



ENAM12006 Mechanical Component Selection

Term 2 - 2022

Profile information current as at 03/05/2024 12:43 pm

All details in this unit profile for ENAM12006 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 introduces you to the relationship between material properties, structure, and functional performance of mechanical components such as gears, shafts, bearings, fasteners etc. You will apply material selection to determine the load for individual machine elements. Subsequently, you will learn to determine the shape and sizes of components by the way of comprehensive analysis, estimation, and selection. You will select and specify common mechanical components like drive line, shafts, axles, gears, bearings, mechanical fasteners, and other relevant parts and modules complying with the relevant standards and codes. You will specify fits and tolerances, and finishes required for mechanical components.

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

ENAG11005 Mechanics or ENEG11006 Engineering Statics, and MATH11160 Technology Mathematics or MATH11218 Engineering Foundation 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 - 2022

- Online

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. **Written Assessment**

Weighting: 40%

2. **Written Assessment**

Weighting: 50%

3. **Online Quiz(zes)**

Weighting: 10%

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 Student feedback

Feedback

The extension of students' professional knowledge helped them relate to the topics easily.

Recommendation

The topics will be kept and updated.

Feedback from Student feedback

Feedback

Audio quality in video recordings was poor and difficult to follow.

Recommendation

Zoom session will be moved to the room with AV Full.

Feedback from Student feedback

Feedback

Textbook extracts from outside resources were difficult to follow in the study guides, underutilising the prescribed textbook for the course.

Recommendation

Lecturing notes were mainly based on the prescribed textbooks. But, some workbook questions were from outside resources. They will be improved and more questions will be from the prescribed textbooks.

Feedback from Student feedback

Feedback

A corrected assignment paper from each assignment posted shortly after the marking of each would be beneficial.

Recommendation

In this term, for each week workbook questions, a corrected paper was uploaded into the moodle site each week. Similar work will be done for the assignment questions.

Unit Learning Outcomes

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

1. Explain the relationship between material properties, structure, and functional performance of mechanical components such as gears, shafts, bearings, fasteners etc
2. Perform simple stress analysis using design limiting criteria to select mechanical components
3. Interpret Australian standards and design codes governing the selection of mechanical components
4. Identify components to suit a given application and justify the basis for the selection
5. Work and learn collaboratively to complete a team project.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Engineering Associates in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

Introductory

3.3 Creative, innovative and pro-active demeanour. (LO: 2N 3N 4N)

3.6 Effective team membership and team leadership. (LO: 5N)

Intermediate

1.1 Descriptive formula-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the practice area. (LO: 2I 3I) 1.2 Procedural-level understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the practice area. (LO: 1I 2I 3I)

1.5 Knowledge of engineering design practice and contextual factors impacting the practice area. (LO: 2I 4I 5N) 1.6

Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the area of practice. (LO: 2I 3I 4I 5N) 3.1 Ethical conduct and professional accountability. (LO: 4I 5I)

Advanced

1.3 In-depth practical knowledge and skills within specialist sub-disciplines of the practice area. (LO: 1I 2A 3A) 1.4

Discernment of engineering developments within the practice area. (LO: 1I 2A 3A 4I 5I) 2.1 Application of established

technical and practical methods to the solution of well-defined engineering problems. (LO: 1A 2I 3I 4A) 2.2 Application of

technical and practical techniques, tools and resources to well-defined engineering problems. (LO: 2A 3A 4A) 2.3

Application of systematic design processes to well-defined engineering problems. (LO: 1I 2A 3A 4A 5N) 3.2 Effective oral and written communication in professional and lay domains. (LO: 1I 2I 3I 4A) 3.4 Professional use and management of information. (LO: 2I 3A 4A 5N)

Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.

Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information

<https://moodle.cqu.edu.au/course/view.php?id=1511>

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Written Assessment - 40%	•	•		•	•
2 - Written Assessment - 50%	•		•	•	•
3 - Online Quiz(zes) - 10%		•	•		

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
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 - 40%	•	•	•			•		•		
2 - Written Assessment - 50%	•	•		•		•		•		
3 - Online Quiz(zes) - 10%		•	•					•		

Textbooks and Resources

Textbooks

ENAM12006

Supplementary

Fundamentals of Machine Component Design

6th Edition (2017)

Authors: Juvinall, Robert C.

Wiley

USA

ISBN: ISBN: 978-1-118-98768-1

Binding: eBook

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Supplementary

Shigley's Mechanical Engineering Design

Edition: 11th in SI Units (2021)

Authors: Richard G. Budynas, and J. K. Nisbett

Mc Graw Hill Education

Singapore

ISBN: ISBN 9789813158986

Binding: Paperback

Additional Textbook Information

Two books will be recommended for this Unit. You can use their eBooks from our Uni's Library. Their addresses:

<http://ebookcentral.proquest.com/lib/cqu/detail.action?docID=5106338>. and

<http://ebookcentral.proquest.com/lib/cqu/detail.action?docID=6032751>.

