



EDSE14005 *Design and Manufacturing*

Term 2 - 2024

Profile information current as at 29/07/2024 03:51 pm

All details in this unit profile for EDSE14005 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview

This unit engages students with an integrated approach to Science, Technology, Engineering and Maths (STEM). The unit will equip students with the skills, knowledge and experience to deliver interdisciplinary STEM-based projects with an emphasis on computer-aided design (CAD), computational fluid dynamics (CFD) and computer numerical controlled machining. Students will use the engineering design process to research, design and develop a small CO₂ gas-powered car. This involves learning how to model design ideas using CAD software, virtually testing designs using CFD software, and documenting the project from start to finish to produce a design folio.

Details

Career Level: *Undergraduate*

Unit Level: *Level 4*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

EDSE12026

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

Offerings For Term 2 - 2024

- Mixed Mode

Attendance Requirements

All on-campus students are expected to attend scheduled classes - in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:

Click here to see your [Residential School Timetable](#).

Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

[Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

[Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Online Quiz(zes)**

Weighting: 10%

2. **Portfolio**

Weighting: 15%

3. **Written Assessment**

Weighting: 25%

4. **Practical Assessment**

Weighting: 30%

5. **Written Assessment**

Weighting: 20%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the [CQUniversity Policy site](#).

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from SUTE

Feedback

Useful feedback

Recommendation

Further investigation of the usefulness of feedback to students.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Apply theories and pedagogies to plan and develop a STEM program based on a suite of design and construction activities
2. Use skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline-specific teaching techniques
3. Demonstrate problem-solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation
4. Critically analyse and evaluate the design and manufacture of STEM teaching and production processes
5. Devise and use appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

This unit aligns with the following Australian Professional Standards for Teachers (Graduate Career Stage):

Standard 2: Know the content and how to teach it

2.1 Content and teaching strategies of the teaching area

2.2 Content selection and organisation

Standard 4: Create and maintain supportive and safe learning environments

4.4 Maintain student safety

Standard 7: Engage professionally with colleagues, parents/carers and the community

7.2 Comply with legislative, administrative and organisational requirements

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Online Quiz(zes) - 10%	•	•	•	•	•
2 - Portfolio - 15%	•	•	•	•	•
3 - Written Assessment - 25%	•	•	•	•	•
4 - Practical Assessment - 30%	•	•	•	•	•
5 - Written Assessment - 20%	•	•	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Communication	•	•	•	•	•
2 - Problem Solving	•	•	•	•	•
3 - Critical Thinking	•	•	•	•	•
4 - Information Literacy	•	•	•	•	•
5 - Team Work	•	•	•	•	•
6 - Information Technology Competence	•	•	•	•	•
7 - Cross Cultural Competence	•	•	•	•	•
8 - Ethical practice	•	•	•	•	•
9 - Social Innovation					
10 - Aboriginal and Torres Strait Islander Cultures					

Textbooks and Resources

Textbooks

There are no required textbooks.

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

Referencing Style

All submissions for this unit must use the referencing style: [American Psychological Association 7th Edition \(APA 7th edition\)](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Brad Connolly Unit Coordinator
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Rowan Cahill Unit Coordinator
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Schedule

Week 1 - 08 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
STEM / F1 in Schools / Aerodynamics	View the media clips and visit the links to read the notes for the first quiz. Quiz 1 is about STEM and Reengineering Australia's F1 in Schools Challenge. View the links and read the notes for the second quiz. Quiz 2 is about the aerodynamics of a car.	Complete quizzes 1 & 2

Week 2 - 15 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Technical Rules and Regulations / CNC Machining and Rapid Prototypes	Download and view the Technical Regulations and read the notes for the third quiz. Quiz 3 introduces you to the strict rules and guidelines student must follow when designing the C02 race car. View the links and read the notes for the fourth quiz. Quiz 4 is about the CNC machining and rapid prototypes.	Complete quizzes 3 & 4 Assessment 1 - Quizzes Due: Sunday, 21 July 2024, 11:55 PM

Week 3 - 22 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
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Design Criteria / CAD Tutorials 1- 3

Read the assessment outlines for Portfolio Assessment 2 and 3. Download the Design Folio template (located in the Unit Introduction folder). Complete the Design Criteria stage of the Design Folio. Create a folder in OnShape called EDSE14005. View and complete OnShape Basic Cadet Car tutorial clips 1, 2, and 3. Title and save your work.

