ENGG200

Engineering Practice

S1 Day 2016

Dept of Engineering

Contents

General Information

Unit convenor and teaching staff
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Credit points
3

Prerequisites
(12cp and admission to BE or BE(Hons) or BEBA or BE(Hons)BA or BEBBA or BEBCom or BE(Hons)BCom or BEBSc or BE(Hons)BSc) or corequisite of ENGG100

Corequisites

Co-badged status

Unit description
This unit covers a range of engineering specialisations with a series of lectures, laboratory sessions, self-study, group work and activities. Students learn about the process of engineering, solving problems, design and product development. The unit also gives students an opportunity to develop and practise generic skills such as written and oral communication. An aim of this unit is to give students some exposure to the specialisations and streams from which they must choose for the remainder of their studies.

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:

Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
Demonstrating a good understanding and awareness of the main characteristics of

engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment Tasks

Name	Weighting	Hurdle	Due
Ethics Case studies - Group	6%	No	Week 4
Mathematical Modeling	8%	No	Week 6
Core Engineering knowledge A	8%	No	Week 9
Core Engineering knowledge B	8%	No	Week 10
Core Engineering knowledge C	8%	No	Week 11
Core Engineering knowledge D	8%	No	Week 12
Presentation Core Engineering	6%	No	TBA in week 9 - 12
Exam	40%	No	Week 13
Participation	8%	No	Session 1

Ethics Case studies - Group

Due: **Week 4**
Weighting: **6%**

You will be given an engineering ethics case study which you will discuss in a team of 4-5 students. You will prepare a short powerpoint presentation (approx. 5 slides, 8 minutes talk - 2 minutes discussion) which you will present in the practical session (week 4). Marks will be given towards how well the ethics theories that will be discussed in lecture 2 are applied to the case study and towards the way it is presented (also discussed in lecture 1).

On successful completion you will be able to:

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
- Demonstrating a good understanding and awareness of the main characteristics of

engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Mathematical Modeling

Due: **Week 6**
Weighting: **8%**

This assignment to be submitted by week 6 involves the solution of a physical model.

On successful completion you will be able to:

- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.

Core Engineering knowledge A

Due: **Week 9**
Weighting: **8%**

This exercise involves the solution of a basic mechanics and hydraulics engineering problem. Some advise can be asked to the tutors during the practical sessions of week 7 and 8.

On successful completion you will be able to:

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Core Engineering knowledge B

Due: **Week 10**
Weighting: **8%**

This exercise involves the solution of a basic hydraulics and thermodynamics engineering problem. Some advise can be asked to the tutors during the practical sessions of week 8 and 9.

On successful completion you will be able to:

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Core Engineering knowledge C

Due: **Week 11**
Weighting: **8%**

This exercise involves the solution of a basic engineering problem (electrical motors, aerodynamics or electromagnetic). Some advise can be asked to the tutors during the practical sessions of week 9 and 10.

On successful completion you will be able to:

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Core Engineering knowledge D

Due: **Week 12**
Weighting: **8%**

This exercise involves the solution of a basic engineering problem (rocket propulsion and electronics). Some advise can be asked to the tutors during the practical sessions of week 10 and 11.

On successful completion you will be able to:

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Presentation Core Engineering

Due: **TBA in week 9 - 12**
Weighting: **6%**

Every student will be allocated a time in week 9 and 12 to present the solution of a core knowledge exercise assessment task through a short powerpoint presentation. The oral presentation should include a statement of the problem, the solution (eventually graphs and/or figures) and a discussion on the results in a broader context. Marks will be predominantly given on the soundness and way of presenting.

On successful completion you will be able to:

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.

Exam

Due: **Week 13**
Weighting: **40%**

Written exam

On successful completion you will be able to:

- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Participation

Due: **Session 1**
Weighting: **8%**

Tutors evaluate the participation during the practical sessions.

On successful completion you will be able to:

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.