If you prefer to study with your own copy, you can purchase one at the CQUni Bookshop here: <http://bookshop.cqu.edu.au> (search on the Unit code).

[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

Yan Sun Unit Coordinator

y.q.sun@cqu.edu.au

Schedule

Week 1 - 11 Jul 2022

Module/Topic	Chapter	Events and Submissions/Topic
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1. Fits and Tolerances	Engineering Drawing Handbook, Chapter 12 Juvinal, Fundamentals of Machine Component Design, 6th Edition, Appendix E Shigley's Mechanical Engineering Design, 11th Edition, Chapter 20 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 15	Tutorial (Lecturing) via Zoom Study Guide Topic 1 - Workbook Activities
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Week 2 - 18 Jul 2022

Module/Topic	Chapter	Events and Submissions/Topic
2. Shaft Design - Principles and Purposes	Juvinal, Fundamentals of Machine Component Design, 6th Edition, Chapter 17 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 7 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 5	Tutorial (Lecturing) via Zoom Study Guide Topic 2-1 - Workbook Activities

Week 3 - 25 Jul 2022

Module/Topic	Chapter	Events and Submissions/Topic
2. Shaft Design (Contd.)	Juvinal, Fundamentals of Machine Component Design, 6th Edition, Chapter 17 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 7 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 5	Tutorial (Lecturing) via Zoom Study Guide Topic 2-2 - Workbook Activities

Week 4 - 01 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
3. Bearing Selection and Applications	Juvinal, Fundamentals of Machine Component Design, 6th Edition, Chapter 14 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 11 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 4	Tutorial (Lecturing) via Zoom Study Guide Topic 3 - Workbook Activities

Week 5 - 08 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
4. Drive Systems - Gears and Keys	Juvinal, Fundamentals of Machine Component Design, 6th Edition, Chapters 15 and 16 Shigley's Mechanical Engineering Design, 11th Edition, Chapters 13~15 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapters 6 and 7	Tutorial (Lecturing) via Zoom Study Guide Topic 4 - Workbook Activities

Vacation Week - 15 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Study Break Complete & Submit Assignment One Assignment		Assignment One Design Problem Solving 1 Due: Vacation Week Friday (19 Aug. 2022) 11:45 pm AEST Design Problem Solving 1 Due: Vacation Week Friday (19 Aug 2022) 11:45 pm AEST

Week 6 - 22 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
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4. Gear Design (contd.)	Juvinall, Fundamentals of Machine Component Design, 6th Edition, Chapters 15 and 16 Shigley's Mechanical Engineering Design, 11th Edition, Chapters 13~15 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapters 6 and 7	Tutorial (Lecturing) via Zoom Study Guide Topic 4 - Workbook Activities
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Week 7 - 29 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
5. Belt Drive Design: Belts and Pulleys	Juvinall, Fundamentals of Machine Component Design, 6th Edition, Chapters 19 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 17 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 8	Tutorial (Lecturing) via Zoom Study Guide Topic 5 - Workbook Activities

Week 8 - 05 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
6. Threaded Fasteners: Selection and Design	Juvinall, Fundamentals of Machine Component Design, 6th Edition, Chapters 10 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 8 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 12	Tutorial (Lecturing) via Zoom Study Guide Topic 6 - Workbook Activities

Week 9 - 12 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
7. Design of Permanent Joints - Welds & Rivets	Juvinall, Fundamentals of Machine Component Design, 6th Edition, Chapters 11 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 9 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 12	Tutorial (Lecturing) via Zoom Study Guide Topic 7 - Workbook Activities

Week 10 - 19 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
8. Design of Chain Drives: Chains and Sprockets	Juvinall, Fundamentals of Machine Component Design, 6th Edition, Chapters 19 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 17 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 8	Tutorial (Lecturing) via Zoom Study Guide Topic 8 - Workbook Activities

Week 11 - 26 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
9. Coupling and Clutches: Application and Design Principles	Juvinall, Fundamentals of Machine Component Design, 6th Edition, Chapters 18 Shigley's Mechanical Engineering Design, 11th Edition, Chapter 16 Peter R. N. Childs, Mechanical Design, 2nd Edition, Chapter 10	Tutorial (Lecturing) via Zoom Study Guide Topic 9 - Workbook Activities

Week 12 - 03 Oct 2022

Module/Topic	Chapter	Events and Submissions/Topic
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10. Design Project Management and Design economics

Lecture notes

Submission of Assignment Two
Design problem Solving 2 Due: Week 12 Friday (7 Oct. 2022) 11:45 pm AEST

Design Problem Solving 2 Due: Week 12 Friday (7 Oct 2022) 11:45 pm AEST

Review/Exam Week - 10 Oct 2022

Module/Topic

Chapter

Events and Submissions/Topic

No formal examination
Port Folio Workbook Due: Review/Exam Week Friday (14 Oct. 2022) 11:45 pm AEST

Workbook (Portfolio of Workbook Activity Problems 10%, not Online Quiz) Due: Review/Exam Week Friday (14 Oct 2022) 11:45 pm AEST

Exam Week - 17 Oct 2022

Module/Topic

Chapter

Events and Submissions/Topic

Assessment Tasks

1 Design Problem Solving 1

Assessment Type

Written Assessment

Task Description

The assignment covers the weekly topics up to week 5 (Topics 1 to 4). The assignment tasks and questions will be uploaded on the unit website. In this assessment item, students are required to answer problem-solving and numerical questions.

