The brochures entitled What’s the AST?, What’s the ATAR?, What’s Plagiarism? How you can avoid it., Equitable Assessment and Special Consideration in Assessment in years 11 and 12: Student Guide and Your Rights to Appeal are all available at this link. All students should read this information.

You can also request copies of these documents from Student Services, the Deputy Principal, or the Assessment Coordinator.

**ASSESSMENT POLICIES**

(Further information on assessment policies can be found on the BSSS website <http://www.bsss.act.edu.au/>)

**Late Submission of Work:** In accordance with BSSS guidelines work submitted late will be penalised at the rate of 5% (of possible total marks) per calendar day late (including weekends and public holidays) to a maximum of 35% of the total available marks. Any submission after the 7th late day will be awarded a notional zero. A notional zero is a mark calculated at the end of the unit in accordance with BSSS policy at the time and will be lower than the lowest real score. Work cannot be submitted on a weekend or public holiday.

***This table demonstrates the application of late penalties.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***Due Mon*** | ***Due Tues*** | ***Due Wed*** | ***Due Thurs*** | ***Due Fri*** |
| ***Received***  ***Monday*** | **0** |  |  |  |  |
| ***Received***  ***Tuesday*** | **5%** | **0** |  |  |  |
| ***Received***  ***Wednesday*** | **10%** | **5%** | **0** |  |  |
| ***Received***  ***Thursday*** | **15%** | **10%** | **5%** | **0** |  |
| ***Received***  ***Friday*** | **20%** | **15%** | **10%** | **5%** | **0** |
| ***Saturday*** | **Late penalties apply 5% per day on weekends and public holidays.** | | | | |
| ***Sunday*** |
| ***Received***  ***Monday*** | **35%** | **30%** | **25%** | **20%** | **15%** |
| ***Received***  ***Tuesday*** | NZ | **35%** | **30%** | **25%** | **20%** |
| ***Received***  ***Wednesday*** | NZ | NZ | **35%** | **30%** | **25%** |
| ***Received***  ***Thursday*** | NZ | NZ | NZ | **35%** | **30%** |
| ***Received***  ***Friday*** | NZ | NZ | NZ | NZ | **35%** |

***(Note: NZ = Notional Zero)***

If a student is unable to hand in work on time, due to illness or misadventure, satisfactory documentation must be provided to support a request for extension to the due date (special consideration). Requests for an extension should be made to the class teacher in advance. If a student knows in advance and for good reason she/he will be unable to be present for an assessment item the class teacher must be informed as soon as possible to arrange an alternative date or assessment item.

**Assessment Tasks:** If absence from an assessment task is known in advance and unavoidable, the teacher should be told prior to the task being due. Absence from a test requires the presentation of a medical certificate or other explanation acceptable to the college. Tests must be taken on the scheduled day except in the case of illness or other extenuating circumstances, where the student is required to supply a letter from a parent/ guardian or a medical certificate.

**Completion of Assessment:** A student will be awarded a V grade in a unit where she/he, fails to submit items of assessment worth at least 70% of the assessable work without acceptable and documented explanation.

**Class Attendance and V grade Policy:** It is expected that students will attend all scheduled classes/contact time/ structured learning activities for the units in which they are enrolled, unless acceptable documentary evidence is provided. A student may be awarded a V grade in a unit where she/he has unacceptable absences in more than 6 scheduled classes in a semester unit (or 3 in a term unit).

**Lateness of more than 10 mins on 6 periods (a double is two periods) in a semester (or 3 in a term unit)** without a satisfactory explanation will be recorded as one unacceptable absence.

**Plagiarism, (the copying of work in any form without acknowledgement of sources)** is a serious offence, and it is the responsibility of students to ensure that they do not commit this breach of discipline intentionally or otherwise. Students may be required to substantiate the authenticity or integrity of completed assignments, reports, etc. Students are advised to keep all material used in preparing their submitted work such as notes, references, photocopied material, and drafts until the end of the semester.

