



MECH320

Mechanical Engineering for Mechatronics Systems

S1 Day 2019

School of Engineering

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General Information

Unit convenor and teaching staff

Unit Convener

Shaokoon Cheng

shaokoon.cheng@mq.edu.au

Contact via 98502234

44 Waterloo Road

Monday, 10am to 12pm.

Unit Convener

Nazmul Huda

nazmul.huda@mq.edu.au

Contact via 9850 2249

44 Waterloo Road, Room 118

Credit points

3

Prerequisites

ELEC260 and MECH203

Corequisites

Co-badged status

Unit description

A full analysis, model, or design of an electromechanical system must consider the engineering dynamics and deformations of components. This unit provides fundamental training in dynamics and mechanics of solids with a particular emphasis on mechatronic examples. The unit is a series of lectures and practicals that develop a fundamental understanding of dynamics and mechanics of solids. It also provides training in hand calculations, numerical approaches and experimental methods using laboratory apparatus.

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:

Demonstrate understanding of basic concepts relating to the strength of materials, and

use that knowledge in design of mechanical components.

Analyse stresses and deformations in mechanical structures and machines.

Analyse the motion in mechanical systems, and employ that knowledge in the design of mechanical systems.

Build problem solving skills for a range of real world engineering dynamics applications

Ability to analyse vibrations in mechanical components and mechanical design.

Assessment Tasks

Name	Weighting	Hurdle	Due
Tutorial	10%	No	Week 2 to Week 13
Mid-term test	20%	No	Week 7
Group project	20%	No	Week 13
Final examination	50%	No	TBA

Tutorial

Due: **Week 2 to Week 13**

Weighting: **10%**

In-class solving of tutoring problems and attendance is compulsory.

On successful completion you will be able to:

- Demonstrate understanding of basic concepts relating to the strength of materials, and use that knowledge in design of mechanical components.
- Analyse stresses and deformations in mechanical structures and machines.
- Analyse the motion in mechanical systems, and employ that knowledge in the design of mechanical systems.
- Build problem solving skills for a range of real world engineering dynamics applications
- Ability to analyse vibrations in mechanical components and mechanical design.

Mid-term test

Due: **Week 7**

Weighting: **20%**

Test will be based on theories in Mechanics of Solid and Engineering Dynamics.

On successful completion you will be able to:

- Demonstrate understanding of basic concepts relating to the strength of materials, and use that knowledge in design of mechanical components.
- Analyse stresses and deformations in mechanical structures and machines.
- Analyse the motion in mechanical systems, and employ that knowledge in the design of mechanical systems.
- Build problem solving skills for a range of real world engineering dynamics applications
- Ability to analyse vibrations in mechanical components and mechanical design.

Group project

Due: **Week 13**

Weighting: **20%**

Group project on the design of an engineering system that requires knowledge in both Mechanics of Solids and Engineering Dynamics. Marks include a group presentation (see marking rubrics for more details) and a detailed report of the engineering solution. The report and presentation will stand for 70% and 30% of this assessment respectively. Group presentations will be conducted in week 12 lecture.

On successful completion you will be able to:

- Demonstrate understanding of basic concepts relating to the strength of materials, and use that knowledge in design of mechanical components.
- Analyse stresses and deformations in mechanical structures and machines.
- Analyse the motion in mechanical systems, and employ that knowledge in the design of mechanical systems.
- Build problem solving skills for a range of real world engineering dynamics applications
- Ability to analyse vibrations in mechanical components and mechanical design.

Final examination

Due: **TBA**

Weighting: **50%**

Final examination will be based on the entire content covered in the unit.

On successful completion you will be able to:

- Demonstrate understanding of basic concepts relating to the strength of materials, and use that knowledge in design of mechanical components.
- Analyse stresses and deformations in mechanical structures and machines.
- Analyse the motion in mechanical systems, and employ that knowledge in the design of mechanical systems.

- Build problem solving skills for a range of real world engineering dynamics applications
- Ability to analyse vibrations in mechanical components and mechanical design.

Delivery and Resources

1. Russell C Hibbeler, Statics and Mechanics of Materials in SI Units (5th Edition, Pearson).
2. Vector Mechanics for Engineers: Dynamics - 10th Edition in SI Units by Beer, Johnston and Cornwell.

Mode of delivery: 2 hours weekly lectures and 3 hours tutorials. There will be no tutorials in week one of the semester.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA student contact globalmba.support@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

If you are a Global MBA student contact globalmba.support@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 outcomes

- Analyse the motion in mechanical systems, and employ that knowledge in the design of mechanical systems.

- Build problem solving skills for a range of real world engineering dynamics applications

Assessment task

- Group project

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Assessment task

- Group project

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Assessment tasks

- Tutorial
- Group project

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

- Demonstrate understanding of basic concepts relating to the strength of materials, and use that knowledge in design of mechanical components.

- Analyse stresses and deformations in mechanical structures and machines.
- Ability to analyse vibrations in mechanical components and mechanical design.

Assessment tasks

- Tutorial
- Mid-term test
- Group project
- 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

- Demonstrate understanding of basic concepts relating to the strength of materials, and use that knowledge in design of mechanical components.
- Analyse stresses and deformations in mechanical structures and machines.
- Ability to analyse vibrations in mechanical components and mechanical design.

Assessment tasks

- Tutorial
- Mid-term test
- Group project
- 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

- Demonstrate understanding of basic concepts relating to the strength of materials, and use that knowledge in design of mechanical components.

- Analyse stresses and deformations in mechanical structures and machines.
- Analyse the motion in mechanical systems, and employ that knowledge in the design of mechanical systems.
- Build problem solving skills for a range of real world engineering dynamics applications
- Ability to analyse vibrations in mechanical components and mechanical design.

Assessment tasks

- Tutorial
- Mid-term test
- Group project
- Final examination

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:

Assessment tasks

- Tutorial
- Mid-term test
- Group project

Changes from Previous Offering

A design project that requires knowledge in Dynamics and Mechanics of Solids has been included this year.