



ENEC12009 *Engineering Surveying*

Term 1 - 2022

Profile information current as at 14/12/2025 05:54 pm

All details in this unit profile for ENEC12009 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 introduces you to engineering surveying techniques and practical skills. It outlines the practice in plane and geodetic surveying such as measurements of distances, elevations and angles. You are also expected to demonstrate an understanding of surveying methods which include triangulation, traversing and transfer of true meridian to an underground base. Concepts are also introduced in relation to automated survey instruments, errors and survey adjustments, and computerised processing of survey data. You will also need to demonstrate the teamwork and communication skills necessary to implement such systems in the civil construction and mining industries. In this unit, you must complete compulsory practical activities. Refer to the Engineering Undergraduate Course Moodle site for proposed dates.

Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Prerequisite: MATH11218 Applied Mathematics or MATH11160 Technology Mathematics.

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 1 - 2022

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Mixed Mode
- Rockhampton

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).

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. **Written Assessment**

Weighting: 30%

2. **Written Assessment**

Weighting: 30%

3. **Practical Assessment**

Weighting: 40%

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 Moodle Website

Feedback

The unit content was informative and covered theoretical and practical aspects of surveying.

Recommendation

Continue to add more insightful and practical materials for Term 1, 2022.

Feedback from Moodle Website

Feedback

Assignment questions were completely referring to the unit content and examples.

Recommendation

Continue to add more worked-out examples to the unit content for Term 1, 2022.

Feedback from Moodle Website

Feedback

The sessions recordings were helpful for online students and on-campus students if needed to re-watch the sessions.

Recommendation

Continue to upload the recordings after the sessions. The recordings will be uploaded in two separate videos, one for the lecture and one for the tutorial, to help students better access videos.

Feedback from Moodle Website and email

Feedback

The staff had good technical knowledge, and the lecturer was really helpful through quick and comprehensive responses.

Recommendation

The same quality of support will be maintained in future offerings.

Feedback from Moodle Website

Feedback

The practical class was really informative and a great way to be hands-on.

Recommendation

Continue to organise the practical sessions on all campuses. Videos demonstrating surveying equipment and their operation will be shown and discussed in the lecture sessions to highlight the importance and usefulness of the practical in understanding surveying.

Feedback from Moodle Website

Feedback

The tutorial sessions are better after the lecture sessions.

Recommendation

The tutorial Questions will be discussed after the lecture delivery. Drop-in sessions will be considered for those who have questions about the unit contents.

Feedback from Moodle Website

Feedback

Feedback given on assignments needs more attention.

Recommendation

The feedback on assignments will be provided within the timeframe in the next offerings.

Unit Learning Outcomes

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

1. Recognise and discuss basic concepts and principles of Engineering Surveying
2. Carry out basic surveying and mapping activities such as measurement of ground elevation, angle and distance measurements and detailed surveying using appropriate surveying equipment
3. Select and apply appropriate computing techniques to analyse and process surveying field measurement data
4. Apply surveying principles in civil and mining engineering works such as setting-out, earth work calculations and underground surveying
5. Explain and demonstrate the concepts, techniques and technologies used in mass surveying
6. Demonstrate a professional level of communication and teamwork.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

Introductory

1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1N 2N 3N 4N 5N)

1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1N 2N 3N 4N 5N)

1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1N 2N 3N 4N 5N 6N)

2.2 Fluent application of engineering techniques, tools and resources. (LO: 1N 2N 3N 4N 5N)

3.1 Ethical conduct and professional accountability. (LO: 2N 3N 4N 5N 6N)

3.5 Orderly management of self, and professional conduct. (LO: 1N 2N 3N 4N 5N 6N)

Intermediate

1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1N 2I 3I 4I 5N)

1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1I 2I 3I 4I 5N)

2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1N 2I 3N 4I 5N)

2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 1N 2I 3I 4I 5N 6N)

3.2 Effective oral and written communication in professional and lay domains. (LO: 1N 2N 3N 4N 5I 6N)

3.4 Professional use and management of information. (LO: 3I 4N 5I 6N)

3.6 Effective team membership and team leadership. (LO: 2N 3N 4N 5N 6I)

Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.

Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information
<https://moodle.cqu.edu.au/course/view.php?id=1511>

Alignment of Learning Outcomes, Assessment and Graduate Attributes

 N/A Level	 Introductory Level	 Intermediate Level	 Graduate Level	 Professional Level	 Advanced Level
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Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Written Assessment - 30%	•		•	•	•	•
2 - Written Assessment - 30%	•		•	•	•	•
3 - Practical Assessment - 40%	•	•	•	•		•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
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

ENEC12009

Prescribed

Surveying for Civil and Mine Engineers (Acquire the Skills in Weeks)

Edition: 2nd (2020)

Authors: John Walker and Joseph L. Awange

Springer

Bentley, WA, Australia

ISBN: 978-3-030-45802-7, 3030458032

Binding: Other

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Supplementary

Engineering Surveying

Edition: 6th (2007)

Authors: W. Schofield and M. Breach

Taylor and Francis

London, United Kingdom

ISBN: 978-0-7506-6949-8

Binding: Other

[View textbooks at the CQUniversity Bookshop](#)