(Refer to the BSSS Policy Booklet, “What’s Plagiarism?”) <http://www.bsss.act.edu.au/information_for_students/whats_plagiarism_how_to_avoid_it>

**Unit Grades:** Grade descriptors provide a guide for teacher judgement of students’ achievement over a unit of work in this subject. Grades are organized on an A-E basis and represent the standard at which students have worked. A-E grades are awarded when assessment and attendance requirements have been met.

**Appeals and Special Consideration:** When an assessment item is returned, the student should check the marking. If a student wishes to have the marking of an item reviewed, she/he must firstly discuss the matter with the class teacher, who may speak to other teachers if marking was shared. If the review is unsatisfactory to the student, he/she should then approach the relevant faculty head. If, after these two steps, the student remains unsatisfied with the outcome, she/he can consider a formal appeal. This should be lodged with the Deputy Principal. A deadline for appeals may be advertised. Further advice is available from Student Services.

If matters beyond a student’s control have seriously affected marks (extended illness or serious family upsets) special consideration may be requested. Workloads in other subjects or difficulties with the English language are not a cause for special consideration. Evidence will be required for a claim for special consideration. Application for special consideration should be made to the head of Student Services.

**VOCATIONAL ASSESSMENT**

Each unit of competence will be assessed independently. There will be an opportunity to be re-assessed (if required) to meet national competency standards, however the original assessment mark will be used to calculate the A-E grade. The reporting of competencies may occur progressively or as part of an identified assessment process at the end of the unit. These will be recorded in a student record book.

**GENERAL MODERATION PROCEDURES**

**Unit scores (T courses):** Assessment items common to two or more classes will be moderated across classes using techniques such as shared marking or marking by more than one teacher. This may include marking a video or other pictorial record of a performance task. Unit scores will be calculated using assessment item results weighted as advertised in the unit outline. Unit scores in each scaling group (one or more courses) are standardised to historical parameters in the first semester of year 11 and back scaled in subsequent semesters.

**Meshing (T courses):** Where two or more courses occur in a scaling group the meshing of results is conducted using techniques such as: where feasible the same type of assessment items (e.g. oral, essay, test, assignment, creative response, performance), cross moderation of a significant sample of all grade levels, where feasible weightings for the same type of assessment item are the same for all units, assessment items/ marking schemes or solutions are developed collaboratively. A range of statistical data, including for example historical data for units, a meshing test or common testing data for the cohort, may be used to inform the meshing process.

**Course Scores (T courses):** The course score in a T course where scores are obtained in at least 80% of units studied is calculated using the better of -

* The average of best 80% of scores in units studied in the course.
* The average of the best 80% of scores in the minimum number of units required for the course.

In cases where 20% or more of units studied do not have a score the course score is the arithmetic mean of the scores obtained excepting if more than 50% of units studied in a course do not have a score then no course score is calculated.

