



ENEM12008 *Solid Materials Handling*

Term 1 - 2020

Profile information current as at 03/05/2024 09:57 pm

All details in this unit profile for ENEM12008 have been officially approved by CQUUniversity 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.

Corrections

Unit Profile Correction added on 24-04-20

The on-campus lab sessions and residential school are cancelled in this term due to COVID 19 restrictions. Students will be asked to watch the recorded videos on the experiments to understand the procedure of conducting the experiments and complete the analysis and discussion based on the observations and findings from the analysis.

General Information

Overview

In this unit, you will develop skills required to analyse the operation and maintenance of solid material handling equipment. The characteristics of solid materials and their impact on storage and conveying systems including requirements for the effective operation of conveyors will be explored. You will design hoppers, identify dust extraction systems, explain the applications of various feeders used in industry and apply the principles of mine product handling systems to a given mine situation. You will be required to work autonomously to produce clear, professional documentation of the approach taken in description and analysis of solid materials handling equipment.

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

PHYS11184 Engineering Physics A OR ENAG11005 Mechanics OR ENEG11006 Engineering Statics and MATH11218 Eng Foundation 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 - 2020

- 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).

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. **Written Assessment**

Weighting: 25%

3. **Written Assessment**

Weighting: 25%

4. **Practical and Written Assessment**

Weighting: 25%

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 Feedback

Feedback

Students found the site visit really useful to relate the theoretical aspects of the unit with authentic application.

Recommendation

The site visit will be organised in future offerings as well to ensure that students receive good exposure to the authentic application of the subject matter.

Feedback from Moodle Feedback

Feedback

More consistent information needed to prepare the lab reports.

Recommendation

A report template will be provided to maintain consistency in the lab report requirements.

Unit Learning Outcomes

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

1. Characterise the properties of bulk materials and explain their impact on the design of storage and conveying systems.
2. Design hoppers for mass and funnel flow and wall loading
3. Explain the application for the various feeders used in industry and select appropriate bin/feeder arrangements
4. Design and select belt conveyor
5. Identify Dust Extraction systems and treatment of dust
6. Apply the principles of mine product handling systems to a given mine situation
7. Work autonomously to solve problems and record and communicate clearly and professionally the approach used to solve each and the reasons for adopting such approaches to the problem

This unit assists students to develop the Engineers Australia Stage 1 Competencies for Professional Engineers and Engineering Technologists

Knowledge and Skills Base: Learning Outcomes 1, 2, 3, 4, 5 and 6 assist development of Elements

Engineering Application Ability: Learning Outcomes 3, and 6 assist development of Elements 2.1 and 2.2

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	7
1 - Written Assessment - 25%	•	•					•
2 - Written Assessment - 25%			•	•	•		•
3 - Written Assessment - 25%					•	•	•

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
4 - Practical and Written Assessment - 25%							•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes						
	1	2	3	4	5	6	7
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 - Written Assessment - 25%		•	•	•	•	•				
2 - Written Assessment - 25%	•	•	•	•	•	•				
3 - Written Assessment - 25%	•		•	•		•		•		
4 - Practical and Written Assessment - 25%	•	•	•					•		

Textbooks and Resources

Textbooks

ENEM12008

Prescribed

Bulk Solids Handling : An Introduction to the Practice and Technology

(2013)

Authors: C R Woodcock and J S Mason

Springer Verlag

New York , NY , USA

ISBN: 0 7514 0295 8 (HB) 0412 01251 0 (USA)

Binding: Hardcover

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

Ashfaque Chowdhury Unit Coordinator

a.chowdhury@cqu.edu.au

Schedule

Week 1 - 09 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Principles of Materials Handling Physics of Bulk Solids -Bulk Characteristics	1 & Resource Material	<ul style="list-style-type: none">• Weekly lecture and tutorial for on-campus students• Weekly recorded lecture and virtual meeting for distance students

Week 2 - 16 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Gravity Flow of Bulk Solids	2 & Resource Material	<ul style="list-style-type: none">• Weekly lecture and tutorial for on-campus students• Weekly recorded lecture and virtual meeting for distance students

Week 3 - 23 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Dynamics of Fluids & Solid Systems	3 & Resource Material	<ul style="list-style-type: none">• Weekly lecture and tutorial for on-campus students• Weekly recorded lecture and virtual meeting for distance students