Delivery and Resources

A series of lectures and practical sessions are organized in this unit that are intended to provide the engineering student with a range of professional engineering skills that are generally not covered in regular technical courses. The lectures are phased with the practical sessions and assignments. The emphasis of the unit is on engineering problem solving.

Lectures are also intended to aid the students to orient themselves in the long tradition of the engineering discipline and to help apply mathematical and physics principles to solving real engineering problems. We also reflect on engineering in the context of a society as a whole in which aspects of environmental sustainable development and ethical decision making are emphasized.

During practical sessions, tutorials will be given on Matlab, report writing tools (Latex) and presentation software (Powerpoint). During practical sessions, students will have the opportunity to develop and practice problem solving skills through exercises and can ask advice to the tutors.

Course material in the form of Powerpoint slides and online tutorials will be provided through the online iLearn Learning System at: https://iLearn.mq.edu.au/login/MQ

Also links to open source software and other useful tools will be made available through the online iLearn Learning System.

Recommended books for self-learning:

- Engineering Your Future: An Australasian Guide (Second Edition) by Dowling, Carew and HadGraft - ed. John Wiley & Sons Australia, Ltd.

Technology used and required

- Library and internet search engines
- Word processing package
- Free graphics design software and presentation software
- Simulation and analysis tools

Unit Schedule

Module	Week	Lecture	Practical session	Assignment
I.	1	Introduction to professional engineering	none	
	2	Engineering Ethics Presentation and report writing	Introduction to Matlab: Vectors and matrices Powerpoint presentations	
II.	3	Mathematical Modelling in Engineering	Introduction to Matlab: Graphs	
	4	Mathematical Modelling in Engineering	Ethics case studies / presentation	Ethics Case studies
	5	Mathematical Modelling in Engineering	Introduction to Matlab: Programming	
	6	Mathematical Modelling in Engineering	Matlab exercises	Mathematical Modelling
III.	7	Engineering Core Knowledge 1: From Prehistory to the Middle Ages	Latex and report writing	
	8	Engineering Core knowledge 2: From Renaissance to Industrial Revolution	Problem Solving: Core Knowledge	
	9	Engineering Core Knowledge 3: From Electricity to Quantum	Problem Solving: Core Knowledge	Mechanics & Hydrodynamics
	10	Engineering Core Knowledge 4: From Plastics to Superconductivity	Problem Solving: Core Knowledge	Hydraulics, Thermodynamics and Chemistry
	11	Engineering Core Knowledge 5: The Information Age and the Anthropocene	Problem Solving: Core Knowledge	Electrical motors, transformer, Aerodynamics and Electro-magnetism
I.	12	Sustainable Engineering in the Anthropocene	Problem Solving: Core Knowledge	Rockets, Semiconductors and Electronics
	13	EXAM		

Learning and Teaching Activities

Module 1 - Lecture 1 - Introduction and scope

In this introductory lecture, we will set the scope of this unit. We will briefly discuss the role of the professional organization 'Engineers Australia' and set the scope for this unit that has an emphasis on problem solving, self-learning and self-development. We will also reflect on critical thinking and analytical thinking which are essential ingredients to problem solving and ethical decision making.

Module 1 - Lecture 2 - The engineering method and project management

In this lecture we will discuss the organizational aspects of engineering projects and provide some helpful tools.

Module 1 - Lecture 3 - Report writing

An essential activity of professional engineers is report writing. This varies from project plans to technical reports, tenders and common communication tools such as memos, emails and letters. The essential ingredients of these reports will be discussed.

Module 1 - Lecture 4 - Communication in Engineering

Communication in engineering takes various forms: consultation and instructions, conversation, team meetings and presentations. We will discuss the essential characteristics of each of them and provide some guidelines on how to organize a meeting or give an oral presentation.

