



# ENGG411

## Engineering Research Thesis

S2 Day 2015

*Dept of Engineering*

### Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	5
<u>Policies and Procedures</u>	5
<u>Graduate Capabilities</u>	7

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## General Information

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Credit points 12
Prerequisites 75cp and ENGG460 and (ELEC426 or ELEC436 or ELEC446 or ELEC466 or ELEC476 or ELEC486 or MECH401)
Corequisites
Co-badged status
Unit description This unit is an individual research thesis in which students conduct research on a topic in their Engineering major under the direction of an academic supervisor.

## 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 undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.

Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement, simulation, modelling and analysis, and environmental constraints and safety issues

Ability to identify, formulate and solve engineering problems in an ethical manner,

including complex and open-ended problems, using established engineering methods, processes, and procedures.

Ability to apply research principles, research methods, and technical standards as well as further learning to identify and provide solutions to complex problems with intellectual independence.

Ability to design and implement the necessary experimental or computational processes, information management, records keeping, project management, and communications that should be undertaken for an engineering research investigation.

Ability to manage, and participate in, complex intra- and cross-disciplinary engineering projects through applying established systematic approaches.

## Assessment Tasks

Name	Weighting	Due
<u>Progress Report</u>	10%	13 September 2015
<u>Final Report</u>	70%	8 November 2015
<u>Presentation, Demo and Poster</u>	20%	18 November 2015

### Progress Report

Due: **13 September 2015**

Weighting: **10%**

The detailed requirements are available in in the Unit Introduction slides on iLearn.

On successful completion you will be able to:

- Ability to undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement, simulation, modelling and analysis, and environmental constraints and safety issues
- Ability to identify, formulate and solve engineering problems in an ethical manner, including complex and open-ended problems, using established engineering methods,

processes, and procedures.

- Ability to apply research principles, research methods, and technical standards as well as further learning to identify and provide solutions to complex problems with intellectual independence.
- Ability to design and implement the necessary experimental or computational processes, information management, records keeping, project management, and communications that should be undertaken for an engineering research investigation.
- Ability to manage, and participate in, complex intra- and cross-disciplinary engineering projects through applying established systematic approaches.

## Final Report

Due: **8 November 2015**

Weighting: **70%**

The detailed requirements are available in the Unit Introduction slides on iLearn.

On successful completion you will be able to:

- Ability to undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement, simulation, modelling and analysis, and environmental constraints and safety issues
- Ability to identify, formulate and solve engineering problems in an ethical manner, including complex and open-ended problems, using established engineering methods, processes, and procedures.
- Ability to apply research principles, research methods, and technical standards as well as further learning to identify and provide solutions to complex problems with intellectual independence.
- Ability to design and implement the necessary experimental or computational processes, information management, records keeping, project management, and communications that should be undertaken for an engineering research investigation.
- Ability to manage, and participate in, complex intra- and cross-disciplinary engineering projects through applying established systematic approaches.

## Presentation, Demo and Poster

Due: **18 November 2015**

Weighting: **20%**

Each presenter will be allocated 20 mins for the talk plus 5 mins for Q&A

On successful completion you will be able to:

- Ability to undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement, simulation, modelling and analysis, and environmental constraints and safety issues
- Ability to apply research principles, research methods, and technical standards as well as further learning to identify and provide solutions to complex problems with intellectual independence.
- Ability to design and implement the necessary experimental or computational processes, information management, records keeping, project management, and communications that should be undertaken for an engineering research investigation.

## Delivery and Resources

The students need to talk to their supervisors on the project related resources.

## 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.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.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](#).

## **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://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use 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

- Ability to undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to identify, formulate and solve engineering problems in an ethical manner, including complex and open-ended problems, using established engineering methods, processes, and procedures.
- Ability to apply research principles, research methods, and technical standards as well as further learning to identify and provide solutions to complex problems with intellectual independence.
- Ability to design and implement the necessary experimental or computational processes, information management, records keeping, project management, and communications that should be undertaken for an engineering research investigation.

### Assessment tasks

- Progress Report
- Final Report
- Presentation, Demo and Poster

### 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

- Ability to undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to identify, formulate and solve engineering problems in an ethical manner, including complex and open-ended problems, using established engineering methods, processes, and procedures.
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- Ability to design and implement the necessary experimental or computational processes, information management, records keeping, project management, and communications that should be undertaken for an engineering research investigation.
- Ability to manage, and participate in, complex intra- and cross-disciplinary engineering projects through applying established systematic approaches.

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## 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

- Ability to undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.



- Ability to apply research principles, research methods, and technical standards as well as further learning to identify and provide solutions to complex problems with intellectual independence.

## **Assessment tasks**

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## **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 undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement, simulation, modelling and analysis, and environmental constraints and safety issues

## **Assessment tasks**

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## **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 undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement, simulation, modelling and analysis, and environmental constraints and safety issues
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- Ability to manage, and participate in, complex intra- and cross-disciplinary engineering projects through applying established systematic approaches.

## **Assessment tasks**

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## **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 undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to identify, formulate and solve engineering problems in an ethical manner, including complex and open-ended problems, using established engineering methods, processes, and procedures.
- Ability to apply research principles, research methods, and technical standards as well as further learning to identify and provide solutions to complex problems with intellectual independence.

## Assessment tasks

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## 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

- Ability to undertake a complex engineering specific research project involving the development of new knowledge, using appropriate technical laboratory skills, data management and synthesis, critical analysis and interpretation of results; culminating in an effective written dissertation and oral presentation to a variety of audiences in research fora.
- Ability to design and implement the necessary experimental or computational processes, information management, records keeping, project management, and communications that should be undertaken for an engineering research investigation.
- Ability to manage, and participate in, complex intra- and cross-disciplinary engineering projects through applying established systematic approaches.

## Assessment tasks

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- Final Report
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## 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

- Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement, simulation, modelling and analysis, and environmental constraints and safety issues
- Ability to identify, formulate and solve engineering problems in an ethical manner, including complex and open-ended problems, using established engineering methods, processes, and procedures.

## Assessment tasks

- Progress Report
- Final Report
- Presentation, Demo and Poster

## 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

- Ability to demonstrate an advanced knowledge of contextual factors, research direction, and underpinning information impacting the engineering discipline, including risk identification and management, design metrics and alternatives, systems measurement,

simulation, modelling and analysis, and environmental constraints and safety issues

- Ability to identify, formulate and solve engineering problems in an ethical manner, including complex and open-ended problems, using established engineering methods, processes, and procedures.

## **Assessment tasks**

- Progress Report
- Final Report
- Presentation, Demo and Poster