Week 4 - 30 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Design of Storage Bins & Hoppers	4 & Resource Material	<ul style="list-style-type: none"> • Weekly lecture and tutorial for on-campus students • Weekly recorded lecture and virtual meeting for distance students
Week 5 - 06 Apr 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Bulk Transport - Conveyor Technology	7, 9 & Resource Material	<ul style="list-style-type: none"> • Weekly lecture and tutorial for on-campus students • Weekly recorded lecture and virtual meeting for distance students • Residential School for Distance Students at Rockhampton Campus • Industry visit
Vacation Week - 13 Apr 2020		
Module/Topic	Chapter	Events and Submissions/Topic
		Assignment One Due: Vacation Week Wednesday (15 Apr 2020) 11:45 pm AEST
Week 6 - 20 Apr 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Conveyor Technology (continued) Belt Conveyors & Bucket Elevators	7, 8 & Resource Material	<ul style="list-style-type: none"> • Weekly lecture and tutorial for on-campus students • Weekly recorded lecture and virtual meeting for distance students
Week 7 - 27 Apr 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Conveyor Technology (continued) Chain Conveyors & Flight Conveyors	9 & Resource Material	<ul style="list-style-type: none"> • Weekly lecture and tutorial for on-campus students • Weekly recorded lecture and virtual meeting for distance students
Week 8 - 04 May 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Conveyor Technology (continued) Screw Conveyors & Vibrating Conveyors	10, 11 & Resource Material	<ul style="list-style-type: none"> • Weekly lecture and tutorial for on-campus students • Weekly recorded lecture and virtual meeting for distance students
Week 9 - 11 May 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Pneumatic Conveying	12, 13, 14 & Resource Material	<ul style="list-style-type: none"> • Weekly lecture and tutorial for on-campus students • Weekly recorded lecture and virtual meeting for distance students <p>Assignment Two Due: Week 9 Wednesday (13 May 2020) 11:45 pm AEST</p>
Week 10 - 18 May 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Hydraulic Conveying	16,17 & Resource Material	<ul style="list-style-type: none"> • Weekly lecture and tutorial for on-campus students • Weekly recorded lecture and virtual meeting for distance students
Week 11 - 25 May 2020		
Module/Topic	Chapter	Events and Submissions/Topic

Explosion Hazards
Storage & Segregation of Bulk

5 & Resource Material

- Weekly lecture and tutorial for on-campus students
- Weekly recorded lecture and virtual meeting for distance students

Week 12 - 01 Jun 2020

Module/Topic

Chapter

Events and Submissions/Topic

Safety in Material Handling
Dust Hazard & Dust Control
Unit Review

5 & Resource Material

- Weekly lecture and tutorial for on-campus students
- Weekly recorded lecture and virtual meeting for distance students

Review/Exam Week - 08 Jun 2020

Module/Topic

Chapter

Events and Submissions/Topic

Assignment Three Due:
Review/Exam Week Tuesday (9 June 2020) 11:45 pm AEST

Exam Week - 15 Jun 2020

Module/Topic

Chapter

Events and Submissions/Topic

Laboratory Report Due: Exam Week
Tuesday (16 June 2020) 11:45 pm AEST

Assessment Tasks

1 Assignment One

Assessment Type

Written Assessment

Task Description

In this written assignment, students will get an opportunity to demonstrate their knowledge in gross sampling, particle size distribution and hardness, cohesion and adhesion, the angle of repose, arching phenomena of material, gas and solids flow. The assignment tasks will be uploaded to the course website (Moodle).

Assignments submission:

Online submission is the only submission mode for all assignments in this course. To submit electronically, the assignment must be saved in PDF format and the files must not be password protected. You are not permitted to submit any hard copies of your assignments.

General rules:

- Non-PDF files will not be accepted.
- Access to the uploading link closes at the scheduled submission time. No submissions will be accepted after the due date and hour unless a student is granted an extension by the Course Coordinator prior to the date of the submission.
- Submission link will be activated in due time by the lecturer.

Assessment Due Date

Vacation Week Wednesday (15 Apr 2020) 11:45 pm AEST

Return Date to Students

Week 8 Wednesday (6 May 2020)

Weighting

25%

Minimum mark or grade

You must get a minimum 40% on this assessment item to secure a Pass in this unit

Assessment Criteria

Assessment criteria for all students

1. Content (40%) - includes the application of subject knowledge, accuracy and relevance of answers, correct use of terminology, units and conventions, language and grammar used in answering the questions.

2. Evidence of understanding and engineering competence (40%) - include an appropriate understanding of the theory / concept and overall demonstration of extensive subject knowledge gathered from literature sources other than the lecture notes and the recommended textbook.
3. Professional presentation (20%) - includes a logical layout of the answer / analysis, appropriate use of the diagram, referencing style, the general appearance of the document or assignment, attention to document detail and quality to provide an easily legible document.

Note:

1. Students should not reproduce their responses to question directly from the Lecture Slides or the Study Guide. All responses must be written in your own words.
2. Marks are deducted for poorly organised/explained solutions / answers.

Referencing Style

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

Submission

Online

Submission Instructions

Original copies must be converted to pdf documents. No photocopies / scanned version permitted.

Learning Outcomes Assessed

- Characterise the properties of bulk materials and explain their impact on the design of storage and conveying systems.
- Design hoppers for mass and funnel flow and wall loading
- Work autonomously to solve problems and record and communicate clearly and professionally the approach used to solve each and the reasons for adopting such approaches to the problem

Graduate Attributes

- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence

2 Assignment Two

Assessment Type

Written Assessment

Task Description

In this written assessment, students will get an opportunity to demonstrate their knowledge in conveyor technology and bulk handling and require to solve several related engineering problems. The assignment tasks will be uploaded to the course website (Moodle).

Assignments submission:

On-line submission is the only submission mode for all assignments in this course. To submit electronically, the assignment must be saved in PDF format and the files must not be password protected. You are not permitted to submit any hard copies of your assignments.

General rules:

- Non-PDF files will not be accepted.
- Access to the uploading link closes at the scheduled submission time. No submissions will be accepted after the due date and hour unless a student is granted an extension by the Course Coordinator prior to the date of the submission.
- Submission link will be activated in due time by the lecturer.

Assessment Due Date

Week 9 Wednesday (13 May 2020) 11:45 pm AEST

Return Date to Students

Week 11 Wednesday (27 May 2020)

It is expected that assessment item will be returned in 2 weeks from the due date.

Weighting

25%

Minimum mark or grade

You must get a minimum 40% on this assessment item to secure a Pass in this unit.

Assessment Criteria

Assessment criteria for all students

1. Content (40%) - includes the application of subject knowledge, accuracy and relevance of answers, correct use of terminology, units and conventions, language and grammar used in answering the questions.
2. Evidence of understanding and engineering competence (40%) - include an appropriate understanding of the theory / concept and overall demonstration of extensive subject knowledge gathered from literature sources other than the lecture notes and the recommended textbook.
3. Professional presentation (20%) - includes a logical layout of the answer / analysis, appropriate use of the diagram, referencing style, the general appearance of the document or assignment, attention to document detail and quality to provide an easily legible document.

Note:

1. Students should not reproduce their responses to question directly from the Lecture Slides or the Study Guide. All responses must be written in your own words.
2. Marks are deducted for poorly organised/explained solutions / answers.

Referencing Style

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

Submission

Online

Submission Instructions

Original documents must be converted to pdf documents. No photocopies / scanned documents permitted.

Learning Outcomes Assessed

- Explain the application for the various feeders used in industry and select appropriate bin/feeder arrangements
- Design and select belt conveyor
- Identify Dust Extraction systems and treatment of dust
- Work autonomously to solve problems and record and communicate clearly and professionally the approach used to solve each and the reasons for adopting such approaches to the problem

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence

3 Assignment Three

Assessment Type

Written Assessment

Task Description

TIn this written assessment, students must demonstrate their knowledge in knowledge in bulk transportation, storage as well as safety in material handling and require to solve several related engineering problems. The assignment tasks will be uploaded to the course website (Moodle).

Assignments submission:

On-line submission is the only submission mode for all assignments in this course. To submit electronically, the assignment must be saved in PDF format and the files must not be password protected. You are not permitted to submit any hard copies of your assignments.

General rules:

- Non-PDF files will not be accepted.
- Access to the uploading link closes at the scheduled submission time. No submissions will be accepted after the due date and hour unless a student is granted an extension by the Course Coordinator prior to the date of the

submission.

- Submission link will be activated in due time by the lecturer.

Assessment Due Date

Review/Exam Week Tuesday (9 June 2020) 11:45 pm AEST

Return Date to Students

It is expected that assessment item will be returned in 2 weeks from the due date.

