



# ENGG450

## Systems Design and Engineering

S1 Day 2017

*Dept of Engineering*

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## General Information

Unit convenor and teaching staff

Unit Convenor

Graham Town

[graham.town@mq.edu.au](mailto:graham.town@mq.edu.au)

Contact via [graham.town@mq.edu.au](mailto:graham.town@mq.edu.au)

E6B 133

9-11am Tuesdays.

Credit points

3

Prerequisites

(69cp at 100 level or above) including ENGG300 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

Corequisites

Co-badged status

ENGG650

Unit description

This unit deals with the design of complex systems from a top-down integrated perspective, concentrating on methods for maximising system performance. The unit includes elements of system design covering the complete life cycle of engineering systems, including: needs identification; functional analysis, detailed design and development; system modelling and optimisation techniques; decision analysis and economic evaluation of alternatives; design for reliability and usability, system test and evaluation; and project management techniques.

## 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:

Understand the reasons for, and be able to use, appropriate processes for designing engineering systems

Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.

Demonstrated ability in project management and group work skills

Demonstrated ability in self-learning and information retrieval skills

Demonstrated ability in oral and written communication skills for system design and engineering

Demonstrated understanding of the role and impact of engineers in society

## General Assessment Information

- Classes are co-taught, however for assessment purposes any groupwork must be completed with students enrolled in the same unit.
- Assessable tasks are to be completed by the due date - requests for extension must be submitted to the unit coordinator before the due date.
- Students are reminded of University policies on [assessment](#), [academic honesty](#) and [disruption to studies](#).

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Participation</a>	10%	No	weekly
<a href="#">Quizzes</a>	10%	No	prior to relevant class
<a href="#">Projects/Assignments</a>	40%	No	see iLearn for unit schedule
<a href="#">Final Exam</a>	40%	No	to be advised

### Participation

Due: **weekly**

Weighting: **10%**

Students are expected to actively participate in and contribute to class discussions, based on their experience and weekly readings. Marks will be awarded based on the quality and quantity of participation.

Late arrival or lack of attendance or lack of participation in more than 3 out of 13 weekly classes will result in an incomplete mark for this component of the assessment.

On successful completion you will be able to:

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem

solving.

- Demonstrated ability in project management and group work skills
- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated ability in oral and written communication skills for system design and engineering
- Demonstrated understanding of the role and impact of engineers in society

## Quizzes

Due: **prior to relevant class**

Weighting: **10%**

Weekly quizzes reviewing material for the coming week to be completed before class each week.

On successful completion you will be able to:

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Demonstrated ability in self-learning and information retrieval skills

## Projects/Assignments

Due: **see iLearn for unit schedule**

Weighting: **40%**

Four major projects or assignments (each 10 %) on system analysis, communication, and system design to be completed during the semester.

On successful completion you will be able to:

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in project management and group work skills
- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated ability in oral and written communication skills for system design and engineering
- Demonstrated understanding of the role and impact of engineers in society

## Final Exam

Due: **to be advised**

Weighting: **40%**

## Final Exam

On successful completion you will be able to:

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in oral and written communication skills for system design and engineering

## Delivery and Resources

### 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.

### CLASS ARRANGEMENTS

- In most weeks classes are run as 3 hour small group tutorial/discussions. To ensure the small group numbers remain balanced, you must seek permission from the Unit Convenor if you wish to transfer between designated classes.
- On a small number of weeks all groups will meet together at one place and time, e.g. for guest lectures. These weeks will be Week 1, and other weeks as per the unit schedule prepared by the Unit Convenor (available on the iLearn unit web page).
- Reading and assignments will be given instead of lecture/laboratory classes. Students are expected to spend at least 3 hours per week on these activities, i.e. in lieu of additional class time.

### ASSESSMENT

- To complete this unit satisfactorily all assessable tasks must be completed.
- Assessable tasks are to be completed by the due date indicated in the unit schedule -

requests for extension must be submitted to the unit coordinator before the due date.