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: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Farzaneh Tahmoorian Unit Coordinator

f.tahmoorian@cqu.edu.au

Schedule

Week 1 - 07 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Basic Concepts of Surveying	1. Chapter 1 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapters 1 & 2 of Engineering Surveying (Schofield and Breach)	

Week 2 - 14 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
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Levelling and its practical application	1. Chapters 2 & 3 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapters 3 & 8 of Engineering Surveying (Schofield and Breach)
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Week 3 - 21 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Distance Measurement	1. Chapter 4 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapter 3 of Engineering Surveying (Schofield and Breach)	

Week 4 - 28 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Angle Measurement	1. Chapter 4 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapter 5 of Engineering Surveying (Schofield and Breach)	

Week 5 - 04 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Traversing & Triangulation	1. Chapter 5 & 16 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapters 6 & 7 of Engineering Surveying (Schofield and Breach)	

Vacation Week - 11 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
MID-TERM BREAK		

Week 6 - 18 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Earthworks (Quantities, Sections, Contours)	1. Chapters 8 & 9 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapter 11 of Engineering Surveying (Schofield and Breach)	Assignment 1 Due: Week 6 Monday (18 Apr 2022) 9:00 am AEST

Week 7 - 25 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Curves	1. Chapters 10, 11, 12 & 13 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapter 10 of Engineering Surveying (Schofield and Breach)	

Week 8 - 02 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Setting out Works	1. Chapter 15 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapter 12 of Engineering Surveying (Schofield and Breach)	

Week 9 - 09 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
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Mine and Underground Surveying	1. Chapter 7 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapter 13 of Engineering Surveying (Schofield and Breach)	
Week 10 - 16 May 2022		
Module/Topic	Chapter	Events and Submissions/Topic
Digital and Mass Survey Methods	1. Chapter 14 of Engineering Surveying (Schofield and Breach)	
Week 11 - 23 May 2022		
Module/Topic	Chapter	Events and Submissions/Topic
Introduction of GPS and advanced surveying methods	1. Chapters 14 & 16 of Surveying for Civil and Mine Engineers (Walker et al.) 2. Chapter 9 of Engineering Surveying (Schofield and Breach)	Assignment 2 Due: Week 11 Monday (23 May 2022) 9:00 am AEST
Week 12 - 30 May 2022		
Module/Topic	Chapter	Events and Submissions/Topic
Review		Surveying Practicals Due: Week 12 Monday (30 May 2022) 9:00 am AEST
Review/Exam Week - 06 Jun 2022		
Module/Topic	Chapter	Events and Submissions/Topic
Exam Week - 13 Jun 2022		
Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Assignment 1

Assessment Type

Written Assessment

Task Description

This assessment task aims to allow the students to demonstrate their understanding of various concepts and theories delivered in the unit during Weeks 1 to 5. This written assessment will constitute a number of questions (usually 6 to 8), similar to the unit tutorial questions, on the topics covered in the first five weeks of the term. All students are required to submit their written assessment individually and as a single PDF file for this assessment. The assignment questions will be made available on the Moodle. Further details will be provided on the unit website.

Assessment Due Date

Week 6 Monday (18 Apr 2022) 9:00 am AEST

Return Date to Students

Week 8 Monday (2 May 2022)

Weighting

30%

Assessment Criteria

Each question in this assignment will be assessed separately for the criterion *accuracy and correct results*.

- Correct application of mathematics and arithmetic
- Answers clearly identified
- Correct results

In addition, the assignment as a whole will be assessed against the following criteria:

Evidence of correct procedures

- All necessary steps in analysis are present in correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results obtained
- Evidence of checking results (mathematical, graphical, logic-common sense)

Evidence of understanding of the topic

- Explanation of choices made in the analysis (why is procedure required, why this particular procedure)
- Interpretation of results, eg limitations, direction of vectors

Professional presentation

- The work (job) is clearly identified (problem, date, analyst)
- Clear statement of each problem and its details and requirements
- Logical layout of analysis
- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results.

A similarity check will be always done before marking the submitted assignments for all students. Upon detection of any plagiarism including i) similarity between submitted reports within the same cohort or ii) with the previous cohorts or iii) submitted works to other institutes or iv) using the material provided by cheating websites will result in failing that assignment without marking and the student will be reported to the CQU Academic Misconduct team for further actions.

Referencing Style

- [Harvard \(author-date\)](#)

Submission

Online

Submission Instructions

The submission should be in a single PDF document. Any spreadsheet must be transferred to the main PDF document. See Moodle for more detail and description.

Learning Outcomes Assessed

- Recognise and discuss basic concepts and principles of Engineering Surveying
- Select and apply appropriate computing techniques to analyse and process surveying field measurement data
- Apply surveying principles in civil and mining engineering works such as setting-out, earth work calculations and underground surveying
- Explain and demonstrate the concepts, techniques and technologies used in mass surveying
- Demonstrate a professional level of communication and teamwork.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

2 Assignment 2

Assessment Type

Written Assessment

Task Description

This assessment task aims to allow the students to demonstrate their understanding of various concepts and theories delivered in the unit during Weeks 6 to 10. This written assessment will constitute a number of questions (usually 6 to 8), similar to the unit tutorial questions, on the topics covered in the second half of the term. All students are required to submit their written assessment individually and as a single PDF file for this assessment. The assignment questions will

be made available on the Moodle. Further details will be provided on the unit website.