Weighting

25%

Minimum mark or grade

You must get a minimum 40% on this assessment item to secure a Pass in this unit

Assessment Criteria

Assessment criteria for all students

1. Content (40%) - includes the application of subject knowledge, accuracy and relevance of answers, correct use of terminology, units and conventions, language and grammar used in answering the questions.
2. Evidence of understanding and engineering competence (40%) - include an appropriate understanding of the theory / concept and overall demonstration of extensive subject knowledge gathered from literature sources other than the lecture notes and the recommended textbook.
3. Professional presentation (20%) - includes a logical layout of the answer / analysis, appropriate use of the diagram, referencing style, the general appearance of the document or assignment, attention to document detail and quality to provide an easily legible document.

Note:

1. Students should not reproduce their responses to question directly from the Lecture Slides or the Study Guide. All responses must be written in your own words.
2. Marks are deducted for poorly organised/explained solutions / answers.

Referencing Style

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

Submission

Online

Submission Instructions

Original documents must be converted to pdf documents. No photocopies / scanned documents permitted.

Learning Outcomes Assessed

- Identify Dust Extraction systems and treatment of dust
- Apply the principles of mine product handling systems to a given mine situation
- Work autonomously to solve problems and record and communicate clearly and professionally the approach used to solve each and the reasons for adopting such approaches to the problem

Graduate Attributes

- Communication
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Ethical practice

4 Laboratory Report

Assessment Type

Practical and Written Assessment

Task Description

Each student will be required to complete the laboratory exercises as per the instruction sheets which will be available on the course website. Attendance in the laboratory sessions / residential school is compulsory and each session will be up to 2 hours in duration. The timetable of laboratories will be supplied separately via Moodle. Students are expected to complete the entire laboratory exercise including the drawing of graphs and calculating the final answer in the lab. All

raw data must be entered in the notebook immediately and checked by the laboratory instructor.

At laboratory session: Arrive early; communicate with other members of the team and be ready for the laboratory experiment.

Ensure to bring:

- Laboratory instruction sheets;
- Notebook;
- Ruler (30 cm clear plastic);
- Pen & pencil;
- Scientific calculator;

Laboratory submission cover sheet:

Softcopy (electronic) submissions must be compiled into one single pdf file and submitted through the course website (Moodle). The first page of the assessment item must show the following information: Team members name, Student numbers, Team No, Year, Term, Course Code and Name of the experiment.

Statement on Safety:

According to the Workplace Health and Safety Act 2011, it is a legal requirement that all persons at a workplace must not act in a manner that endangers the health or safety of any person at that workplace. As a student, your University is your workplace. When attending laboratories, workshops and field activities, fully enclosed footwear covering the whole foot must be worn at all times. Other personal protective equipment must be worn when required, or as directed by the lecturer or technical officer-in-charge. All requirements of the School of Engineering and Technology Workplace Clothing Policy must also be observed. In the laboratory, clothing must fully cover the torso, and has at least a short sleeve (i.e. No singlets). Failure to comply with any of the above health and safety requirements may result in your exclusion from laboratory, workshop or activities - most of which are compulsory.

Assessment Due Date

Exam Week Tuesday (16 June 2020) 11:45 pm AEST

Return Date to Students

It is expected that assessment item will be returned in 2 weeks from the due date.

Weighting

25%

Minimum mark or grade

You must get a minimum 40% on this assessment item to secure a Pass in this unit

Assessment Criteria

Assessment criteria for all students

1. Content (40%) - includes accuracy of the calculation, relevance of answers, data collection and analysis, graphing, application of knowledge, correct use of terminology, units and conventions, language and grammar used in answering the questions.
2. Evidence of understanding and engineering competence (40%) - include an appropriate understanding of the theory / concepts and overall demonstration of extensive knowledge in interpreting the experimental results and drawing appropriate inferences and conclusions.
3. Professional presentation (20%) - includes a logical layout of analysis/answer, appropriate use of the diagram, referencing style, the general appearance of the document or assignment, attention to document detail and quality to provide an easily legible document.

Referencing Style

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

Submission

Online Group

Submission Instructions

Each group will submit only one pdf document of all the laboratory exercises. Original documents converted to pdf only. No photocopies permitted.

Learning Outcomes Assessed

- Work autonomously to solve problems and record and communicate clearly and professionally the approach used to solve each and the reasons for adopting such approaches to the problem

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- 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