



ENAR13001 *Economic Geology*

Term 1 - 2022

Profile information current as at 18/04/2024 09:57 am

All details in this unit profile for ENAR13001 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 is an introduction to geological resources: metals, non-metals, coal, oil and gas, and construction materials. It prepares you to assess and effectively communicate the geological setting, quality and grade of geological resources. The unit balances this with consideration of infrastructure and methods of accessing and extracting the geological resources in a socially, culturally and environmentally responsible manner. You will work individually and collaboratively to consider resource geology issues. You will investigate resource geology in a defined context and carry out standard sampling strategies and apply techniques for locating resources, grade control and resource estimation by undertaking sustainable practices.

Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Prerequisite: ENAR12016 Earth Science OR PHYG12003 Geological Science

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

- 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. **Written Assessment**

Weighting: 25%

2. **Practical Assessment**

Weighting: 25%

3. **Presentation**

Weighting: 20%

4. **Report**

Weighting: 30%

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](#).

Unit Learning Outcomes

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

1. Critically discuss Australia's energy resources, metallic and non-metallic minerals and their role in the economy
2. Characterise the major energy resources, metallic and non-metallic minerals, and their formation processes
3. Create prospecting and exploration plans to identify energy resources and mineral deposits
4. Evaluate and quantify mineral reserves
5. Reflect upon Indigenous cultures and sustainable mining exploration practices
6. Demonstrate effective and professional level 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:

Intermediate 1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1I 2N 3I 4I 5I) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1I 2I 3I 4I 5I) 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1I 3I 4I 5I 6I) 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 3I 4I 5I 6I) 2.2 Fluent application of engineering techniques, tools and resources. (LO: 2I 3I 4I 6I) 2.3 Application of systematic engineering synthesis and design processes. (LO: 1I 2N 3N 4I 5I 6I) 2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 2N 3I 4I 5I 6I) 3.2 Effective oral and written communication in professional and lay domains. (LO: 1I 2I 3I 4I 5I 6I) 3.3 Creative, innovative and proactive demeanour. (LO: 1I 2I 3I 4I 5I 6I) 3.6 Effective team membership and team leadership. (LO: 1I 2N 3I 4I 5I 6I)

Advanced 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1N 3I 4I 5A 6A) 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 2I 3A 4I 5I 6I) 3.1 Ethical conduct and professional accountability. (LO: 2N 3I 4I 5A 6A) 3.4 Professional use and management of information. (LO: 1A 2I 3A 4N 5A 6A) 3.5 Orderly management of self, and professional conduct. (LO: 1I 2I 3I 4I 5A 6A)

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



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	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						

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Practical Assessment - 25%	•	•		•						
2 - Written Assessment - 25%	•			•		•	•	•		
3 - Presentation - 20%	•	•		•	•	•	•	•		
4 - Report - 30%	•		•	•			•	•		

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)
- Zoom (both microphone and webcam capability)

Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)
For further information, see the Assessment Tasks.

Teaching Contacts

Andrew Hammond Unit Coordinator
a.hammond@cqu.edu.au

Schedule

Week 1 - 07 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Mining Cycle and Economic Geology Economic Minerals & Energy	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 2 - 14 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Ores and Geological Settings - 1	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 3 - 21 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Ores and Geological Settings - 2	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 4 - 28 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Prospecting & Exploration Socio-environmental, community and indigenous engagement during the exploration phase. Australian Mining Legislation	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 5 - 04 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Prospecting & Exploration - 1	Readings provided in Moodle.	Weekly Zoom Tutorial

Vacation Week - Non Teaching Week - 11 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 18 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Prospecting & Exploration - 2	Readings provided in Moodle.	Weekly Zoom Tutorial Written Assessment Due: Week 6 Friday (22 Apr 2022) 11:59 pm AEST

Week 7 - 25 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Geological Sampling - 1	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 8 - 02 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Geological Sampling - 2	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 9 - 09 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Geological Sampling & Grade Control	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 10 - 16 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Geological Modelling	Readings provided in Moodle.	Weekly Zoom Tutorial Practical Due: Week 10 Friday (20 May 2022) 11:59 pm AEST