Module 1 - Lecture 5 - Ethics in Engineering

Engineering most often involves several stakeholders and may have significant impact on society and the environment. It is therefore essential that engineers are equipped with moral frameworks that can help in making the most ethical decision. After a brief overview of philosophical movements and thinkers in normative ethics, we will demonstrate the importance of ethical decision making in engineering and discuss some scenario's where ethical decisions are required. The philosophical frameworks may be a guide in addressing real world moral dilemmas encountered in the engineering profession.

Practical session (+ Assessment) - Ethics case studies

Different engineering ethics dilemma's (case studies) will be distributed to teams of 4 students in week 2. Each case study will be discussed in team and in the practical session of week 4, each team will give an oral (powerpoint) presentation (10 min.) on the case study. In the presentation, the case study will be discussed in the light of the moral philosophical frameworks (provided in lecture 2).

Practical sessions on Matlab

Different practical sessions will be held on the use of Matlab. Spread out over different practical sessions, tutorials will be given by the tutors from the basic ingredients of Matlab (vectors and matrices) to plotting graphs and writing Matlab scripts. After each tutorial, students will have the opportunity to practice on exercises provided by the tutors.

Text editing with Latex

Latex is a frequently used and versatile software tool for professional text editing of letters, reports, scientific papers and books. However, it is not always trivial for first time users. In one tutorial, the tutor will explain the basic steps in using the Latex editing package. Students will have the opportunity to develop Latex writing skills throughout the semester and to ask questions to the tutors during any of the other practical sessions.

Module 2 - Mathematical modelling

After a first lecture on the basic principles of mathematical modelling, we will discuss how to construct ordinary differential equations for a variety of engineering problems: Flow systems, moving object systems and structural systems.

Module 3 - Engineering core knowledge

Human evolution is characterized by invention and curiosity and has shaped the environment in which we live today. In this lecture, we will follow mankind from prehistory to modern times in its ascent to understand nature and to create and shape the environment within the context of its 'Zeitgeist'. This historical overview is a narrative in which different concrete engineering problems will be highlighted which will be the problem solving exercises in tutorials and against which students will be able to test their problem solving capability.

Module 1 - Lecture 6 - Sustainable engineering

The challenges for a sustainable future will be discussed and some practical approaches will be provided.

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

- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.

Assessment tasks

- Ethics Case studies - Group
- Core Engineering knowledge A
- Core Engineering knowledge B
- Core Engineering knowledge C
- Core Engineering knowledge D
- Participation

Learning and teaching activities

- In this lecture we will discuss the organizational aspects of engineering projects and provide some helpful tools.
- Latex is a frequently used and versatile software tool for professional text editing of letters, reports, scientific papers and books. However, it is not always trivial for first time users. In one tutorial, the tutor will explain the basic steps in using the Latex editing package. Students will have the opportunity to develop Latex writing skills throughout the semester and to ask questions to the tutors during any of the other practical sessions.

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:

Learning outcome

- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment tasks

- Ethics Case studies - Group
- Presentation Core Engineering
- Exam
- Participation

Learning and teaching activities

- In this introductory lecture, we will set the scope of this unit. We will briefly discuss the role of the professional organization 'Engineers Australia' and set the scope for this unit that has an emphasis on problem solving, self-learning and self-development. We will also reflect on critical thinking and analytical thinking which are essential ingredients to problem solving and ethical decision making.
- In this lecture we will discuss the organizational aspects of engineering projects and provide some helpful tools.
- Engineering most often involves several stakeholders and may have significant impact on society and the environment. It is therefore essential that engineers are equipped with moral frameworks that can help in making the most ethical decision. After a brief overview of philosophical movements and thinkers in normative ethics, we will demonstrate the importance of ethical decision making in engineering and discuss some scenario's where ethical decisions are required. The philosophical frameworks may be a guide in addressing real world moral dilemmas encountered in the engineering profession.
- Different engineering ethics dilemma's (case studies) will be distributed to teams of 4 students in week 2. Each case study will be discussed in team and in the practical session of week 4, each team will give an oral (powerpoint) presentation (10 min.) on the case study. In the presentation, the case study will be discussed in the light of the moral philosophical frameworks (provided in lecture 2).
- Human evolution is characterized by invention and curiosity and has shaped the environment in which we live today. In this lecture, we will follow mankind from prehistory to modern times in its ascent to understand nature and to create and shape the

environment within the context of its 'Zeitgeist'. This historical overview is a narrative in which different concrete engineering problems will be highlighted which will be the problem solving exercises in tutorials and against which students will be able to test their problem solving capability.