# UNIT GRADE DESCRIPTORS

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| --- | --- | --- | --- | --- | --- |
| Achievement Standards Technologies A Course Year 11 | | | | | |
|  | A student who achieves an **A** grade typically | A student who achieves a **B** grade typically | A student who achieves a **C** grade typically | A student who achieves a **D** grade typically | A student who achieves an **E** grade typically |
| Knowledge and understanding | * analyses the design process and explains decision making | * explains the design process and describes decision making | * describes the design process with reference to decision making | * identifies major features of the design process with little reference to decision making | * identifies some features of the design process |
| * analyses technology concepts and principles and explains the properties of materials or data or systems to address a need, problem or challenge | * explains technology concepts and principles and describes the properties of materials or data or systems to address a need, problem or challenge | * describes technology concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge | * identifies major technology concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge | * identifies few technology concepts and principles with minimal reference to properties of materials or data or systems to address a need, problem or challenge |
| * analyses technologies, explains ethical and sustainable application | * explains technologies, describes ethical and sustainable application | * describes technologies with some reference to ethical and sustainable application | * identifies major features of technologies with little reference to ethical and sustainable application | * identifies some features of technologies with no reference to ethical and sustainable application |
| * thinks critically, drawing on data and information to solve complex problems and analyses opportunities for application of technology | * thinks critically, drawing on data and information to solve problems and explains opportunities for application of technology | * draws on data and information to solve problems and describes opportunities for application of technology | * identifies some opportunities for application of technology with limited use of information and data | * identifies some opportunities for application of technology with little evidence of use of information and data |
| Skills | * applies technology concepts, strategies and methodologies with control and precision demonstrating understanding of the historical and cultural context and its impact | * applies technology concepts, strategies and methodologies with control demonstrating understanding of the historical and cultural context and its impact | * applies technology concepts, strategies and methodologies with some control demonstrating understanding of context and its impact | * applies technology concepts, strategies and methodologies with minimal control demonstrating understanding of its impact | * applies technology concepts, strategies and methodologies with limited control demonstrating little evidence of understanding its impact |
| * creates innovative and high-quality design solutions/products using techniques and approaches and justifies ideas coherently | * creates innovative and high-quality design solutions/products using techniques and approaches and justifies ideas coherently | * creates design solutions/products using techniques and approaches and explains ideas | * creates design solutions/products using some techniques and approaches and describes ideas | * creates design solutions/products using some techniques and approaches and description of ideas |
| * critically analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * explains potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * describes analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * identifies potential prototypes and solutions with little or no reference to their appropriateness and effectiveness via iterative improvement and review |
| * communicates complex ideas and insights effectively in a range of mediums and justifies ideas coherently using appropriate evidence, metalanguage and accurate referencing | * communicates ideas effectively in a range of mediums and justifies ideas coherently using appropriate evidence, metalanguage and referencing | * communicates ideas appropriately in mediums and explains ideas coherently using appropriate evidence, metalanguage and referencing | * communicates ideas in mediums and describes ideas with some use of appropriate evidence with minimal use metalanguage and referencing | * communicates basic ideas in few mediums and describes ideas with little or no use of appropriate evidence and referencing |
| * reflects with insight on their own thinking and evaluates inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking and analyses inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking and explains inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking with some reference to planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking with little or no reference to planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively |

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| Achievement Standards Technologies T Course Year 11 | | | | | |
|  | A student who achieves an **A** grade typically | A student who achieves a **B** grade typically | A student who achieves a **C** grade typically | A student who achieves a **D** grade typically | A student who achieves an **E** grade typically |
| Knowledge and understanding | * critically analyses the design process and evaluates constraints and implications for decision making | * analyses the design process and explains constraints and implications for decision making | * explains the design process and describes constraints and implications for decision making | * describes the design process with some reference to constraints and implications for decision making | * identifies features of the design process with little or no reference to decision making |
| * synthesises technology theories, concepts and principles and evaluates the properties of materials or data or systems to address a need, problem or challenge | * analyses technology theories, concepts and principles and explains the properties of materials or data or systems to address a need, problem or challenge | * explains technology theories, concepts and principles and describes the properties of materials or data or systems to address a need, problem or challenge | * describes technology theories, concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge | * identifies technology theories, concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge |
| * critically analyses technologies and evaluates ethical and sustainable application of technology | * analyses technologies and explains ethical and sustainable application of technology | * explains technologies and describes ethical and sustainable application of technology | * describes technologies with some reference to ethical and sustainable application of technology | * identifies some features of technologies with little or no reference to ethical and sustainable application of technology |
| * thinks critically and creatively, drawing on data and information to solve complex problems | * thinks critically, drawing on data and information to solve complex problems | * thinks critically, drawing on data and information to solve problems | * draws on data and information to solve problems and describes opportunities | * applying limited use of information and data |
| Skills | * applies technology concepts, strategies and methodologies with control and precision demonstrating understanding of the historical and cultural context and its impact | * applies technology concepts, strategies and methodologies with control demonstrating understanding of the historical and cultural context and its impact | * applies technology concepts, strategies and methodologies with some control demonstrating understanding of context and its impact | * applies technology concepts, strategies and methodologies with minimal control demonstrating understanding of its impact | * applies technology concepts, strategies and methodologies with limited control demonstrating little evidence of understanding its impact |
| * creates innovative and high quality design solutions/products using techniques and approaches and justifies ideas coherently | * creates innovative and quality design solutions/products using techniques and approaches and justifies ideas coherently | * creates quality design solutions/ products using techniques and approaches and justifies ideas coherently | * creates design solutions/products using some techniques and approaches and explains ideas | * plans design solutions/products using some techniques and approaches and describes ideas |
| * critically analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * analyses potential prototypes and solutions explaining their appropriateness and effectiveness via iterative improvement and review | * explains potential prototypes and solutions describing their appropriateness and effectiveness via iterative improvement and review | * describes potential prototypes and solutions with some reference to their appropriateness and effectiveness via iterative improvement and review | * identifies potential prototypes and solutions with little or no reference to their appropriateness and effectiveness via iterative improvement and review |
| * communicates complex ideas and insights effectively in a range of mediums to a variety of audiences using appropriate evidence, metalanguage and accurate referencing | * communicates ideas effectively in a range of mediums to a variety of audiences using appropriate evidence, metalanguage and accurate referencing | * communicates ideas appropriately in a range of mediums to a variety of audiences using appropriate evidence, metalanguage and accurate referencing | * communicates ideas in mediums to a variety of audiences using some evidence, metalanguage and referencing | * communicates basic ideas in mediums to a variety of audiences using minimal evidence, metalanguage and some referencing |
| * reflects with insight on their own thinking and that of others and evaluates inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work independently and collaboratively | * reflects on their own thinking and analyses inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work independently and collaboratively | * reflects on their own thinking and explains inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work independently and collaboratively | * reflects on their own thinking with some reference to inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work independently and collaboratively | * reflects on their own thinking with little or no reference to planning, time management, use of appropriate techniques and strategies and capacity to work independently and collaboratively |