Week 11 - 23 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Resource Estimation JORC and VALMIN Codes in the Resource Industry	Readings provided in Moodle.	Weekly Zoom Tutorial

Week 12 - 30 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Unit Summary and Review	Readings provided in Moodle.	Weekly Zoom Tutorial Presentation - Group Work Due: Week 12 Friday (3 June 2022) 11:59 pm AEST

Review/Exam Week - 06 Jun 2022

Module/Topic	Chapter	Events and Submissions/Topic
		Field Trip Report Due: Review/Exam Week Friday (10 June 2022) 11:59 pm AEST

Exam Week - 13 Jun 2022

Module/Topic	Chapter	Events and Submissions/Topic
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Assessment Tasks

1 Written Assessment

Assessment Type

Written Assessment

Task Description

The first assignment will test your newly gained knowledge and skills in:

- Australia's natural resources
- Economic Geology
- Prospecting and exploration legislation in Australian mining
- Working with indigenous communities and
- Operating in sensitive ecological environments

Your assignment must include a cover page showing the unit code and name, student name and number, assignment number, lecturer assessing the task and university. An interesting cover picture related to the assignment work would enhance your work. State each assignment question clearly at the beginning of each answer to give your answers context.

For descriptive answers, ensure photographs, figures, diagrams and tables are correctly labelled and introduced within the context of the answer. Use suitable geological and mining terminology when required and in its correct context. Ensure research is from reliable sources such as peer reviewed journal articles, government web sites and textbooks. Cite all references using the CQUniversity Harvard referencing style guide. Include a list of references at the end of the assignment.

Assessment Due Date

Week 6 Friday (22 Apr 2022) 11:59 pm AEST

Submit electronically via Moodle with your name, unit code and assignment number i.e. NAME_ENAR13001_Assignment Name

Return Date to Students

Assignments will be returned within a fortnight once all have been submitted for assessment

Weighting

25%

Minimum mark or grade

To Pass this unit you must submit all assessment items (assignments) and obtain a minimum mark of 40% for any single assessment item (assignment) and must obtain an overall grade of 50% or more on all assessment items (assignments).

Assessment Criteria

Criteria that will be assessed for this assessment task will include:

- Critical Thinking
- Evidence to research appropriate material from the literature, besides supplied reference material
- Ability to organize and structure work into a legible, professional looking document
- Effective written communication skills i.e. are clear, coherent and succinct that demonstrate an understanding of technical content
- Effective use of tables and figures, where deemed appropriate
- Well annotated and referenced maps, tables and figures
- Adequate review of peer-reviewed and published work
- Appropriate use of CQUniversity's Harvard Referencing system to correctly cite all sources of externally acquired material in-text and provide a consistent style for the assignment's reference list.

An assessment rubric is available in the unit's Moodle site along with technical exemplars. Weekly Zoom tutorials and forums will provide further assessment support

Referencing Style

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

Submission

No submission method provided.

Submission Instructions

Please use the upload link in Moodle for online electronic assignment submission as a MICROSOFT WORD or PDF document. It is expected that you will adopt the file-naming protocol indicated on the Moodle site and for it to be followed as indicated. It is important that you do this as your individual file is one of many and replicating the correct file-naming protocol reduces the chances of omissions, losses and errors.

Learning Outcomes Assessed

- Create prospecting and exploration plans to identify energy resources and mineral deposits
- Evaluate and quantify mineral reserves
- Reflect upon Indigenous cultures and sustainable mining exploration practices

Graduate Attributes

- Communication
- Information Literacy
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

2 Practical

Assessment Type

Practical Assessment

Task Description

During your Residential School you will undertake a variety of assessable tasks that include:

- Exercises in the identification and description of some major ore minerals
- Exercises in economic geology in the interpretation of geological maps, geophysical and geochemical data
- Utilizing some of the geological tools and software in economic geology
- Exercises in core logging and evaluation.

Some changes to tasks may need to be made on the day/s of the Residential School due to conditions beyond our control e.g. access to mine site/s where exercises are to be undertaken and use of equipment and resources from external parties.

