ENEM13018 *Materials and Manufacturing*
Term 2 - 2017

Profile information current as at 06/05/2024 03:58 pm

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.

Corrections

Unit Profile Correction added on 16-06-17

The recommended textbook has now been changed to:
Kilpakjian, S., and Schmid, S.R. Manufacturing Engineering and Technology, SI Edition (7e), Pearson Singapore. ISBN 9789810694067

Unit Profile Correction added on 15-06-17

The recommended textbook has now been changed to:
Kalpakjian, S., and Schmid, S.R. (2014) Manufacturing Engienering & Technology, SI Edition (7e), Pearson Singapore. ISBN 9789810694067

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 - 2017

- Bundaberg
- 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).

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. **Practical and Written Assessment**
Weighting: 20%
2. **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.

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

— N/A Level ◦ Introductory Level • Intermediate Level • Graduate Level ◦ Professional Level ◦ Advanced Level

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	•	•					•

Graduate Attributes	Learning Outcomes						
	1	2	3	4	5	6	7
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%	•	•			•			•		
2 - Written Assessment - 20%		•	•	•		•				
3 - Written Assessment - 20%		•	•	•		•				
4 - Examination - 40%	•	•	•					•		

Textbooks and Resources

Textbooks

ENEM13018

Prescribed

Principles of Modern Manufacturing, SI Version
Edition: 5th (2015)
Authors: Groover, Mikell, P.
John Wiley
New York , New York , USA
ISBN: 978-1-118-47420-4
Binding: Hardcover

Additional Textbook Information
An ebook access will be provided to students closer to the commencement of the term.

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

Prasad Gudimetla Unit Coordinator
p.gudimetla@cqu.edu.au

Schedule

Week 1 - 10 Jul 2017

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

Week 2 - 17 Jul 2017

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

Week 3 - 24 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 3a: Fundamentals of Metal Forming - Material behaviour, bulk deformation properties (yield strength, plasticity, strain, strain rate, strain-rate sensitivity, flow stress, ductility) Lecture 3b: Influence of Temperature, Friction and Lubriation on Metal Forming	Lecture Notes	Tutorial 2 Monday, 24th July 2017 - Machine Shop Session at Rockhampton TAFE 27th July 2017 - Machine Shop Session at Mackay TAFE. Refer to unit Moodle site for more details.

Week 4 - 31 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 4a: Bulk Deformation Processes - Rolling, Forging, Extrusion, Deep Drawing: Operations, process control, parameters Lecture 4b: Sheet Metal Working - Operations, process control, parameters	Lecture Notes Reading: Part III - Kalpakjian, Chapters 13 - 16	Tutorial 3

Week 5 - 07 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 5: Forming & Shaping of Plastics	Lecture Notes Reading: Part III - Kalpakjian, Chapter 19	Tutorial 4 **Practical and Written Assessment** Due: Week 5 Friday (11 Aug 2017) 11:45 pm AEST

Vacation Week - 14 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 21 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 6a: Mechanics of Metal Cutting - materials properties governing metal cutting, theory of chip formation, force, power and energy relationships, cutting parameters Lecture 6b: Cutting Tool Technology - Tool life, Tool Materials, Geometry, Cutting Fluids	Lecture Notes Reading: Part IV - Kalpakjian, Chapters 21, 22	Tutorial 5

Week 7 - 28 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 7a: Machining Operations and Machine Tools- Turning, Milling, Drilling, Boring, Shaping, Planing, Broaching Lecture 7b:Machining Economics	Lecture Notes Reading: Part IV - Kalpakjian, Chapters 23 - 25	Tutorial 6

Week 8 - 04 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 8a: Abrasive Machining - Grinding Technology & Processes Lecture 8b: Surface Processing Operations	Lecture Notes Reading: Part IV - Kalpakjian, Chapters 26, 34	Tutorial 7 **Written Assessment** Due: Week 8 Friday (8 Sept 2017) 11:45 pm AEST

Week 9 - 11 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 9a: Advanced Manufacturing Processes - waterjet, abrasive waterjet, laser, ECM, EDM, Plasma Lecture 9b: Additive Manufacturing - 3D printing, VAT Photopolymerisation, Material Jetting, Binder Jetting, Material Extrusion, Powder Bed Fusion, Sheet Lamination, Directed Energy Deposition	Lecture Notes Reading: Part IV - Kalpakjian, Chapter 27	Tutorial 8

Week 10 - 18 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 10: Advanced Materials - Composites, Shape Memory Alloys & Polymers, Biocomposites	Lecture Notes Reading: Part II - Kalpakjian, Chapters 9, 19	Tutorial 9 **Written Assessment** Due: Week 10 Friday (22 Sept 2017) 11:45 pm AEST

Week 11 - 25 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 11: Powder Metal Processes	Lecture Notes Reading: Part III- Kalpakjian, Chapter 17	Tutorial 10

Week 12 - 02 Oct 2017

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

Review/Exam Week - 09 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 16 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

The Machine shop sessions will run in Week 3 at the TAFE campuses in **Mackay** and **Rockhampton**. Students from all other campuses are required to travel to either of these campuses on the scheduled dates below. Distance students may elect to travel to a campus nearest to them.
Rockhampton - 24th July 2017 8 a.m. to 2 p.m.
Mackay - 27th July 2017 8 a.m. to 2 p.m.
Please see the detailed run sheet on the unit Moodle site.

Assessment Tasks

1 Practical and Written Assessment

Assessment Type
Practical and Written Assessment

Task Description
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 5 Friday (11 Aug 2017) 11:45 pm AEST
Submission via link on the unit Moodle site

Return Date to Students
Week 7 Friday (1 Sept 2017)
Via link on the unit Moodle site

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)

Submission
Online

Submission Instructions
Submit a PDF document via the assessment link provided on the unit Moodle site.

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

2 Written Assessment

Assessment Type
Written Assessment

Task Description
The goal of this assessment is to test your ability to retrieive 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 (8 Sept 2017) 11:45 pm AEST

Return Date to Students
Week 10 Friday (22 Sept 2017)

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 veiws 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 Style

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit a PDF document via the assessment link provided on the unit Moodle site.

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

3 Written Assessment

Assessment Type
Written Assessment

Task Description
This assessment will comprise a set of questions which demand short descriptive answers and numerical solutions. They are modelled around 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.

Assessment Due Date
Week 10 Friday (22 Sept 2017) 11:45 pm AEST

Return Date to Students
Week 12 Friday (6 Oct 2017)

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, with proper referencing (Harvard 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)

Submission
Online

Submission Instructions
Submit a PDF document via the assessment link provided on the unit Moodle site.

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
120 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