



ENEG11008 *Materials for Engineers*

Term 2 - 2017

Profile information current as at 14/12/2025 08:14 pm

All details in this unit profile for ENEG11008 have been officially approved by CQU University 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

ENEG11008 - Materials for Engineers introduces you to the essential knowledge of materials science and the ways in which engineers understand, select and use materials and processes for engineering applications. In this unit you will gain knowledge of specific materials, their microstructure and its effect on the material properties. You will learn how to identify and explain the properties of engineering materials and processes and how to classify these materials. You will also learn how to select engineering materials and processes for a given application, as well as conduct material tests and report on their results. Throughout this unit you will develop team-work, research and communication skills. Students enrolled in distance mode are required to attend a compulsory residential school.

Details

Career Level: *Undergraduate*

Unit Level: *Level 1*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

There are no requisites for this unit.

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 - 2017

- Bundaberg
- Cairns
- Distance
- Gladstone
- Mackay
- 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. **Practical and Written Assessment**

Weighting: 15%

2. **Written Assessment**

Weighting: 15%

3. **Practical and Written Assessment**

Weighting: 10%

4. **Online Test**

Weighting: 20%

5. **Examination**

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 Through Moodle Site

Feedback

Provide more solved examples in the lectures so that the concepts will be better understood.

Recommendation

More examples will be discussed in the lectures as well as the tutorials to reinforce learning.

Feedback from Through Moodle Site

Feedback

No local academic staff on some regional campuses

Recommendation

It will be ensured that all regional campuses will have a local staff member who will assist the students with various queries and tutorial support on a weekly basis.

Feedback from Through Moodle Site

Feedback

Assessments need to be scheduled in such a way to give students time to reflect on their work and that the submission dates do not clash with other units' assessments.

Recommendation

The submission dates for the assessments had to be revised to accommodate the clashes that some of the transition students faced in this year. Since most of the assessments were group submissions, this created problems for some groups which had a combination of fresh and transition students. This issue will not repeat in the next offering since there will be no more transitioning students in the program. The unit coordinator will however work closely with other disciplines and timetable the submission of assessments to ensure this issue is mitigated.

Feedback from Through Moodle Site

Feedback

Feedback on assessment items not provided in reasonable time frame.

Recommendation

It will be ensured that the submission dates will be scheduled adequately so that timely feedback will be provided to students.

Unit Learning Outcomes

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

1. Identify and explain the properties and processing techniques of engineering materials to classify them
2. Describe how the physical mechanisms that dictate material properties are affected by the internal-structure of materials
3. Explain how processing methods can be used to optimise the structure of materials for the desired material properties
4. Work both individually and collaboratively in a team to produce quality outputs
5. Conduct material tests in accordance with international standards and prepare the corresponding reports
6. Research and apply engineering standards, practices and material optimisation and constraints.

Learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities. You can find the mapping for this on the [Engineering Undergraduate Course website](#).

Alignment of Learning Outcomes, Assessment and Graduate Attributes

Alignment of Assessment Tasks to Learning Outcomes

Alignment of Graduate Attributes to Learning Outcomes

Alignment of Assessment Tasks to Graduate Attributes

[illegible]

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
3 - Practical and Written Assessment - 10%	•	•	•	•	•	•				
4 - Online Test - 20%		•	•			•				
5 - Examination - 40%	•	•	•	•						

Textbooks and Resources

Textbooks

ENEG11008

Prescribed

Materials Science and Engineering

Edition: 9th ed. (2013)

Authors: William D. Callister, Jr. and David G. Rethwisch

John Wiley & Sons Inc.

US

ISBN: 9781118324578

Binding: Hardcover

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Supplementary

Engineering Materials 1

Edition: 4th (2012)

Authors: Michael F. Ashby and D.R.H. Jones

Elsevier

US

ISBN: 9780080966656

Binding: Paperback

[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

Jay Sul Unit Coordinator

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Schedule

Week 1 - 10 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Introduction to the unit and information session • Introduction to materials science and engineering • Materials classification and their characteristics 	<ul style="list-style-type: none"> • Chapter 1: 1.2 - 1.6 • Chapter 22: 22.1 - 22.5 • Lecture note 	<ul style="list-style-type: none"> • Group selection for laboratory work and group assignment