- Assessable work should conform to accepted standards for professional communication (e.g. in formatting, presentation, spelling, clarity, etc.) A useful resource on Engineering Communications may be found at <http://www.engineering.utoronto.ca/Directory/students/ecp/handbook.htm>

## TECHNOLOGY USED

- 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 will be provided via the iLearn unit website.

## CHANGES SINCE LAST OFFERING

- Unit schedule revised.
- Assessable tasks and weightings have been revised.

## Unit Schedule

Classes in ENGG450 involve pre-reading of the text followed by class discussions of the material, and working through of example problems. In later weeks students take the role of lecturer, moderating the presentation and discussions. This mode of teaching and learning is used to develop self-learning and communication skills, which are particularly important when working as a professional engineer.

Please refer to the unit schedule in the iLearn unit webpage for week-by-week details of class learning and assessment activities, and other relevant information.

## Learning and Teaching Activities

### Weekly classes

Tutorial/discussion of course material.

### Guest lectures

Guest lectures on how system design and engineering is practiced in specific industries (e.g. telecommunications, medical devices, etc).

### Assignments

Three major system analysis or system design tasks or problems to be completed during semester.

### Student presentations

Student presentations of course material to class.

## 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)

Assessment Policy [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.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 (in effect until Dec 4th, 2017): [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html)

Special Consideration Policy (in effect from Dec 4th, 2017): <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>

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 outcomes

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated understanding of the role and impact of engineers in society

### Assessment tasks

- Participation
- Projects/Assignments

### Learning and teaching activities

- Three major system analysis or system design tasks or problems to be completed during semester.

### 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 outcomes**

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in project management and group work skills
- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated ability in oral and written communication skills for system design and engineering
- Demonstrated understanding of the role and impact of engineers in society

## **Assessment tasks**

- Participation
- Projects/Assignments
- Final Exam

## **Learning and teaching activities**

- Tutorial/discussion of course material.
- Guest lectures on how system design and engineering is practiced in specific industries (e.g. telecommunications, medical devices, etc).
- Three major system analysis or system design tasks or problems to be completed during semester.
- Student presentations of course material to class.

## **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**

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.

- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated ability in oral and written communication skills for system design and engineering

## **Assessment tasks**

- Participation
- Quizzes
- Projects/Assignments

## **Learning and teaching activities**

- Tutorial/discussion of course material.
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- Student presentations of course material to class.

## **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**

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in project management and group work skills
- Demonstrated ability in self-learning and information retrieval skills
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- Participation
- Quizzes
- Projects/Assignments
- Final Exam

## Learning and teaching activities

- Tutorial/discussion of course material.
- Guest lectures on how system design and engineering is practiced in specific industries (e.g. telecommunications, medical devices, etc).
- Three major system analysis or system design tasks or problems to be completed during semester.
- Student presentations of course material to class.

## 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

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated ability in oral and written communication skills for system design and engineering
- Demonstrated understanding of the role and impact of engineers in society

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- Tutorial/discussion of course material.
- Three major system analysis or system design tasks or problems to be completed during semester.

## 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

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in project management and group work skills
- Demonstrated ability in self-learning and information retrieval skills

## Assessment tasks

- Participation
- Quizzes
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- Tutorial/discussion of course material.
- Three major system analysis or system design tasks or problems to be completed during semester.

## 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

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Demonstrated ability in project management and group work skills
- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated ability in oral and written communication skills for system design and engineering

## Assessment tasks

- Participation
- Projects/Assignments
- Final Exam

## Learning and teaching activities

- Tutorial/discussion of course material.
- Three major system analysis or system design tasks or problems to be completed during semester.
- Student presentations of course material to class.

## 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 outcomes

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
- Demonstrated ability in self-learning and information retrieval skills
- Demonstrated ability in oral and written communication skills for system design and engineering
- Demonstrated understanding of the role and impact of engineers in society

## Assessment tasks

- Participation
- Projects/Assignments

## Learning and teaching activities

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## 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 outcomes

- Understand the reasons for, and be able to use, appropriate processes for designing engineering systems
- Ability to use appropriate tools to perform critical analysis, decision making, and problem solving.
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