Assessment Due Date

Week 10 Friday (20 May 2022) 11:59 pm AEST

Submit electronically via Moodle with your name, unit code and assignment number i.e. NAME_ENAR13001_Assignment Name

Return Date to Students

Assignments will be returned within a fortnight once all have been submitted for assessment

Weighting

25%

Minimum mark or grade

To Pass this unit you must submit all assessment items (assignments) and obtain a minimum mark of 40% for any single assessment item (assignment) and must obtain an overall grade of 50% or more on all assessment items (assignments).

Assessment Criteria

You will be assessed on your ability to:

- Identify common ore minerals
- Conduct prospecting and exploration programs
- Effectively utilize a range of geological equipment and software used in Exploration and Economic Geology
- Analyze drill cores, input drill core data into geodatabases
- Interpret geological databases (digital maps, geochemical and geophysical).

Further details and training will be provided during the weekly Zoom Tutorials, in Moodle Forums and whilst attending the Residential School.

Referencing Style

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

Submission

Online

Submission Instructions

Please use the upload link in Moodle for online electronic assignment submission as a MICROSOFT WORD or PDF document. It is expected that you will adopt the file-naming protocol indicated on the Moodle site and for it to be followed as indicated. It is important that you do this as your individual file is one of many and replicating the correct file-naming protocol reduces the chances of omissions, losses and errors.

Learning Outcomes Assessed

- Critically discuss Australia's energy resources, metallic and non-metallic minerals and their role in the economy
- Characterise the major energy resources, metallic and non-metallic minerals, and their formation processes

Graduate Attributes

- Communication
- Problem Solving
- Information Literacy

3 Presentation - Group Work

Assessment Type

Presentation

Task Description

Your exploration team (Group Work) has been asked to prepare a program for finding a Greenfield Prospect and to geologically evaluate the deposit. You can choose any (one only) of the bulk mineral commodities, base metals, gems, precious metals, specialty metals, industrial minerals, industrial rocks or energy commodities as your focus.

The presentation (Group Work) should include:

1. a description of the geological setting/s
2. the type of background information you will need to acquire
3. a knowledge of environmental and cultural issues and constraints. Show how you would work towards obtaining culturally and environmentally sensitive outcomes
4. the geophysical method/s you will apply and the geochemical survey/s you will undertake.
5. the type of samples you would take and your QA/QC for the sampling
6. the type of geological model you have developed for the commodity being evaluated.

Class members will be assigned to groups during the first two weeks of undertaking this unit in Term 1. As group members you need to be able to allocate tasks within your group, to share/pool information and for the group to submit a cohesive, professional presentation to your peers. Decide amongst your group an equitable division of project tasks. It is recommended that you start to gather the preparatory information and communicate this to fellow group members at an early stage during the term via Zoom, Skype, group forums and email.

This assessment item will take the form of a Presentation. You will be required to present a live PowerPoint presentation to your client (your lecturer and other unit participants) via a Zoom session during week 12. The presentation will be ½ hour duration with 10 minutes of question time allocated. The mark awarded (for the group), besides being based on factual content and presentation skills, will also include how well you verbally answered the questions posed by the client and other participants. Note, you are required to submit your PowerPoint file to your lecturer A DAY PRIOR to your group's presentation.

Further support and information to assist you will be provided during the weekly Zoom tutorial sessions.

Assessment Due Date

Week 12 Friday (3 June 2022) 11:59 pm AEST

Submit electronically via Moodle with your name, unit code and assignment number i.e. NAME_ENAR13001_Assignment Name

Return Date to Students

Assignments will be returned within a fortnight once all have been submitted for assessment

Weighting

20%

Minimum mark or grade

To Pass this unit you must submit all assessment items (assignments) and obtain a minimum mark of 40% for any single assessment item (assignment) and must obtain an overall grade of 50% or more on all assessment items (assignments).