Week 2 - 17 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Microstructural aspects of engineering materials: bonding • Microstructural aspects of engineering materials: crystal structures 	<ul style="list-style-type: none"> • Chapter 2: 2.2 - 2.10 • Chapter 3: 3.2 - 3.7, 3.13 - 3.16 • Lecture note 	<ul style="list-style-type: none"> • Group selection for laboratory work and group assignment due

Week 3 - 24 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Mechanical properties of materials • Thermal properties of materials • International standards for material testing 	<ul style="list-style-type: none"> • Chapter 6: 6.2 - 6.12 • Chapter 19: 19.2 - 19.5 • Lecture note 	<ul style="list-style-type: none"> • Lab #1 for on-campus students • Online test #1 <p>Online Test Due: Week 3 Friday (28 July 2017) 11:45 pm AEST</p>

Week 4 - 31 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Principles of material selection and material selection process • Introduction to CES/EduPack • Examples and case studies 	<ul style="list-style-type: none"> • Unit Moodle page and lecture note 	<ul style="list-style-type: none"> • Residential school for distance students

Week 5 - 07 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Microstructural aspects of engineering materials: Imperfection in solids • Microstructural aspects of engineering materials: Diffusion in solids 	<ul style="list-style-type: none"> • Chapter 4: 4.2 - 4.7 • Chapter 5: 5.2 - 5.6 • Lecture note 	<ul style="list-style-type: none"> • Lab #1 reports for on-campus students submission due <p>Practical and Written Assessment Due: Week 5 Friday (11 Aug 2017) 11:00 pm AEST</p>

Vacation Week - 14 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 21 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Dislocations and strengthening mechanisms • Applications and processing 	<ul style="list-style-type: none"> • Chapter 7: 7.2 - 7.13 • Lecture note 	<ul style="list-style-type: none"> • Lab #1 group report submission for distance students due • Online test #2

Week 7 - 28 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Phase diagram and phase transformations • Alteration of mechanical properties 	<ul style="list-style-type: none"> • Chapter 9: 9.2 - 9.13 • Chapter 10: 10.2 - 10.8 • Lecture note 	

Week 8 - 04 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
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- Failure of engineering materials: ductile and brittle failure
- Examples and case studies

- Chapter 8: 8.2 - 8.13
- Lecture note

- Group assignment: material selection process submission due

Written Assessment Due: Week 8 Friday (8 Sept 2017) 11:00 pm AEST

Week 9 - 11 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Electrical and magnetic properties of materials • Semi-conductors 	<ul style="list-style-type: none"> • Overview of chapter 18 • Lecture note 	<ul style="list-style-type: none"> • Lab #2 for on-campus students • Online test #3

Week 10 - 18 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Non-metallic materials: ceramic, polymers and composites 	<ul style="list-style-type: none"> • Overview of chapters 12 - 16 • Lecture note 	

Week 11 - 25 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Materials in civil engineering 	<ul style="list-style-type: none"> • Lecture note 	<ul style="list-style-type: none"> • Lab #2 group worksheet submission due for both on-campus and distance students <p>Practical and Written Assessment Due: Week 11 Friday (29 Sept 2017) 11:00 am AEST</p>

Week 12 - 02 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
<ul style="list-style-type: none"> • Corrosion & degradation of materials • Unit review and tips on preparing for final exam 	<ul style="list-style-type: none"> • Chapter 17: 17.2 - 17.10 • Lecture note 	<ul style="list-style-type: none"> • Online test #4

Review/Exam Week - 09 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 16 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
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Assessment Tasks

1 Practical and Written Assessment

Assessment Type

Practical and Written Assessment

Task Description

This assessment pertains to the development and submission of laboratory reports. Tensile testing and examination of the microscopic structure of metals will be carried out as a group. You will attend the prescribed laboratory session, participate in the activity, perform experiments, collect data and then carry out some tasks based on the experimental activity. You, as a group, will be required to produce formal lab reports for the tensile testing and microstructural examination.

Further information is available on the unit Moodle site.

Assessment Due Date

Week 5 Friday (11 Aug 2017) 11:00 pm AEST

Submission for distance students is due in week 6.

Return Date to Students

Week 6 Friday (25 Aug 2017)

Marks for distance students will be available in the following week (week 7).