Assessment Due Date

Vacation Week Friday (19 Aug 2022) 11:45 pm AEST

Return Date to Students

Week 9 Friday (16 Sept 2022)

Weighting

40%

Minimum mark or grade

50%

Assessment Criteria

Each question in this assignment will be assessed separately for the criterion accuracy and correct results. 20% of the total marks for this assignment are based on accuracy and correct results, including:

1. Free Body Diagrams (FBD) or schematic illustration of the problem
2. Use of correct equations and approach to solve the problem
3. Presenting final results in correct units

In addition, the assignment, as a whole, will be assessed against the following criteria:

Evidence of correct procedures (40% of the total marks for the assignment)

- All necessary steps in analysis and equations in original form are present on correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results obtained

Evidence of understanding of the topic (30% of the total marks for the assignment)

- Explanation of choices made in the analysis

- Interpretation of results, e.g., limitations, assumptions etc., if any.

Professional presentation (10% of the total marks for the assignment)

- Assignment title page
- The problem is clearly identified
- Clear statement of each problem and its details and requirements
- Logical layout of analysis
- Appropriate use of diagrams, units, clear diagrams
- Correct use of terminology and conventions

Referencing Style

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

Submission

Online

Submission Instructions

Submit as a PDF document

Learning Outcomes Assessed

- Explain the relationship between material properties, structure, and functional performance of mechanical components such as gears, shafts, bearings, fasteners etc
- Perform simple stress analysis using design limiting criteria to select mechanical components
- Identify components to suit a given application and justify the basis for the selection
- Work and learn collaboratively to complete a team project.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Technology Competence
- Ethical practice

2 Design Problem Solving 2

Assessment Type

Written Assessment

Task Description

The assignment covers the topics of weeks 6 to 12 (Topics 4 to 10). The assignment tasks and questions will be uploaded on the unit website. In this assessment item, students are required to answer problem-solving and numerical questions.

Assessment Due Date

Week 12 Friday (7 Oct 2022) 11:45 pm AEST

Return Date to Students

Exam Week Friday (21 Oct 2022)

Weighting

50%

Minimum mark or grade

50%

Assessment Criteria

Each question in this assignment will be assessed separately for the criterion accuracy and correct results. 20% of the total marks for this assignment are based on accuracy and correct results, including:

1. Free Body Diagrams (FBD) and appropriate schematics
2. Use of correct equations and approach to solve the problem
3. Presenting final results in correct units

In addition, the assignment, as a whole, will be assessed against the following criteria:

Evidence of correct procedures (40% of the total marks for the assignment)

- All necessary steps in analysis are present on correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results

obtained.

Evidence of understanding of the topic (30% of the total marks for the assignment)

Explanation of choices made in the analysis

Interpretation of results, e.g., limitations etc., if any.

Professional presentation (10% of the total marks for the assignment)

- Assignment title page
- The problem is clearly identified
- Clear statement of each problem and its details and requirements
- Logical layout of analysis
- Appropriate use of diagrams, units, clear diagrams
- Correct use of terminology and conventions

Referencing Style

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

Submission

Online

Submission Instructions

Submit as a PDF document

Learning Outcomes Assessed

- Explain the relationship between material properties, structure, and functional performance of mechanical components such as gears, shafts, bearings, fasteners etc
- Interpret Australian standards and design codes governing the selection of mechanical components
- Identify components to suit a given application and justify the basis for the selection
- Work and learn collaboratively to complete a team project.

Graduate Attributes

- Communication
- Problem Solving
- Information Literacy
- Information Technology Competence
- Ethical practice

3 Workbook (Portfolio of Workbook Activity Problems 10%, not Online Quiz)

Assessment Type

Online Quiz(zes)

Task Description

This submission will contain evidences of your weekly workings of various workbook activity problems and other examples and concepts.

Number of Quizzes

Frequency of Quizzes

Assessment Due Date

Review/Exam Week Friday (14 Oct 2022) 11:45 pm AEST

Return Date to Students

Exam Week Friday (21 Oct 2022)

Weighting

10%

Minimum mark or grade

50%

Assessment Criteria

No Assessment Criteria

Referencing Style

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

Submission

Online

Submission Instructions

Submit as a PDF document

Learning Outcomes Assessed

- Perform simple stress analysis using design limiting criteria to select mechanical components
- Interpret Australian standards and design codes governing the selection of mechanical components

Graduate Attributes

- 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