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| Achievement Standards Technologies A Course Year 12 | | | | | |
|  | A student who achieves an **A** grade typically | A student who achieves a **B** grade typically | A student who achieves a **C** grade typically | A student who achieves a **D** grade typically | A student who achieves an **E** grade typically |
| Knowledge and understanding | * analyses the design process and explains opportunities, constraints and implications for decision making | * explains the design process and describes opportunities, constraints and implications for decision making | * describes the design process with reference to opportunities, constraints and implications for decision making | * identifies major features of the design process with little reference to opportunities, constraints and implications for decision making | * identifies some features of the design process with minimal understanding of opportunities, constraints and implications |
| * analyses technology theories, concepts and principles and explains the properties of materials or data or systems to address a need, problem or challenge | * explains technology theories, concepts and principles and describes the properties of materials or data or systems to address a need, problem or challenge | * describes technology theories, concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge | * identifies major technology theories, concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge | * identifies few technology theories, concepts and principles with minimal reference to properties of materials or data or systems to address a need, problem or challenge |
| * analyses technologies in a range of contexts and explains ethical and sustainable application | * explains technologies in a range of contexts and describes ethical and sustainable application | * describes technologies in a range of contexts with some reference to ethical and sustainable application | * identifies major features of technologies with little reference to ethical and sustainable application | * identifies some features of technologies with no reference to ethical and sustainable application |
| * thinks critically, drawing on data and information to solve complex problems and analyses opportunities for application of technology | * thinks critically, drawing on data and information to solve problems and explains opportunities for application of technology | * draws on data and information to solve problems and describes opportunities for application of technology | * identifies some opportunities for application of technology with limited use of information and data | * identifies some opportunities for application of technology with little evidence of use of information and data |
| Skills | * applies technology concepts, strategies and methodologies with control and precision demonstrating understanding of the historical and cultural context and its impact | * applies technology concepts, strategies and methodologies with control demonstrating understanding of the historical and cultural context and its impact | * applies technology concepts, strategies and methodologies with some control demonstrating understanding of context and its impact | * applies technology concepts, strategies and methodologies with minimal control demonstrating understanding of its impact | * applies technology concepts, strategies and methodologies with limited control demonstrating little evidence of understanding its impact |
| * creates innovative and high-quality design solutions/products using techniques and approaches and justifies ideas coherently | * creates quality design solutions/products using techniques and approaches and explains ideas coherently | * creates design solutions/products using some techniques and approaches and explains ideas | * creates design solutions/products using some techniques and approaches and describes ideas | * creates design solutions/products using some techniques and approaches and description of ideas |
| * critically analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * explains potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * describes analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * identifies potential prototypes and solutions with little or no reference to their appropriateness and effectiveness via iterative improvement and review |
| * communicates complex ideas and insights effectively in a range of mediums and justifies ideas coherently using appropriate evidence, metalanguage and accurate referencing | * communicates ideas effectively in a range of mediums and justifies ideas coherently using appropriate evidence, metalanguage and referencing | * communicates ideas appropriately in mediums and explains ideas coherently using appropriate evidence, metalanguage and referencing | * communicates ideas in mediums and describes ideas with some use of appropriate evidence with minimal use metalanguage and referencing | * communicates basic ideas in few mediums and describes ideas with little or no use of appropriate evidence and referencing |
| * reflects with insight on their own thinking and evaluates inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking and analyses inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking explains inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking with some reference to planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking with little or no reference to planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively |

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| --- | --- | --- | --- | --- | --- |
| Achievement Standards Technologies T Course Year 12 | | | | | |
|  | A student who achieves an **A** grade typically | A student who achieves a **B** grade typically | A student who achieves a **C** grade typically | A student who achieves a **D** grade typically | A student who achieves an **E** grade typically |
| Knowledge and understanding | * critically analyses the design process and evaluates opportunities, constraints and implications for decision making | * analyses the design process and explains opportunities, constraints and implications for decision making | * explains the design process and describes opportunities, constraints and implications for decision making | * describes the design process with some reference to opportunities, constraints and implications for decision making | * identifies features of the design process with little or no reference to decision making |
| * critically analyses strategies, methodologies and procedures and evaluates their validity and reliability | * analyses strategies, methodologies and procedures and explains their validity and reliability | * explains strategies, methodologies and procedures and describes their validity and reliability | * describes strategies, methodologies and procedures with some reference to validity and reliability | * identifies some strategies, methodologies and procedures with little reference to validity and reliability |
| * synthesises technology theories, concepts and principles and evaluates the properties of material or data or systems to address a need, problem or challenge | * analyses technology theories, concepts and principles and explains the properties of materials or data or systems to address a need, problem or challenge | * explains technology theories, concepts and principles and describes the properties of materials or data or systems to address a need, problem or challenge | * describes technology theories, concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge | * identifies technology theories, concepts and principles with some reference to properties of materials or data or systems to address a need, problem or challenge |
| * critically analyses technologies in a range of contexts and evaluates ethical and sustainable application of technology | * analyses technologies in a range of contexts and explains ethical and sustainable application of technology | * explains technologies in a range of contexts and describes ethical and sustainable application of technology | * describes technologies in a range of contexts with some reference to ethical and sustainable application of technology | * identifies some features of technologies in a range of contexts with little or no reference to ethical and sustainable application of technology |
| * thinks critically and creatively, drawing on data and information to solve complex problems and evaluates opportunities for application of technology | * thinks critically, drawing on data and information to solve complex problems and analyses opportunities for application of technology | * thinks critically, drawing on data and information at times to solve problems and explains opportunities for application of technology | * draws on data and information at times to solve problems and describes opportunities for application of technology | * identifies some opportunities for application of technology with limited use of information and data |
| Skills | * applies technology concepts, strategies and methodologies demonstrating an understanding of the historical and cultural context and impact on individuals, groups, communities and society | * applies technology concepts, strategies and methodologies with control demonstrating understanding of the historical and cultural context and impact on individuals, groups, communities and society | * applies technology concepts, strategies and methodologies with some control demonstrating understanding of context and the impact on individuals, groups, communities and society | * applies technology concepts, strategies and methodologies with minimal control demonstrating understanding of the impact on individuals, groups, communities and society | * applies technology concepts, strategies and methodologies with limited control demonstrating little evidence of understanding of the impact on individuals, groups, communities and society |
| * creates innovative and high quality design solutions/products using techniques and approaches and justifies ideas coherently | * creates innovative and quality design solutions/products using techniques and justifies ideas coherently | * creates quality design solutions/ products using techniques and justifies ideas coherently | * creates design solutions/products using some techniques and explains ideas | * plans design solutions/products using some techniques and describes ideas |
| * critically analyses potential prototypes and solutions evaluating their appropriateness and effectiveness via iterative improvement and review | * analyses potential prototypes and solutions explaining their appropriateness and effectiveness via iterative improvement and review | * explains potential prototypes and solutions describing their appropriateness and effectiveness via iterative improvement and review | * describes analyses potential prototypes and solutions with some reference to their appropriateness and effectiveness via iterative improvement and review | * identifies potential prototypes and solutions with little or no reference to their appropriateness and effectiveness via iterative improvement and review |
| * communicates complex ideas and insights effectively in a range of mediums to a variety of audiences using appropriate evidence, metalanguage and accurate referencing | * communicates ideas effectively in a range of mediums to a variety of audiences using appropriate evidence, metalanguage and accurate referencing | * communicates ideas appropriately in a range of mediums to a variety of audiences using appropriate evidence, metalanguage and accurate referencing | * communicates ideas in mediums to a variety of audiences using some evidence, metalanguage and referencing | * communicates basic ideas in mediums to a variety of audiences using minimal evidence, metalanguage and some referencing |
| * reflects with insight on their own thinking and that of others and evaluates inter and intrapersonal skills including planning, time management, use of appropriate techniques & strategies and capacity to work independently and collaboratively | * reflects on their own thinking and that of others and analyses inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking and that of others and explains inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking with some reference to inter and intrapersonal skills including planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively | * reflects on their own thinking with little or no reference to planning, time management, use of appropriate techniques and strategies and capacity to work both independently and collaboratively |