Week 4 - 29 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Car Design Ideas	Read the assessment outlines for Portfolio Assessment 3. Review the links on aerodynamics. View the links on concept sketching. Refer to the Technical Rules and Regulations document attached to Week 2. Complete the Car Design Ideas stage of the design folio.	

Week 5 - 05 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
CAD Tutorials 5 - 26	View the CAD tutorial clips 1 - 5 and start to create the car model.	The F1 Car and drawing files are due: Week 9 for scrutineering.

Vacation Week - 12 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Enjoy your break.		

Week 6 - 19 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Cover Page / CAD Tutorials 6-9	View the CAD tutorial clips 6-9 and continue to create the car model. Complete and export a Car Render	

Week 7 - 26 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Design Development CAD	Revise Onshape tutorial clips 1- 5. Refer to your Car Design Ideas from your folio. Copy your advanced cadet car workspace in Onshape and rename. Modify the car design to incorporate your own design ideas. Take print-screens of your new model as you create it in Onshape. The print-screens should highlight the aerodynamic features explored in the Car Design Ideas stage of the folio. Use the print-screens to complete of the Design Development CAD stage of the folio.	

Week 8 - 02 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic

Compliance Drawing / CAD Tutorials 21 - 23	Revise how to create an Onshape Drawing file by viewing tutorial clip from week 6. Create F1 in Schools Compliance Drawing pdf. Refer to the Technical Rules and Regulations. Annotate Drawing with dimensions, rules and regulations. Complete the Compliance Drawing for the folio. Submit the Compliance Drawings to Moodle and share your Onshape file with the Tutor	Assessment 2 due 8/9/2024: Submit the Compliance Drawings to Moodle and share your Onshape file with the Tutor
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Week 9 - 09 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Assessment 3 - Design Folio	With your car design complete, finish your design folio detailing your car design. Save your folio as a .PDF file using the following name structure Last name_First name_Design Folio.pdf Submit your folio via Moodle using the link below	Assessment 3 - Design Folio Exemplar Due: 4/10/2024

Week 10 - 16 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Manufacturing Preparation	Read through the attached PowerPoint about preparing your car design for machining and 3D printing. Modify your own car design ready for the Residential School next week. Review the Residential School schedule and resources.	

Week 11 - 23 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Assessment 4 - Compulsory Residential School	THREE-DAY COMPULSORY RESIDENTIAL SCHOOL MONDAY 23/9/24 TO WEDNESDAY 25/9/24 OR THURSDAY 26/9/24 TO SATURDAY 28/9/23 HELD IN MACKAY - LOCATION TO BE ANNOUNCED. THE DAYS RUNS FROM 8AM TO 5PM.	RES SCHOOL REQUIREMENTS: STUDENTS ARE REQUIRED TO SUPPLY THE FOLLOWING ITEMS FOR THE RES SCHOOL - CLOSED-IN-SHOES, COMFORTABLE CLOTHES-NOTHING LOOSE FITTING THAT COULD BE CAUGHT IN EQUIPMENT, CLEAR SAFETY GLASSES AND HEARING PROTECTION.

Week 12 - 30 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Assessment 5 - Manufacturing Logbook	Complete the Manufacturing Logbook. Submit Manufacturing Logbook via Moodle.	Assessment 5 - Manufacturing Logbook Due: Sunday, 6/10/2024

Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 14 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
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Assessment Tasks

1 Online Quiz(zes)

Assessment Type

Online Quiz(zes)

Task Description

The initial study introduces STEM education, F1 in Schools Challenge, Aerodynamics and CNC manufacture. Four quizzes require you to instigate the four topics on selected readings and media provided and online. Questions will be available on the Moodle website each Monday and remain open until the following Monday at midnight. Students have a maximum of 60 minutes per quiz. You are allowed two attempts for each quiz.

