ENGG2050

Engineering Systems and Design Thinking

Session 1, Online-scheduled-weekday 2022

School of Engineering

Contents

General Information

Unit convenor and teaching staff

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Credit points
10

Prerequisites
(ENGG1050 or ENGG100) and (COMP1000 or COMP115) and (MATH1010 or MATH1015 or MATH135 or MATH132 or MATH1007 or DMTH137)

Corequisites

Co-badged status

Unit description
The 3rd SPINE unit aimed to develop professional, transferable and employability skills. The unit deals with the design of complex systems from a top-down perspective. Students will be exposed to different engineering management approaches (waterfall and Agile) and other tools involved in the field of systems engineering. Students will be able to apply Design Thinking processes and apply problem-solving heuristics to solve complex engineering systems.

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:

ULO1: Evaluate a complex engineering problem from a range of perspectives, such as technological, social, environmental, financial, professional and ethical.

ULO2: Analyse and describe large engineering problems and related systems and subsystems.

ULO3: Apply appropriate engineering modelling and management tools in analysing a large engineering system.

ULO4: Apply design thinking and associated thinking techniques in generating a variety of solutions.

ULO5: Explain and integrate human and non-technical elements in an engineering project and its associated systems.

General Assessment Information

Grading and passing requirement for unit

In order to pass this unit, a student must obtain a mark of 50 or more for the unit (i.e. obtain a passing grade P/ CR/ D/ HD).

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date.

Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark of zero.

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

Professional Hurdle (Fitness to practice)

Starting from 2nd year and onwards, all SPINE units will be applying the professional hurdle requirement widely known as “Fitness to Practice”. According to the policy, fitness to practice is deemed as exhibiting behaviours that demonstrate professional competence, acceptable professional behaviour, freedom from an impairment, and compliance with program-specific requirements needed for a student to practice properly and safely throughout their Practical, Clinical or Professional program or unit. Failure to demonstrate these qualities will result in students being at risk of not progressing in the professional engineering program regardless of their marks and grades within individual units. Please refer to the University policy for further details.

Assessment Tasks

Name	Weighting	Hurdle	Due
Workshop participation	10%	No	Throughout semester
Online quizzes	40%	No	W3-13 (see iLearn)
Case study 1	15%	No	W5
In class presentation	10%	No	W7
Case study 2	15%	No	W10
Infographic submission	10%	No	W13

Workshop participation

Assessment Type [1]: Participatory task
Indicative Time on Task [2]: 0 hours
Due: **Throughout semester**
Weighting: **10%**

Weekly participation in workshop activities. Indicative hours spent on assessment excludes scheduled workshop hours.

On successful completion you will be able to:

- Evaluate a complex engineering problem from a range of perspectives, such as technological, social, environmental, financial, professional and ethical.
- Analyse and describe large engineering problems and related systems and subsystems.
- Apply appropriate engineering modelling and management tools in analysing a large engineering system.
- Apply design thinking and associated thinking techniques in generating a variety of solutions.
- Explain and integrate human and non-technical elements in an engineering project and its associated systems.

Online quizzes

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 8 hours

Due: **W3-13 (see iLearn)**
Weighting: **40%**

8 online quizzes throughout session

On successful completion you will be able to:

- Analyse and describe large engineering problems and related systems and subsystems.
- Apply appropriate engineering modelling and management tools in analysing a large engineering system.
- Apply design thinking and associated thinking techniques in generating a variety of solutions.
- Explain and integrate human and non-technical elements in an engineering project and its associated systems.

Case study 1

Assessment Type [1]: Case study/analysis
Indicative Time on Task [2]: 20 hours
Due: **W5**
Weighting: **15%**

Case study on engineering systems

On successful completion you will be able to:

- Evaluate a complex engineering problem from a range of perspectives, such as technological, social, environmental, financial, professional and ethical.
- Analyse and describe large engineering problems and related systems and subsystems.
- Explain and integrate human and non-technical elements in an engineering project and its associated systems.