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| Achievement Standards Technologies M Course Years 11 & 12 | | | | | |
|  | *A student who achieves an* ***A*** *grade typically* | *A student who achieves a* ***B*** *grade typically* | *A student who achieves a* ***C*** *grade typically* | *A student who achieves a* ***D*** *grade typically* | *A student who achieves an* ***E*** *grade typically* |
| Knowledge and understanding | * describes and uses the design process and procedures with independence | * describes and uses the design process and procedures with some assistance | * recounts design procedures used with assistance | * identifies design procedures with continuous guidance | * identifies design procedures with direct instruction |
| * describes practical techniques and materials required to address a need or solve a problem with independence | * describes practical techniques and materials required to address a need or solve a problem with some assistance | * recounts practical techniques and materials used to solve a problem with assistance | * uses practical techniques and materials required with continuous guidance | * identifies practical techniques and materials with direct instruction |
| Skills | * communicates ideas using appropriate terminology with independence | * communicates ideas using appropriate terminology with some assistance | * communicates ideas using appropriate, terminology with assistance | * communicates ideas using appropriate, terminology with continuous guidance | * communicates ideas using appropriate terminology with direct instruction |
| * makes discerning choice of strategies and procedures to use technology with independence | * selects strategies and procedures to use technology with some assistance | * selects strategies and procedures to use technology with assistance | * selects strategies and procedures to use technology with continuous guidance | * selects strategies and procedures to use technology with direct instruction |
| * demonstrates interpersonal and intrapersonal skills in a range of technology contexts with independence | * demonstrates interpersonal and intrapersonal skills in a range of technology contexts with some assistance | * demonstrates interpersonal and intrapersonal skills in technology contexts with assistance | * demonstrates interpersonal and intrapersonal skills in technology contexts with continuous guidance | * demonstrates interpersonal and intrapersonal skills in technology contexts with direct instruction |
| * plans and undertakes independent inquiries with independence | * plans and undertakes independent inquiries with some assistance | * undertakes guided inquiries with assistance | * undertakes guided inquiries with continuous guidance | * undertakes simple research on a topic with direct instruction |
| * create design solutions/products with independence | * create design solutions/products with some assistance | * create design solutions/products with assistance | * create design solutions/products with continuous guidance | * create design solutions/products with direct instruction |

**Weekly Unit Content – Semester 1 2021**