Use of Generative Artificial Intelligence agents (Gen AI)

Within this assessment, the use Gen AI agents is as follows:

- **No Gen AI use at any point during this assessment.**

Number of Quizzes

4

Frequency of Quizzes

Other

Assessment Due Date

Sunday, 21 July 2024, 11:55 PM

Return Date to Students

Review/Exam Week Monday (7 Oct 2024)

Weighting

10%

Minimum mark or grade

50% of Quiz assessment grade

Assessment Criteria

Students are assessed on the following criteria:

- Knowledge and understanding of design task
- Ability to express and develop an Idea
- Knowledge and application of CAD tools and processes
- Knowledge and application of Technical Rules and Regulations
- Application and evaluation of CFD testing
- Ability to present and communicate work effectively

Referencing Style

- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Learning Outcomes Assessed

- Apply theories and pedagogies to plan and develop a STEM program based on a suite of design and construction activities
- Use skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline-specific teaching techniques
- Demonstrate problem-solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation
- Critically analyse and evaluate the design and manufacture of STEM teaching and production processes
- Devise and use appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

2 Portfolio

Assessment Type

Portfolio

Task Description

Computer Aided Design (CAD) CO2 Car Model 15%

You are required to utilize computer aided design (CAD) software, and computational fluid dynamics (CFD) software to model and test a car design. By following the CAD tutorials provided you will be shown how to create and modify a basic race car suitable for side machining using OnShape.

To complete this task, you will need to register online with 'OnShape' and 'Autodesk Flow Design' from the OnShape Education website. Use your student email to first register and then register the web-app.

<https://www.onshape.com/en/education/>

F1 Car model is to be submitted online via the course Moodle website in two parts.

1. The Onshape part file share link - share to r.cahill@cqu.edu.au
2. The drawing file (.pdf) titled Last name_First name_C02CAR Compliance Drawing

Use of Generative Artificial Intelligence agents (Gen AI)

Within this assessment, the use Gen AI agents is as follows:

- **No Gen AI use at any point during this assessment.**

Assessment Due Date

Sunday, 8 September 2024, 11:55 PM

Return Date to Students

Review/Exam Week Monday (7 Oct 2024)

Weighting

15%

Minimum mark or grade

50% of Portfolio Assessment grade

Assessment Criteria

Students are assessed on the following criteria:

- Knowledge and understanding of design task
- Ability to express and develop an Idea
- Knowledge and application of CAD tools and processes
- Knowledge and application of Technical Rules and Regulations
- Application and evaluation of CFD testing
- Ability to present and communicate work effectively

Referencing Style

- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Learning Outcomes Assessed

- Apply theories and pedagogies to plan and develop a STEM program based on a suite of design and construction activities
- Use skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline-specific teaching techniques
- Demonstrate problem-solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation
- Critically analyse and evaluate the design and manufacture of STEM teaching and production processes
- Devise and use appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

3 Written Assessment

Assessment Type

Written Assessment

Task Description

Scenario:

As a teacher at a secondary school and you have been asked to run an after school club. The principal has specified it should be STEM based activity and suggested the F1 in Schools challenge. The challenge involves designing and making a miniature F1 race car. The car is to be made from balsa wood and be powered only by a single gas cylinder containing 8 grams of pressurised CO₂. It must be able to travel the 20-meter distance as quickly as possible, and withstand the forces of launch acceleration, track traversing and physical deceleration. In addition, its design and manufacture must adhere to detailed rules and regulations outlined in the Technical-Regulations for a cadet class competitor. To be prepared, you have decided to produce a design folio exemplar to be used when teaching the project.

The folio is to demonstrate how to approach a design problem by following the design process. Your work must demonstrate an understanding and application of the design process, key concepts regarding aerodynamics, F1 in Schools technical rules and regulations, as well as sketching and CAD skills. All work is to be collated and presented in the form of a PowerPoint presentation. A template is provided for the Design Folio Exemplar. It is to be submitted online

via the Moodle website in the following format: Last name_First name_Design Folio

Use of Generative Artificial Intelligence agents (Gen AI)

Within this assessment, the use Gen AI agents is as follows:

- **No Gen AI use at any point during this assessment.**

Assessment Due Date

Friday, 4 October 2024, 11:55 PM

Return Date to Students

Review/Exam Week Monday (7 Oct 2024)

Weighting

25%

Minimum mark or grade

50% of Written Assessment grade

Assessment Criteria

Students are assessed on the following criteria:

