



ENGG2050

Engineering Systems and Design Thinking

Session 1, In person-scheduled-weekday, North Ryde 2023

School of Engineering

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General Information

Unit convenor and teaching staff

Co-convenor

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By Appointment

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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 requirements for unit

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

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

Hurdle Requirements

Starting from 2nd year and onwards, all SPINE units will be applying a 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.

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of ‘0’ will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is 11:55 pm. A 1-hour grace period will be provided to students who experience a technical concern. **You should contact your convenor for any anticipated issues that might prevent you from a timely submission of work.**

Re-submission for any submitted and/or graded work will not be allowed.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for Special Consideration.

Assessments where Late Submissions will be accepted: Case Study 1, Case Study 2, Infographic, Video Submission

Assessments where Late Submissions will NOT be accepted: 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 assessments are required to be submitted through the assessment submission portal on iLearn.

Special Consideration

The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due
Workshop participation	10%	No	Throughout Session
Online quizzes	40%	No	Wees 3-13, See iLearn
Case study 1	15%	No	Week 5
In class presentation	10%	No	Week 7
Case study 2	15%	No	Week 10
Infographic submission	10%	No	Week 13

Workshop participation

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 0 hours

Due: **Throughout Session**

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: **Wees 3-13, See iLearn**

Weighting: **40%**

8 online quizzes throughout session

On successful completion you will be able to:

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

Case study 1

Assessment Type ¹: Case study/analysis

Indicative Time on Task ²: 20 hours

Due: **Week 5**

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: **Week 7**

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: **Week 10**

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: **Week 13**

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.

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 Session 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 other staff directly, but instead use the "Important Private Messages to Unit Contacts" forum on the unit website in iLearn.

TEXTBOOK

- B. S. Blanchard & W. J. Fabrycky, Systems Engineering and Analysis, Pearson, 5th edition, 2014.

It is required that every student 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. A limited number of copies are available through the library.

OTHER RESOURCES

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.

COVID-19 Information

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](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 \(https://students.mq.edu.au/support/study/policies\)](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 \(https://policies.mq.edu.au\)](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 Advocacy](#) provides independent advice on MQ policies, procedures, and processes

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

The case studies have been changed. Additional information for each activity is provided with the activity. Late Submission policy has changed to reflect university policy.

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.	ULO3, ULO5
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO1, ULO2, ULO3
	2.2 Fluent application of engineering techniques, tools and resources.	ULO2, ULO3, ULO5
	2.3 Application of systematic engineering synthesis and design processes.	ULO4
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	ULO1, ULO2
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	ULO1
	3.2 Effective oral and written communication in professional and lay domains.	ULO1
	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	
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