



# MECH204

## Mechanics of Solids

S2 Day 2016

*Dept of Engineering*

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#### **Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

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Credit points

3

Prerequisites

(ENGG150(P) or ENGG170(P) or ELEC170(P)) and (MATH133 or MATH136(P)) and ((PHYS106 and PHYS107) or (PHYS140(P) and PHYS143(P)))

Corequisites

Co-badged status

Unit description

This unit will examine free body diagrams. Stress-strain relations and elastic constants will be analysed in an engineering context. The unit will examine statically determinate stress systems, considering the impacts of direct stress, shear stress, bending stress, torsional stress in an engineering context. Bending moment diagrams, shear force diagrams and deflection of beams will be examined.

## 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 explain and demonstrate understanding on the mechanical properties of materials and identify different modes of mechanical failures in machines and structures.

Ability to analyse and determine forces and stresses in two and three-dimensional structures accurately.

Ability to apply the concept of force and stress analysis in mechanical engineering design and in real world engineering problems.

Demonstrate self-learning, time-management, and project management.

## 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](http://www.mq.edu.au)

## Assessment Tasks

Name	Weighting	Due
<a href="#">Diagnostic quiz</a>	5%	Week 2
<a href="#">Quiz</a>	10%	Week 9
<a href="#">Assignment</a>	10%	Week 9
<a href="#">Laboratory report</a>	10%	Week 10

Name	Weighting	Due
<a href="#">Participation and Logging</a>	5%	Week 12
<a href="#">Final examination</a>	60%	TBA

## Diagnostic quiz

Due: **Week 2**

Weighting: **5%**

Students are expected to pass this quiz. Students who fail this quiz may consider disenrolling themselves before the census date to avoid penalty. This quiz consists of basic background information that students are expected to know before they continue with this unit. In this quiz, students are expected to show accurate solutions of force analysis on structures and machines. All the solution steps including the free body diagram must be shown clearly.

On successful completion you will be able to:

- Ability to analyse and determine forces and stresses in two and three-dimensional structures accurately.

## Quiz

Due: **Week 9**

Weighting: **10%**

The quiz will include topics covered from lecture 1 to lecture 8. Accurate numerical solutions of the problems are required and all solution steps must be shown clearly.

On successful completion you will be able to:

- Ability to explain and demonstrate understanding on the mechanical properties of materials and identify different modes of mechanical failures in machines and structures.
- Ability to analyse and determine forces and stresses in two and three-dimensional structures accurately.

## Assignment

Due: **Week 9**

Weighting: **10%**

This assignment must be typed and submitted online with a cover sheet. There is an element of design in this assignment and it is unlikely that students will generate the same solutions or reports that look similar. Academic misconduct related to plagiarism will incur academic penalty. Students should not discuss solutions of this assignment with one another.

On successful completion you will be able to:

- Ability to explain and demonstrate understanding on the mechanical properties of materials and identify different modes of mechanical failures in machines and structures.
- Ability to analyse and determine forces and stresses in two and three-dimensional structures accurately.
- Ability to apply the concept of force and stress analysis in mechanical engineering design and in real world engineering problems.

## Laboratory report

Due: **Week 10**

Weighting: **10%**

There will be two laboratory tasks in this unit. The laboratory report must be typed written and must include both the laboratory tasks. Students must use the laboratory report template provided on ILEARN. Laboratory report must be submitted online with a cover sheet.

On successful completion you will be able to:

- Ability to apply the concept of force and stress analysis in mechanical engineering design and in real world engineering problems.

## Participation and Logging

Due: **Week 12**

Weighting: **5%**

Attendance will only be given to students who attempt 2 of 6 of the tutorial questions before they attend the tutorial. Students are required to prepare a bound notebook to be used as a laboratory/ tutorial logbook. On the completion of each tutorial session, log book must be signed and dated by a tutor. Marks for the log book at the end of tutorial sessions (week 2 to week 12) will be given. At the end of the semester (week 13), marks will be collated for this assignment task.

On successful completion you will be able to:

- Demonstrate self-learning, time-management, and project management.

## Final examination

Due: **TBA**

Weighting: **60%**

There will be three to four questions in the final exam. Accurate numerical solutions of the problems are required and all solution steps must be shown clearly.

On successful completion you will be able to:

- Ability to explain and demonstrate understanding on the mechanical properties of materials and identify different modes of mechanical failures in machines and structures.
- Ability to analyse and determine forces and stresses in two and three-dimensional structures accurately.

## Delivery and Resources

Text book:

R.C. Hibbeler, "Mechanics of Materials." Pearson, 9th 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](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](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/](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](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](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/](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](http://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](http://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](http://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/](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 apply the concept of force and stress analysis in mechanical engineering design and in real world engineering problems.

### 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:

### **Learning outcome**

- Demonstrate self-learning, time-management, and project management.

### **Assessment task**

- Participation and Logging

## **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 explain and demonstrate understanding on the mechanical properties of materials and identify different modes of mechanical failures in machines and structures.
- Ability to analyse and determine forces and stresses in two and three-dimensional structures accurately.

### **Assessment tasks**

- Diagnostic quiz
- Quiz
- Assignment
- Participation and Logging
- 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 explain and demonstrate understanding on the mechanical properties of materials and identify different modes of mechanical failures in machines and structures.
- Ability to apply the concept of force and stress analysis in mechanical engineering design and in real world engineering problems.

## Assessment tasks

- Quiz
- Assignment
- Laboratory report
- 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 and determine forces and stresses in two and three-dimensional structures accurately.
- Ability to apply the concept of force and stress analysis in mechanical engineering design and in real world engineering problems.
- Demonstrate self-learning, time-management, and project management.

## Assessment tasks

- Diagnostic quiz
- Quiz
- Assignment
- Laboratory report
- 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:

### **Learning outcome**

- Demonstrate self-learning, time-management, and project management.

### **Assessment tasks**

- Assignment
- Laboratory report
- Participation and Logging