Assessment Due Date

Week 11 Monday (23 May 2022) 9:00 am AEST

Return Date to Students

Review/Exam Week Monday (6 June 2022)

Weighting

30%

Assessment Criteria

Each question in this assignment will be assessed separately for the criterion accuracy and correct results.

- Correct application of mathematics and arithmetic
- Answers clearly identified
- Correct results

In addition, the assignment as a whole will be assessed against the following criteria:

Evidence of correct procedures

- All necessary steps in analysis are present in correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results obtained
- Evidence of checking results (mathematical, graphical, logic-common sense)

Evidence of understanding of the topic

- Explanation of choices made in the analysis (why is procedure required, why this particular procedure)
- Interpretation of results, eg limitations, direction of vectors

Professional presentation

- The work (job) is clearly identified (problem, date, analyst)
- Clear statement of each problem and its details and requirements
- Logical layout of analysis
- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results.

A similarity check will be always done before marking the submitted assignments for all students. Upon detection of any plagiarism including i) similarity between submitted reports within the same cohort or ii) with the previous cohorts or iii) submitted works to other institutes or iv) using the material provided by cheating websites will result in failing that assignment without marking and the student will be reported to the CQU Academic Misconduct team for further actions.

Referencing Style

- [Harvard \(author-date\)](#)

Submission

Online

Submission Instructions

The submission should be in a single PDF document. Any spreadsheet must be transferred to the main PDF document. See Moodle for more detail and description.

Learning Outcomes Assessed

- Recognise and discuss basic concepts and principles of Engineering Surveying
- Select and apply appropriate computing techniques to analyse and process surveying field measurement data
- Apply surveying principles in civil and mining engineering works such as setting-out, earth work calculations and underground surveying
- Explain and demonstrate the concepts, techniques and technologies used in mass surveying
- Demonstrate a professional level of communication and teamwork.

Graduate Attributes

- Communication

- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

3 Surveying Practicals

Assessment Type

Practical Assessment

Task Description

Practical exercises assist students in achieving the Learning Outcomes for this unit. For this assessment item, students will be formed into teams of generally 3-4 members. Students are required to complete the practical activities as per instructions given in the Practical Class information. The Practical Class Information, report template and requirements, and more details on this assessment task will be made available on the Moodle. **The practical report is an individual submission.** The required practical activities are as follows:

1. Differential Levelling
2. Angle and Distance
3. Detailed Survey
4. Contour Survey

Details of activities and report requirements will be given on the unit website. Please note that the practical activities duration on each campus may be slightly different from the other campuses. You may complete the practical and most of the report tasks during your practical class time, which will conclude by the end of Week 8 for all campuses. For the administrative purpose, the due date is set as the first day of Week 12. This does not mean you need to wait until that date.

Assessment Due Date

Week 12 Monday (30 May 2022) 9:00 am AEST

Return Date to Students

After the final grade release

Weighting

40%

Minimum mark or grade

50% of the practical report marks

Assessment Criteria

- Students must include a technical description of the activity and associated procedures in their report.
- The report must include calculations and discussion on the collected data and results.
- The report must be short and precise to point out calculations/results/graphs and discussion.

Each report will be assessed separately for the criterion accuracy and correct procedure as required in the Instruction.

- Correct application of mathematics and arithmetic
- Results clearly identified and explained
- Correct results/explanation

In addition, the report as a whole will be assessed against the following criteria:

Evidence of correct procedures

- All necessary steps in experiment and reporting are followed in the correct order
- Clear presentation of results obtained
- Evidence of checking results (mathematical, graphical, logic-common sense)

Evidence of the understanding of the topic

- Explanation of possible error in the experiment
- Interpretation of results

Professional presentation

- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results

Please note that the practical assessment is a team activity. Still, the practical report is **an individual submission**, and each student should do their own analysis and explanations based on the activity they have carried out.

A similarity check will be always done before marking the submitted assignments for all reports. Upon detection of any plagiarism including i) similarity between submitted reports within the same cohort or ii) with the previous cohorts or iii) submitted works to other institutes or iv) using the material provided by cheating websites will result in failing that assignment without marking and the student will be reported to the CQU Academic Misconduct team for further actions.

Referencing Style

- [Harvard \(author-date\)](#)

Submission

Online

Submission Instructions

See Moodle for more detail and description.

Learning Outcomes Assessed

- Recognise and discuss basic concepts and principles of Engineering Surveying
- Carry out basic surveying and mapping activities such as measurement of ground elevation, angle and distance measurements and detailed surveying using appropriate surveying equipment
- Select and apply appropriate computing techniques to analyse and process surveying field measurement data
- Apply surveying principles in civil and mining engineering works such as setting-out, earth work calculations and underground surveying
- Demonstrate a professional level of communication and teamwork.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

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