In class presentation

Assessment Type [1]: Presentation
Indicative Time on Task [2]: 2 hours
Due: **W7**
Weighting: **10%**

In class presentation on a given reserach topic

On successful completion you will be able to:

- Apply appropriate engineering modelling and management tools in analysing a large engineering system.
- Explain and integrate human and non-technical elements in an engineering project and its associated systems.

Case study 2

Assessment Type [1]: Case study/analysis
Indicative Time on Task [2]: 20 hours
Due: **W10**
Weighting: **15%**

Case study on engineering systems

On successful completion you will be able to:

- Evaluate a complex engineering problem from a range of perspectives, such as technological, social, environmental, financial, professional and ethical.
- Analyse and describe large engineering problems and related systems and subsystems.
- Explain and integrate human and non-technical elements in an engineering project and its associated systems.

Infographic submission

Assessment Type [1]: Poster
Indicative Time on Task [2]: 5 hours
Due: **W13**
Weighting: **10%**

Submission of infographics on a given topic relating to systems engineering

On successful completion you will be able to:

- Analyse and describe large engineering problems and related systems and subsystems.
- Apply design thinking and associated thinking techniques in generating a variety of

solutions.

- Explain and integrate human and non-technical elements in an engineering project and its associated systems.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Practical sessions start in Week 1.

COMMUNICATIONS

- Students are reminded the University will communicate all official notices to you by email to your university email account. Please read your @student.mq.edu.au email regularly, or forward it to an account you do read regularly.
- All announcements and other communications regarding this unit will be via the unit iLearn website, https://ilearn.mq.edu.au/
- *Please do not email unit convenors and tutors directly, but instead use the "General Discussion" or "Dialogue" tabs on the unit website in iLearn.*

TEXTBOOK

- B. S. Blanchard & W. J. Fabrycky, Systems Engineering and Analysis, Pearson, 5th edition, 2014.
- It is expected that every student will have access to this textbook - weekly readings are assigned (see the Unit Schedule on the unit's iLearn website) and must be completed before class.

OTHER RESOURCES

- The iLearn web page for this unit can be found at: https://ilearn.mq.edu.au/login/MQ/
- All unit resources and communications relating to this unit, including a week-by-week schedule of learning and assessment activities, will be provided via the iLearn unit website.

Unit Schedule

Refer to iLearn for detailed schedule.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). 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
- Assessment Procedure
- Complaints Resolution Procedure for Students and Members of the Public
- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/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

Academic Integrity

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

Student Support

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

The Writing Centre

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader
- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Macquarie University offers a range of Student Support Services including:

- IT Support
- Accessibility and disability support with study
- Mental health support
- Safety support to respond to bullying, harassment, sexual harassment and sexual assault
- Social support including information about finances, tenancy and legal issues

Student Enquiries

Got a question? Ask us via AskMQ, or contact Service Connect.

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.

Changes from Previous Offering

2nd offering. Changes since 2021:

There have been some changes made to:

- Online quizzes
- Questions in the case studies
- Penalty for late submissions
- and other minor concerns and feedback by students via LEU and LET.

Engineers Australia Competency Mapping

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	
	1.3 In-depth understanding of specialist bodies of knowledge	
	1.4 Discernment of knowledge development and research directions	
	1.5 Knowledge of engineering design practice	
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	3,5
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	1,2,3
	2.2 Fluent application of engineering techniques, tools and resources.	2,3,5
	2.3 Application of systematic engineering synthesis and design processes.	4
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	1,2
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	1
	3.2 Effective oral and written communication in professional and lay domains.	1
	3.3 Creative, innovative and pro-active demeanour.	
	3.4 Professional use and management of information.	
	3.5 Orderly management of self, and professional conduct.	
	3.6 Effective team membership and team leadership	

Changes since First Published

Date	Description
02/02/2022	Updated General Assessment Information inline with faculty requirements. Added Engineers Australia Competency Mapping inline with school requirements.