Weighting

15%

Assessment Criteria

Presentation (/20%)

- The report is in a professional and consistent format.
- The report meets the proposed specification (file format, length, etc.).
- Good quality of English expression is demonstrated and its language is clear and concise.
- The report is sectioned properly to aid the overall argument.
- All figures and tables are labelled properly and discussed in the text.
- Figures and tables are relevant and informative.
- Correct citation and reference styles are used in accordance with the suggested referencing system.
- Good use of visual aids is demonstrated.

Introduction and background (/10%)

- Comprehensive, detailed and focused background is given. The significance of the lab is well presented with realistic and logical argument.
- Background and theories are clearly outlined and comprehensively justified.
- Its hypotheses are clear, relevant and viable.
- The aims of the laboratory work are clearly shown.

Methods and results (/20%)

- Enough details for replication of procedure
- Clear and concise summary of the procedure
- Succinct information about the experimental apparatus
- Clear and well developed connections between the methods and the hypotheses are presented.
- A clear statement about which standard the experiment abides by
- The requirements given in the lab handout are addressed.
- Appropriate figures and tables

Discussion (/20%)

- All minimum required questions are answered and well integrated.
- Own interpretation of the results
- The source of possible error is discussed thoroughly.
- Effort to validate the experimental results is shown.
- Discussions related to the hypotheses or theories presented in the introductory part

Conclusions and reflection (/10%)

- Own clear conclusions on the validity of the experiment and suitability of the methods in relation to the initial hypotheses
- Suggestions to improve and minimise the identified source of error
- Significance of the results and findings
- Statement of your learning reflection

Peer-assessment (/20%)

- Your contribution to the group work will be assessed by your peers within your group through a questionnaire to be provided right after submission.

Referencing Style

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

Submission

Online Group

Submission Instructions

Submit two lab reports per group in PDF format. Indicate the names and student numbers of your group members on the cover pages of your submission.

Learning Outcomes Assessed

- Describe how the physical mechanisms that dictate material properties are affected by the internal-structure of materials
- Work both individually and collaboratively in a team to produce quality outputs
- Conduct material tests in accordance with international standards and prepare the corresponding reports

Graduate Attributes

- Communication
- Problem Solving

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

2 Written Assessment

Assessment Type

Written Assessment

Task Description

Your task is to analyse an engineering design of your interest and suggest alternative materials to improve its design for any purpose (e.g. process and/or manufacturing cost, performance, better user and environmental friendliness, improved safety, improved operating condition, etc.). In this assessment, you will learn to use CES/EduPack using the instructions provided in the unit Moodle page. You will carry out this assessment activity and produce a report as a group.

Further information is available on the unit Moodle site.

Assessment Due Date

Week 8 Friday (8 Sept 2017) 11:00 pm AEST

Return Date to Students

Week 10 Friday (22 Sept 2017)

Weighting

15%

Assessment Criteria

Presentation (/20%)

- The report is in a professional and consistent format.
- The report meets the proposed specification (file format, length, etc.).
- Good quality of English expression is demonstrated and its language is clear and concise.
- The report is sectioned properly to aid the overall argument.
- All figures and tables are labelled properly and discussed in the text.
- Figures and tables are relevant and informative.
- Correct citation and reference styles are used in accordance with the suggested referencing system.
- Good use of visual aids is demonstrated.

Introduction and background (/15%)

- A clear statement about why the report was commissioned in the first place.
- Comprehensive, detailed and focused context about the chosen application is given.
- Succinctly lead the reader to the purpose of the work being documented.
- The objectives of the work are expressed well.
- Previous reports and research, if the present report builds on, are included.

Methods and results (/20%)

- Detailed information on the approach and/or materials used in the study
- Sufficient references are provided to support the methodology used in the report
- Results are presented in a logical way
- Clear but concise evidence in the form of statistics, graphs and tables
- Justification for conclusions and recommendations

Discussion (/15%)

- Analysis using your own words on the method and results
- Good interpretation and explanation of the results
- Relation of the results with the literature
- Examine whether and how the questions raised in the introduction have been answered

Conclusions (/10%)

- Clear agreement with all the objectives that were set out in the introduction is made
- The significant findings and elements from the report are highlighted
- The main points of the report are drawn
- A clear statement about how the topic relates to its context (an evaluation of the importance of the topic, implications and/or recommendations for future studies)

Peer-assessment (/20%)

- Your contribution to the group work will be assessed by your peers within your group through a questionnaire to be provided right after submission.