- The challenges for a sustainable future will be discussed and some practical approaches will be provided.

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 outcomes

- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment task

- Participation

Learning and teaching activity

- Human evolution is characterized by invention and curiosity and has shaped the environment in which we live today. In this lecture, we will follow mankind from prehistory to modern times in its ascent to understand nature and to create and shape the environment within the context of its 'Zeitgeist'. This historical overview is a narrative in which different concrete engineering problems will be highlighted which will be the problem solving exercises in tutorials and against which students will be able to test their problem solving capability.

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

- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment tasks

- Mathematical Modeling
- Core Engineering knowledge A
- Core Engineering knowledge B
- Core Engineering knowledge C
- Core Engineering knowledge D
- Presentation Core Engineering
- Exam
- Participation

Learning and teaching activities

- In this lecture we will discuss the organizational aspects of engineering projects and provide some helpful tools.
- Different practical sessions will be held on the use of Matlab. Spread out over different practical sessions, tutorials will be given by the tutors from the basic ingredients of Matlab (vectors and matrices) to plotting graphs and writing Matlab scripts. After each tutorial, students will have the opportunity to practice on exercises provided by the tutors.
- After a first lecture on the basic principles of mathematical modelling, we will discuss how to construct ordinary differential equations for a variety of engineering problems: Flow systems, moving object systems and structural systems.
- Human evolution is characterized by invention and curiosity and has shaped the environment in which we live today. In this lecture, we will follow mankind from prehistory

to modern times in its ascent to understand nature and to create and shape the environment within the context of its 'Zeitgeist'. This historical overview is a narrative in which different concrete engineering problems will be highlighted which will be the problem solving exercises in tutorials and against which students will be able to test their problem solving capability.

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

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment tasks

- Ethics Case studies - Group
- Mathematical Modeling
- Core Engineering knowledge A
- Core Engineering knowledge B
- Core Engineering knowledge C
- Core Engineering knowledge D
- Presentation Core Engineering
- Exam
- Participation

Learning and teaching activities

- In this introductory lecture, we will set the scope of this unit. We will briefly discuss the

role of the professional organization 'Engineers Australia' and set the scope for this unit that has an emphasis on problem solving, self-learning and self-development. We will also reflect on critical thinking and analytical thinking which are essential ingredients to problem solving and ethical decision making.

- In this lecture we will discuss the organizational aspects of engineering projects and provide some helpful tools.
- Engineering most often involves several stakeholders and may have significant impact on society and the environment. It is therefore essential that engineers are equipped with moral frameworks that can help in making the most ethical decision. After a brief overview of philosophical movements and thinkers in normative ethics, we will demonstrate the importance of ethical decision making in engineering and discuss some scenario's where ethical decisions are required. The philosophical frameworks may be a guide in addressing real world moral dilemmas encountered in the engineering profession.
- Different engineering ethics dilemma's (case studies) will be distributed to teams of 4 students in week 2. Each case study will be discussed in team and in the practical session of week 4, each team will give an oral (powerpoint) presentation (10 min.) on the case study. In the presentation, the case study will be discussed in the light of the moral philosophical frameworks (provided in lecture 2).
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- The challenges for a sustainable future will be discussed and some practical approaches will be provided.

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 outcome

- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.

Assessment tasks

- Mathematical Modeling
- Core Engineering knowledge A
- Core Engineering knowledge B
- Core Engineering knowledge C
- Core Engineering knowledge D
- Exam
- Participation

Learning and teaching activities

- In this lecture we will discuss the organizational aspects of engineering projects and provide some helpful tools.
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problem solving exercises in tutorials and against which students will be able to test their problem solving capability.