- Knowledge and understanding of design task
- Ability to express and develop an Idea
- Knowledge and application of CAD tools and processes
- Knowledge and application of Technical Rules and Regulations
- Application and evaluation of CFD testing
- Ability to present and communicate work effectively

Referencing Style

- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Learning Outcomes Assessed

- Apply theories and pedagogies to plan and develop a STEM program based on a suite of design and construction activities
- Use skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline-specific teaching techniques
- Demonstrate problem-solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation
- Critically analyse and evaluate the design and manufacture of STEM teaching and production processes
- Devise and use appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

4 Practical Assessment

Assessment Type

Practical Assessment

Task Description

During the Residential School, you will utilise computer aided design and manufacturing software and equipment to design and make a miniature CO2 gas powered balsa wood car. It is an opportunity to develop an understanding of how technology can be used to make your ideas a reality. Completion of this task will enable you to demonstrate how to create cutting paths, set machine parameters, enter computer code, and operate and maintain a CNC router and 3D printer. Hand tools are applied during the finishing and assembly stages of the course. The CO2 race car will be assessed on completion during the Residential School. An A4 page of photos of the finished car is to be submitted via Moodle in the following format: Last name_First name_CO2 race Car

Use of Generative Artificial Intelligence agents (Gen AI)

Within this assessment, the use Gen AI agents is as follows:

- **No Gen AI use at any point during this assessment.**

Assessment Due Date

Saturday, 28 September 2024, 11:55 PM

Return Date to Students

Review/Exam Week Monday (7 Oct 2024)

Weighting

30%

Minimum mark or grade

50% of Practical Assessment grade

Assessment Criteria

Students are assessed on the following criteria:

- Knowledge and understanding of design task
- Ability to express and develop an idea
- Knowledge and application of CAD tools and processes
- Knowledge and application of Technical Rules and Regulations
- Application and evaluation of CFD testing
- Ability to present and communicate work effectively

Referencing Style

- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Offline

Learning Outcomes Assessed

- Apply theories and pedagogies to plan and develop a STEM program based on a suite of design and construction activities
- Use skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline-specific teaching techniques
- Demonstrate problem-solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation
- Critically analyse and evaluate the design and manufacture of STEM teaching and production processes
- Devise and use appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

5 Written Assessment

Assessment Type

Written Assessment

Task Description

During and post Residential School, you are required to produce a manufacturing logbook that documents the creation of the miniature CO₂ race car. The logbook should describe the aim and objectives of each stage of manufacture, as well as outline relevant challenges, solutions, quality control measures and health & safety issues. The logbook will provide evidence of your work in the form of photos, screen shots, videos and annotations. It must demonstrate an understanding and application of computer aided design and manufacture as well as manual finishing processes. All work is to be collated and presented in the form of a PowerPoint presentation. A template is provided.

The Manufacturing logbook is to be submitted online via the Moodle website in the following format: Last name_First name_Manufacturing Logbook

Use of Generative Artificial Intelligence agents (Gen AI)

Within this assessment, the use Gen AI agents is as follows:

- **No Gen AI use at any point during this assessment.**

Assessment Due Date

Sunday, 6 October 2024, 11:55 PM

Return Date to Students

Review/Exam Week Monday (7 Oct 2024)

Weighting

20%

Minimum mark or grade

50% of Written Assessment grade

Assessment Criteria

Students will be assessed on the following criteria:

- Ability to produce a quality and well finished product
- Ability to operate CNC Machinery skillfully and safely
- Ability to work autonomously with complex tasks
- Ability to investigate and evaluate the manufacturing process
- Ability to present and communicate work effectively

Referencing Style

- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Learning Outcomes Assessed

- Apply theories and pedagogies to plan and develop a STEM program based on a suite of design and construction activities
- Use skills sequences and procedures using CAD/CAM, virtual modelling techniques and appropriate discipline-specific teaching techniques
- Demonstrate problem-solving, planning, sequencing, implementing and assessing strategies to STEM applications and processes to promote STEM education including the application of innovation
- Critically analyse and evaluate the design and manufacture of STEM teaching and production processes
- Devise and use appropriate workplace health and safety and maintenance practices when engaging in design and manufacturing activities.

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?



Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem