



# **ENEM13018 *Materials and Manufacturing***

## **Term 2 - 2018**

Profile information current as at 04/05/2024 03:32 am

All details in this unit profile for ENEM13018 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 offers extended information on material behaviours and manufacturing properties, principles of manufacturing processes and technologies. The unit aims to deepen the understanding of material selection process and enable you to identify appropriate manufacturing processes for a particular product design and development. You will study a wide variety of manufacturing processes such as bulk deformation processes, material removal processes, finishing and joining processes, micro/nano scale manufacturing and other modern manufacturing techniques and learn product design, quality management and manufacturing in a competitive environment. You will apply information literacy skills to obtain relevant engineering information and identify appropriate standards and practices. Students enrolled in distance mode can opt to attend a Residential School.

### 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

Prerequisites: (ENEG11008 Materials for Engineers or ENEG12005 Materials Science & Engineering) AND MATH11218 Applied Mathematics or MATH11219 Engineering 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 2 - 2018

- 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 Optional 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: 20%

#### 2. **Practical and Written Assessment**

Weighting: 20%

#### 3. **Written Assessment**

Weighting: 20%

#### 4. **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 Moodle

**Feedback**

Better alignment of assessment tasks with unit delivery

**Recommendation**

This feedback relates to the TAFE visit that students had to partake as the first assessment. Due to the passing away of one colleague, the original visit which was scheduled in line with the related content delivery, had to be advanced. This will be duly addressed in the next iteration.

#### Feedback from Moodle

**Feedback**

Missing data in the final exam

**Recommendation**

Contrary to the opinion, it being an open book exam, students are expected to find the missing data from relevant tables/graphs and solve the problems. Sufficient emphasis was laid on this aspect throughout the term and this practice will be continued.

#### Feedback from Moodle

**Feedback**

Access to TAFEs closer to students

**Recommendation**

It being a first time collaboration with TAFE and shrouded with unfortunate events, we were forced to limit the TAFE sessions to Rockhampton and Mackay only. The event will be replicated at Gladstone next year which will provide students an additional access. We are also exploring the option of holding the event at Cairns TAFE.

#### Feedback from Moodle

**Feedback**

Content on Metrology would prove very useful

**Recommendation**

This is an interesting aspect. Metrology is introduced to students in a different unit but this topic will be included in this unit too so students can better appreciate the importance of size and scale in manufacturing.

## Unit Learning Outcomes

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

1. Clearly establish the relationships between the microstructural of materials and their mechanical and manufacturing properties
2. Explain various bulk deformation and material removal processes as applicable to ductile and brittle materials; and the machine tools that are used to carry out these operations
3. Calculate numerically the forces, torques and power requirements for various processing different materials for bulk deformation
4. Mathematically analyse the mechanics of metal cutting and the control of various process parameters to achieve optimum material removal and machining economics
5. Apply the knowledge of engineering metrology, instrumentation and quality assurance of manufacturing of products
6. Apply information literacy skills, obtain relevant engineering information and identify appropriate standards and practices
7. Work, learn and communicate in an ethical, professional manner, both individually and in teams

Learning outcomes are linked to Engineers 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

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
1 - Practical and Written Assessment - 20%		•	•			•	•
2 - Written Assessment - 20%		•	•	•	•	•	
3 - Written Assessment - 20%	•	•	•			•	
4 - Examination - 40%	•	•	•	•	•		

### 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 - Practical and Written Assessment - 20%	•	•			•			•		

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

## Textbooks and Resources

### Textbooks

ENEM13018

#### Prescribed

#### Manufacturing Engineering and Technology SI Edition

Edition: 7th SI (2018)

Authors: Kalpakjian, S & Schmid, SR

Pearson Education Centre

Singapore, Singapore

ISBN: 9789810694067

Binding: Paperback

#### Additional Textbook Information

eBook access will be provided to students closer to the commencement of the term.

[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 styles below:

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

For further information, see the Assessment Tasks.

## Teaching Contacts

**Prasad Gudimetla** Unit Coordinator

[p.gudimetla@cqu.edu.au](mailto:p.gudimetla@cqu.edu.au)

## Schedule

### Week 1 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
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1. Lecture 1a: Introduction to the Unit		
2. Lecture 1b: Introduction to Manufacturing	Lecture Notes	1. Discussion on assignments
3. Lecture 1c: Microstructural Aspects & Manufacturing Properties of Engineering Materials	Reading: Part I - Kalpakjian	2. Machine Shop Practice 3. Forming teams

### Week 2 - 16 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 2a: Mechanics of Metal Cutting - materials properties governing metal cutting, theory of chip formation, force, power and energy relationships, cutting parameters	Lecture Notes	Tutorial 1
2. Lecture 2b: Cutting Tool Technology - Tool life, Tool Materials, Geometry, Cutting Fluids	Reading: Part IV - Kalpakjian, Chapters 21, 22	

### Week 3 - 23 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 3a: Machining Operations and Machine Tools- Turning, Milling, Drilling, Boring, Shaping, Planing, Broaching	Lecture Notes	Tutorial 2
2. Lecture 3b: Machining Economics	Reading: Part IV - Kalpakjian, Chapters 23 - 25	TAFE Visits: Rockhampton - 24th July, Mackay - 25th July

### Week 4 - 30 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 4a: Abrasive Machining - Grinding Technology & Processes	Lecture Notes	Tutorial 3
2. Lecture 4b: Surface Processing Operations	Reading: Part IV - Kalpakjian, Chapters 26, 34	

### Week 5 - 06 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 5a: Synthesis of Materials - Solidification Processes, Principles of Metal Casting	Lecture Notes	Tutorial 4
2. Lecture 5b: Metal Casting Processes, Cast Design, Materials & Economics	Reading: Part II - Kalpakjian	

### Vacation Week - 13 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic

### Week 6 - 20 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 6a: Fundamentals of Metal Forming - Material behaviour, bulk deformation properties (yield strength, plasticity, strain, strain rate, strain-rate sensitivity, flow stress, ductility)	Lecture Notes	Tutorial 5
2. Lecture 6b: Influence of Temperature, Friction and Lubrication on Metal Forming		<b>Machine Shop Practice</b> Due: Week 6 Friday (24 Aug 2018) 11:45 pm AEST

### Week 7 - 27 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic

1. Lecture 7a: Bulk Deformation Processes - Rolling, Forging, Extrusion, Deep Drawing: Operations, process control, parameters
2. Lecture 7b: Sheet Metal Working - Operations, process control, parameters

Lecture Notes  
 Reading: Part III - Kalpakjian, Chapters 13 - 16  
 Tutorial 6

### Week 8 - 03 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 8: Forming & Shaping of Plastics	Lecture Notes Reading: Part III - Kalpakjian, Chapter 19.1-19.12	Tutorial 7  <b>Research Paper</b> Due: Week 8 Friday (7 Sept 2018) 11:45 pm AEST

### Week 9 - 10 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 9a: Advanced Manufacturing Processes - waterjet, abrasive waterjet, laser, ECM, EDM, Plasma 2. Lecture 9b: Additive Manufacturing - 3D printing	Lecture Notes Reading: Part IV - Kalpakjian, Chapter 27	Tutorial 8

### Week 10 - 17 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 10: Advanced Materials - Composites Processing	Lecture Notes Reading: Part II - Kalpakjian, Chapters 9, 19.13-19.16	Tutorial 9

### Week 11 - 24 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 11a: Powder Metal Processes 2. Lecture 11b: Engineering Metrology	Lecture Notes Reading: Part III- Kalpakjian, Chapter, 17, 35	Tutorial 10  <b>Problem Solving</b> Due: Week 11 Monday (24 Sept 2018) 11:45 pm AEST

### Week 12 - 01 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
1. Lecture 12a: Joining Processes - Welding Technology 2. Lecture 12b: Joining Processes - Soldering, Adhesive Bonding	Lecture Notes Reading: Part VI - Kalpakjian	

### Review/Exam Week - 08 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic

### Exam Week - 15 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic

## Term Specific Information

All students will have to attend a 1-day machine shop practice session which will be held at the TAFE facilities at Rockhampton (24th July 2018) and Mackay (25th July 2018) campuses. Attendance is mandatory as there will be a 20% assessment based on this visit.

## Assessment Tasks



# 1 Machine Shop Practice

## Assessment Type

Written Assessment

## Task Description

1. The goal of this assessment is to test your observational skills and ability to relate theory to practice. You will participate in a 4-hour interactive show-and-tell session in one of the TAFE machine shops. Following this, you will answer a set of questions provided to you in the hand out. You will also access the Qld Workplace Health & Safety Act (WHS 2011) and research into the legislation related to various safety aspects in design and manufacture, and provide a 500 word essay on how you think they were followed during your visit to the TAFE machine shop.

## Assessment Due Date

Week 6 Friday (24 Aug 2018) 11:45 pm AEST

## Return Date to Students

Week 8 Monday (3 Sept 2018)

## Weighting

20%

## Minimum mark or grade

50%

## Assessment Criteria

The following criteria shall apply to this assessment:

1. Your report will provide clear answers with appropriate sketches where applicable and will be duly referenced with in-text citations in Harvard Style
2. Your WHS essay will draw up on several examples and relate them to appropriate sections of the WHS Act as evidence

## Referencing Style

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

## Submission

Online

## Learning Outcomes Assessed

- Explain various bulk deformation and material removal processes as applicable to ductile and brittle materials; and the machine tools that are used to carry out these operations
- Calculate numerically the forces, torques and power requirements for various processing different materials for bulk deformation
- Mathematically analyse the mechanics of metal cutting and the control of various process parameters to achieve optimum material removal and machining economics
- Apply the knowledge of engineering metrology, instrumentation and quality assurance of manufacturing of products
- Apply information literacy skills, obtain relevant engineering information and identify appropriate standards and practices

## Graduate Attributes

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

# 2 Research Paper

## Assessment Type

Practical and Written Assessment

## Task Description

The goal of this assessment is to test your ability to retrieve information about a manufacturing process of your choice and capture its state-of-the-art and future directions. You will access various databases, scientific journals, textbooks and web resources and gather relevant information and

compile a professional report with a word limit ranging between 2500 and 3000 words at 1.5 line spacing using a suitable 11 or 12 point font. The final report shall be a properly structured document along with a set of good references and in-text citations in Harvard Style.

**Assessment Due Date**

Week 8 Friday (7 Sept 2018) 11:45 pm AEST

**Return Date to Students**

Week 10 Monday (17 Sept 2018)

**Weighting**

20%

**Minimum mark or grade**

50%

**Assessment Criteria**

The following criteria shall apply to this assessment:

1. The report will not exceed the set word limit and conform to the other format specifications
2. The report will include all the elements as outlined the assessment handout
3. You include a section highlighting your own views on the manufacturing process and its impact on the manufacturing sector in the Australian vis-a-vis global contexts
4. You will include at least 20 references with at least 60% of them being reputed journal articles
5. The report will be well referenced in Harvard/Turabian

**Referencing Style**

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

**Submission**

Online

**Learning Outcomes Assessed**

- Explain various bulk deformation and material removal processes as applicable to ductile and brittle materials; and the machine tools that are used to carry out these operations
- Calculate numerically the forces, torques and power requirements for various processing different materials for bulk deformation
- Apply information literacy skills, obtain relevant engineering information and identify appropriate standards and practices
- Work, learn and communicate in an ethical, professional manner, both individually and in teams

**Graduate Attributes**

- Communication
- Problem Solving
- Team Work
- Ethical practice

### 3 Problem Solving

**Assessment Type**

Written Assessment

**Task Description**

This assessment will comprise a set of questions which demand short descriptive answers and numerical solutions. They are modeled on the various examples and tutorial problems you will solve during the term. The problems will span across various chapters and you will solve them progressively and submit this assessment in the later part of the term. Solving these problems will be a good preparation for the final exam in this unit.

**Assessment Due Date**

Week 11 Monday (24 Sept 2018) 11:45 pm AEST

**Return Date to Students**

Review/Exam Week Monday (8 Oct 2018)

**Weighting**

20%

**Minimum mark or grade**

50%

**Assessment Criteria**

The following assessment criteria shall apply to this assessment:

1. Short answer questions - You will provide succinct answers with neatly labelled diagrams where applicable, and proper referencing (Harvard/Turabian Style)
2. Numerical questions - You will present your solutions in a logical structure by providing free body diagrams where applicable, implementing the correct formulas and using the correct system of units to express your final answers. You will make appropriate and valid comments on your final results.

**Referencing Style**

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

**Submission**

Online

**Learning Outcomes Assessed**

- Clearly establish the relationships between the microstructural of materials and their mechanical and manufacturing properties
- Explain various bulk deformation and material removal processes as applicable to ductile and brittle materials; and the machine tools that are used to carry out these operations
- Calculate numerically the forces, torques and power requirements for various processing different materials for bulk deformation
- Apply information literacy skills, obtain relevant engineering information and identify appropriate standards and practices

**Graduate Attributes**

- Problem Solving
- Critical Thinking
- Information Literacy
- 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**

Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).  
Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised

## 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