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 outcomes

- Demonstrating a good understanding of the role and importance of written and oral communication of technical concepts and solutions in engineering.
- Being able to apply foundational scientific knowledge (mathematics, physics and chemistry) to basic core engineering concepts such as encountered in mechanical and hydrodynamic problems, engines and motors and semiconductors.
- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment tasks

- Ethics Case studies - Group
- Presentation Core Engineering
- Participation

Learning and teaching activities

- An essential activity of professional engineers is report writing. This varies from project plans to technical reports, tenders and common communication tools such as memos, emails and letters. The essential ingredients of these reports will be discussed.
- Communication in engineering takes various forms: consultation and instructions, conversation, team meetings and presentations. We will discuss the essential characteristics of each of them and provide some guidelines on how to organize a meeting or give an oral presentation.
- Different engineering ethics dilemma's (case studies) will be distributed to teams of 4 students in week 2. Each case study will be discussed in team and in the practical session of week 4, each team will give an oral (powerpoint) presentation (10 min.) on the

case study. In the presentation, the case study will be discussed in the light of the moral philosophical frameworks (provided in lecture 2).

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcome

- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment tasks

- Ethics Case studies - Group
- Exam
- Participation

Learning and teaching activities

- In this introductory lecture, we will set the scope of this unit. We will briefly discuss the role of the professional organization 'Engineers Australia' and set the scope for this unit that has an emphasis on problem solving, self-learning and self-development. We will also reflect on critical thinking and analytical thinking which are essential ingredients to problem solving and ethical decision making.
- Engineering most often involves several stakeholders and may have significant impact on society and the environment. It is therefore essential that engineers are equipped with moral frameworks that can help in making the most ethical decision. After a brief overview of philosophical movements and thinkers in normative ethics, we will demonstrate the importance of ethical decision making in engineering and discuss some scenario's where ethical decisions are required. The philosophical frameworks may be a guide in addressing real world moral dilemmas encountered in the engineering profession.
- Different engineering ethics dilemma's (case studies) will be distributed to teams of 4

students in week 2. Each case study will be discussed in team and in the practical session of week 4, each team will give an oral (powerpoint) presentation (10 min.) on the case study. In the presentation, the case study will be discussed in the light of the moral philosophical frameworks (provided in lecture 2).

- The challenges for a sustainable future will be discussed and some practical approaches will be provided.

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- Demonstrating a good understanding and awareness of the main characteristics of engineering from a historical and contemporary perspective and recognizing professional, social, economical, ethical and environmental aspects of the engineering specialization.

Assessment tasks

- Ethics Case studies - Group
- Exam
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Learning and teaching activities

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- Communication in engineering takes various forms: consultation and instructions, conversation, team meetings and presentations. We will discuss the essential characteristics of each of them and provide some guidelines on how to organize a meeting or give an oral presentation.
- Engineering most often involves several stakeholders and may have significant impact on society and the environment. It is therefore essential that engineers are equipped with moral frameworks that can help in making the most ethical decision. After a brief

overview of philosophical movements and thinkers in normative ethics, we will demonstrate the importance of ethical decision making in engineering and discuss some scenario's where ethical decisions are required. The philosophical frameworks may be a guide in addressing real world moral dilemmas encountered in the engineering profession.

- Different engineering ethics dilemma's (case studies) will be distributed to teams of 4 students in week 2. Each case study will be discussed in team and in the practical session of week 4, each team will give an oral (powerpoint) presentation (10 min.) on the case study. In the presentation, the case study will be discussed in the light of the moral philosophical frameworks (provided in lecture 2).
- The challenges for a sustainable future will be discussed and some practical approaches will be provided.

Changes from Previous Offering

The emphasis in ENGG200 will now be more on engineering problem solving using engineering foundational skills (maths and physics). In addition we will touch on new concepts of mathematical modelling, basic thermodynamics and basic chemistry.