MECH203

Mechanical Design 1

S2 Day 2016

Dept of Engineering

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General Information

Unit convenor and teaching staff
Unit convenor and Lecturer
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Wednesday, 10 - 12pm

Lecturer
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Credit points
3

Prerequisites
(ENGG150(P) or ENGG170(P) or ELEC170(P)) and (MATH132 or MATH135(P)) and ((PHYS106 and PHYS107) or (PHYS140(P) and PHYS143(P)))

Corequisites

Co-badged status

Unit description
In this unit students will develop their skills in machine drawing and engineering design. The unit will demonstrate to students the processes involved in the selection of machine elements and machine assembly design in an engineering context. The unit will introduce students to the principles of computer-aided design and manufacture.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

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

Ability to identify the usage of different types of permanent and non-permanent joints.
Ability to produce manufacturing drawings that meet industrial standards.
Ability to analyse power transmission, losses and speed reduction ratio in a mechanical engineering system.

Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.

Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.

Ability to present design concepts effectively and professionally.

General Assessment Information

Student Responsibilities

Be familiar with University policy and College procedures and act in accordance with those policy and procedures. It is the responsibility of the student to retain a copy of any work submitted. Students must produce these documents upon request. Copies should be retained until the end of the grade appeal period each term. Student is to perform the required due diligent for their assessment grade and rectify as soon as possible upon finding any errors.

Notifications

Formal notification of assessment tasks, grading rubrics and due dates will be posted on iLearn. Although all reasonable measures to ensure the information is accurate, The University reserves the right to make changes without notice. Each student is responsible for checking iLearn for changes and updates.

Report and Assignment Tasks

Assignment Problems will be posted on iLearn at least two weeks before their submission date.

Assignment submissions and plagiarism policies

All assignments and reports must be submitted electronically through iLearn (in pdf format). Submissions will undergo plagiarism checkers using the turnitin software and any work deemed to have 30% or higher similarity score may incur academic penalty. For more details on the policies of academic penalties relating to academic honesty, please refer to the policies and procedures section below. Markers WILL NOT grade poorly organized or illegible scans or drafts. The expected workload includes preparation of final copies and clear diagrams.

Late submissions

Late submissions or absences from tutorials and laboratories will not be accepted without prior arrangement made at least one week before the submission date. Extenuating circumstances will be considered upon lodgement of a formal notice of disruption of studies.

Grading and passing requirement for unit

For further details about grading, please refer below in the policies and procedures section.

Final Examinations

Final examinations will typically take place at the end of the semester. For further information, please refer to the Examination Timetable website on www.mq.edu.au

Assessment Tasks

Name	Weighting	Due
CAD tests	15%	Week 4 and week 7
Preliminary design report	5%	Week 10
Quiz	5%	Week 10
Final design report	10%	Week 12
In class assignments	5%	Week 12 and week 13
Final examination	60%	TBA

CAD tests

Due: **Week 4 and week 7**
Weighting: **15%**

There will be two tests (7.5% each) on computer aided drawing (CAD) using the CREO software.

On successful completion you will be able to:

- Ability to produce manufacturing drawings that meet industrial standards.

Preliminary design report

Due: **Week 10**
Weighting: **5%**

The online submission of this report is NOT required. Students will be given verbal feedback for their report in one of the tutorials in week 10. Students are expected to refine their report so that they can submit it as part of the Final Design Report in week 12.

On successful completion you will be able to:

- Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.
- Ability to present design concepts effectively and professionally.

Quiz

Due: **Week 10**
Weighting: **5%**

Attendance for this quiz is compulsory. Students will be tested on materials covered in Lectures 1 – 9.

On successful completion you will be able to:

- Ability to identify the usage of different types of permanent and non-permanent joints.
- Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.
- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.

Final design report

Due: **Week 12**
Weighting: **10%**

This design report must be submitted online only. In the event that this assessment task is submitted late, the following penalties will apply; 0 to 24 hours -25%, 24 hours to 48 hours -50%, greater than 48 hours will result in no mark being awarded. Any acts of plagiarisms such as similarities in design report layout, content (e.g. design solutions) and manufacturing drawings will incur academic penalty.

On successful completion you will be able to:

- Ability to identify the usage of different types of permanent and non-permanent joints.
- Ability to produce manufacturing drawings that meet industrial standards.
- Ability to analyse power transmission, losses and speed reduction ratio in a mechanical engineering system.
- Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.
- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.
- Ability to present design concepts effectively and professionally.

In class assignments

Due: **Week 12 and week 13**
Weighting: **5%**

There will be two in class assignments (2.5% each). Students are required to produce accurate solutions of their design and manufacturing drawings that meet industrial standards. Any acts of plagiarisms such as similarities in design solution and manufacturing drawings will incur

academic penalty.

On successful completion you will be able to:

- Ability to produce manufacturing drawings that meet industrial standards.
- Ability to analyse power transmission, losses and speed reduction ratio in a mechanical engineering system.
- Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.
- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.

Final examination

Due: **TBA**
Weighting: **60%**

This is a closed book exam. Attendance is compulsory for all students. The exam includes multiple choice questions and specific design tasks where accurate solutions of the design analysis are expected.

On successful completion you will be able to:

- Ability to identify the usage of different types of permanent and non-permanent joints.
- Ability to analyse power transmission, losses and speed reduction ratio in a mechanical engineering system.
- Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.
- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.

Delivery and Resources

Richard G Budynas, "Shigley's Mechanical Engineering Design." McGrawll Hill, 9th Edition. A.W. Boundy, "Engineering drawing." McGrawll Hill, 5th Edition.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.

Assessment task

- Final design report

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Ability to identify the usage of different types of permanent and non-permanent joints.
- Ability to produce manufacturing drawings that meet industrial standards.
- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify

appropriate manufacturing techniques for the elements.

Assessment tasks

- CAD tests
- Preliminary design report
- Quiz
- In class assignments
- Final examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Ability to analyse power transmission, losses and speed reduction ratio in a mechanical engineering system.
- Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.
- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.

Assessment tasks

- Final design report
- In class assignments
- Final examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Ability to analyse forces and perform stress analysis accurately to design the members of machines and structures.
- Ability to analyse, design and select machine elements (e.g. belts and pulleys, chain and sprockets, bearings) off-the-shelf using commercial available catalogs and specify appropriate manufacturing techniques for the elements.

Assessment task

- Preliminary design report

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcome

- Ability to present design concepts effectively and professionally.

Assessment tasks

- Preliminary design report
- Final design report
- Final examination