Assessment Criteria

The assessment criteria for each group's presentation will be based on:

- Presentation and layout i.e. the general appearance and style of the PowerPoint presentation to provide a professional talk.
- Effective written and oral communication skills i.e. are clear, coherent and succinct that demonstrate an understanding of content
- Content. This includes the accuracy and relevance of answers, application of knowledge, language and grammar used in answering questions
- Evidence of sourcing and referencing relevant, peer reviewed material beyond that provided in the lecture material

Further support and information to assist you will be provided during the weekly Zoom tutorial sessions.

Referencing Style

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

Submission

Online Group

Submission Instructions

Please use the upload link in Moodle for online electronic assignment submission as a MICROSOFT WORD or PDF document. It is expected that you will adopt the file-naming protocol indicated on the Moodle site and for it to be followed as indicated. It is important that you do this as your individual file is one of many and replicating the correct file-naming protocol reduces the chances of omissions, losses and errors.

Learning Outcomes Assessed

- Critically discuss Australia's energy resources, metallic and non-metallic minerals and their role in the economy
- Reflect upon Indigenous cultures and sustainable mining exploration practices
- Demonstrate effective and professional level communication and teamwork.

Graduate Attributes

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

4 Field Trip Report

Assessment Type

Report

Task Description

During the Residential School you will visit a mine site/s that includes a mine tour and being shown the tasks that geological professionals undertake onsite. Whilst on this tour you will make comprehensive notes of the topics presented by mine site professionals. An individual geological report needs to be submitted that summarizes the activities you were shown. Your report also needs to include:

- A brief history and overview of the mine
- The geological setting and style of mineralization
- Descriptions of the major rock types present (lithologies), the stratigraphy and the minerals mined
- The geological techniques used in economic geology to explore, locate and sample minerals for later mining at the mine.
- The Grade and Value of the ore
- Quantification of current mineral reserves
- Details about sustainable mineral exploration practices and
- Details of engagement with local indigenous communities during the exploration and mining phases.

Further support and information to assist you will be provided during the Residential School by the mine site professionals. These will be discussed further during weekly Zoom tutorial sessions and in Moodle Forums.

Assessment Due Date

Review/Exam Week Friday (10 June 2022) 11:59 pm AEST

Submit electronically via Moodle with your name, unit code and assignment number i.e. NAME_ENAR13001_Assignment Name

Return Date to Students

Assignments will be returned within a fortnight once all have been submitted for assessment

Weighting

30%

Minimum mark or grade

To Pass this unit you must submit all assessment items (assignments) and obtain a minimum mark of 40% for any single assessment item (assignment) and must obtain an overall grade of 50% or more on all assessment items (assignments).

Assessment Criteria

Criteria that will be assessed for this task will include:

- Critical Thinking
- Evidence to research appropriate material from the literature, besides supplied reference material
- Ability to organize and structure work into a legible, professional looking document
- Effective written communication skills i.e. are clear, coherent and succinct that demonstrate an understanding of technical content
- Effective use of tables and figures, where deemed appropriate
- Well annotated and referenced maps, tables and figures
- Adequate review of peer-reviewed and published work, annual reports, company web site etc.
- Appropriate use of CQUniversity's Harvard Referencing system to correctly cite all sources of externally acquired material in-text and provide a consistent style for the assignment's reference list.

An assessment rubric is available in the unit's Moodle site. Weekly Zoom tutorials and forums will provide further assessment support

Some changes to tasks may need to be made on the day/s of the Residential School due to conditions beyond our control e.g. access to mine site/s and operational areas.

Referencing Style

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

Submission

Online

Submission Instructions

Please use the upload link in Moodle for online electronic assignment submission as a MICROSOFT WORD or PDF document. It is expected that you will adopt the file-naming protocol indicated on the Moodle site and for it to be followed as indicated. It is important that you do this as your individual file is one of many and replicating the correct file-naming protocol reduces the chances of omissions, losses and errors.

Learning Outcomes Assessed

- Reflect upon Indigenous cultures and sustainable mining exploration practices
- Demonstrate effective and professional level communication and teamwork.

Graduate Attributes

- Communication
- Critical Thinking
- Information Literacy
- 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