Referencing Style

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

Submission

Online Group

Submission Instructions

The length of the report must not exceed 15 pages, including EVERYTHING. The report will be submitted in PDF through the link provided in Moodle.

Learning Outcomes Assessed

- Work both individually and collaboratively in a team to produce quality outputs
- Research and apply engineering standards, practices and material optimisation and constraints.

Graduate Attributes

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

3 Practical and Written Assessment

Assessment Type

Practical and Written Assessment

Task Description

This assessment pertains to the completion and submission of a laboratory worksheet. Three laboratory activities will be carried out as a group: Impact test, Ductility & Brittleness and Hardness test. You will attend the prescribed laboratory session, participate in the activity, perform experiments, collect data and then carry out some tasks based on the experimental activity. You, as an individual, will be required to fill in the lab worksheet that will be provided on the unit Moodle site for these three laboratory activities.

Further information is available on the unit Moodle site.

Assessment Due Date

Week 11 Friday (29 Sept 2017) 11:00 am AEST

Return Date to Students

Review/Exam Week Friday (13 Oct 2017)

Weighting

10%

Assessment Criteria

You will be given a series of tasks for the laboratory works. Each task carries different weightings. Please refer to the lab worksheet template provided on the unit Moodle page.

Referencing Style

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

Submission

Online

Submission Instructions

This lab worksheet must NOT exceed 5 pages. You will submit it to the submission link provided in Moodle.

Learning Outcomes Assessed

- Conduct material tests in accordance with international standards and prepare the corresponding reports
- Research and apply engineering standards, practices and material optimisation and constraints.

Graduate Attributes

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

- Information Technology Competence

4 Online Test

Assessment Type

Online Test

Task Description

The assessment consists of four triweekly online tests which can be accessed via the unit Moodle site. A set of multiple choice, short answer, drag-and-drop and calculation questions is assigned every three weeks (viz. week 3, 6, 9 and 12). Each online test will cover the contents in the previous two weeks and the corresponding week (i.e. Online test 1 covers the contents in weeks 1 to 3).

Each online test will remain open from Wednesday to Friday midnight in the corresponding weeks so that you can take the online tests whenever you are available and ready. You will be given unlimited attempts but only the mark of your first attempt will be registered in the Moodle grade book. There will be a time limit of 30 minutes for 15 questions for each test. Once started, it cannot be paused and it will become inaccessible after its closure. There is no restriction for the test venue and materials. However, you are strongly recommended to prepare for the tests due to the time limitation.

Further information is available on the unit Moodle site.

Assessment Due Date

Week 3 Friday (28 July 2017) 11:45 pm AEST

This is a set of triweekly tests that will be held in week 3, 6, 9 and 12. This is an individual task.

Return Date to Students

The mark for each test will be available immediately after each test has ended.

Weighting

20%

Assessment Criteria

You will be given a series of questions through Moodle. Each online test accounts for 5% of the unit total which means these four online tests weigh 20% of the unit total. There are no specific marking criteria. The duration of each test is 30 minutes and you will be given multiple attempts but the mark of your first attempt will be registered.

Referencing Style

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

Submission

Online

Submission Instructions

This online test contains the lecture materials in two previous weeks and the current week. You will be able to check your marks immediately after the deadline has passed. The total marks of this online test will be scaled to out of 5 marks for the unit total. Numerical answers must be entered to 3 significant figures, and there is no harm in entering answers to 4 significant figures. An answer of 0.1467 has 4 significant figures. Choose your answer and select 'NEXT PAGE' to move to the next question or use the 'QUIZ NAVIGATION' block on the left to navigate the questions.

Learning Outcomes Assessed

- Identify and explain the properties and processing techniques of engineering materials to classify them
- Explain how processing methods can be used to optimise the structure of materials for the desired material properties

Graduate Attributes

- Problem Solving
- Critical Thinking
- Information Technology Competence

Examination

Outline

Complete an invigilated examination.

Date

During the examination period at a CQUniversity examination centre.

Weighting

40%

Length

180 minutes

Minimum mark or grade

50%

Exam Conditions

Restricted.

Materials

Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised

Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).

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