ELEC466

Advanced Mechatronic Engineering

S1 Day 2014

Dept of Engineering

Contents

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General Information

Unit convenor and teaching staff
Unit Convenor
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Credit points
3

Prerequisites
ELEC326(P) and ELEC342(P)

Corequisites

Co-badged status

Unit description
This unit integrates prior learning in a specialist area of engineering with problem solving, emerging technology and aspects of engineering application, technical reporting and self-management to prepare students to work at a professional capacity. The unit aims to address the application of fundamental principles and methods at an advanced level in the context of standards and practices, modelling, analysis, design and practical implementation. The unit also develops skills in the critical evaluation of information, software and sources of error, and experimental methods. Learning will be achieved using case studies, laboratories, presentations, group work and traditional lecture format. The specific topics will focus on current advances in the area such as microcontrollers, MEMs, nanotechnologies, control systems, sensors and actuators, mechanical interfacing, advanced electronics systems such as analogue-to-digital conversion, power conversion and control, and IC design.

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:

demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical

synthesize this knowledge and understanding in the design and creation of a

mechatronic system

Evaluate and critique relevant data and technical writing

Demonstrate planning, creativity, problem solving, initiative and time management skills in the completion of a major project

Understand a wide range of advanced topics relevant to mechatronic engineering

Assessment Tasks

Name	Weighting	Due
Project Logbook	15%	Week 13
Engagement	3%	week 13
Project Plan	5%	Week 3
Assignments	10%	TBD
Brief Technical Report	5%	Week 4
Improved Technical Report	7%	Week 8
Peer Review of Reports	5%	Week 5
Project Outcome and Report	30%	Week 13
Final Exam	20%	exam period

Project Logbook

Due: **Week 13**
Weighting: **15%**

Whenever working on your major project you should use an individual log book to document your progress. This is preferably a bound paper document. In grading you log book, I will be looking for dates, times, of work done, as well as evidence of quality work. This is your chance to show the good work you have done on the group project. If you work as a consultant, a log of your work is an important part of billing for hours.

The individual project log is worth 20% of your final grade.

Due: end of week 13.

On successful completion you will be able to:
- synthesize this knowledge and understanding in the design and creation of a

mechatronic system

- Demonstrate planning, creativity, problem solving, initiative and time management skills in the completion of a major project

Engagement

Due: **week 13**
Weighting: **3%**

You will be graded on your engagement with the material and the wider engineering community. You are encouraged to make contributions in class, and to share news, discoveries, triumphs, etc through the twitter #MQMechatronics, which is fed to the iLearn page, and/or on the class discussion page, and/or through other written means.

This will contribute 3% to your final grade and will be assessed after week 13.

On successful completion you will be able to:

- demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical
- Demonstrate planning, creativity, problem solving, initiative and time management skills in the completion of a major project

Project Plan

Due: **Week 3**
Weighting: **5%**

In Week 1 you will form groups and choose a major project. Your first assignment will be a project plan. This document must clearly show

· what each member will be responsible for

· Initial concept sketches and descriptions

· Back-up plans should initial plans fail

· Budget estimates

· Timeline of deliverables and milestones

· It must include a brief section detailing the contributions of team member to the document. This should include an overall percentage contribution from each team member that must add up to 100%. This will be used to differentiate grades within a group.

This group document is worth 5% of your final grade. If major changes are required, an updated project plan should be submitted.

Due: End of week 3.

On successful completion you will be able to:
- Evaluate and critique relevant data and technical writing
- Demonstrate planning, creativity, problem solving, initiative and time management skills in the completion of a major project

Assignments

Due: **TBD**
Weighting: **10%**

There will be 3 or 4 short assignments which review topics covered in lecture. These are worth a total of 10% of your final grade.

On successful completion you will be able to:
- demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical
- Understand a wide range of advanced topics relevant to mechatronic engineering

Brief Technical Report

Due: **Week 4**
Weighting: **5%**

You are to individually prepare a brief technical report on a topic of relevance to your major project. It should cover one topic in depth, detailing the options and technology choices in the area. It should conclude with a well justified implementation plan/decision. Suitable topics include, but are not limited to, component choice, material choice or manufacturing options.

The report may include figures and images and should have a length of 700 to 1000 words. The report will be graded by two of your peers and scaled appropriately to produce a class average of ~66% with ~10% Ds and HDs. It is worth 5% of your final grade.

You must submit a .doc to ilearn for assessment.

Due: first class in week 4.

On successful completion you will be able to:
- demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical
- Evaluate and critique relevant data and technical writing

Improved Technical Report

Due: **Week 8**
Weighting: **7%**

You will receive your peer reviewed technical reports in Week 5. You will then act on the feedback that you received and improve your report, paying particular attention to clarity and structure.

This document will then be submitted to iLearn for grading by the Lecturer. It is worth 7% of your final grade

Due: first class in week 8.

On successful completion you will be able to:

- demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical
- Evaluate and critique relevant data and technical writing

Peer Review of Reports

Due: **Week 5**
Weighting: **5%**

You will provide feedback and grading on two of your peers technical reports. You will be randomly assigned two of your peers technical reports. You will provide feedback and grading on the two reports. Your feedback may be written on the reports in red ink, or you may use "track changes" and other software tools to edit and provide comments/feedback.

Your feedback will be graded by the lecturer/tutor, and together are worth 5% of your final grade.

These two documents should also be submitted to ilearn.

Due: first class in week 5.

On successful completion you will be able to:

- Evaluate and critique relevant data and technical writing

Project Outcome and Report

Due: **Week 13**
Weighting: **30%**

Your major project will be graded for completion and quality. You must also submit a brief project report..

This report should

· provide the reader with enough information to re-created your device.

· It should include drawings, and component data sheets.

· You may wish to include important calculations or justifications for decisions made.

· It should also include a set of instructions for using and or controlling the device.

· It must include a brief section detailing the roles and responsibilities of each team member. This should include an overall percentage contribution from each team member that must add up to 100%. This will be used to differentiate grades within a group.

· It should not include a description of your journey, mental, physical, emotional or otherwise.

You must also submit a brief (~100 word) confidential reflection on your role in the project

The group project report is worth 15% of your final grade, and the project outcome is worth 15% of your final grade.

Projects and project reports will be graded in the last hour of the last prac.

On successful completion you will be able to:

- synthesize this knowledge and understanding in the design and creation of a mechatronic system
- Demonstrate planning, creativity, problem solving, initiative and time management skills in the completion of a major project

Final Exam

Due: **exam period**
Weighting: **20%**

The final exam will cover topics dealt with in lectures. You are permitted one A4 sheet of hand-written notes. It will be a mix of problems, concepts and writing. It will be given in the first week of the exam period at a time to be determined by the class, the exam duration will be 2 hours, and it will be worth 20% of your final grade.

On successful completion you will be able to:

- demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical
- Understand a wide range of advanced topics relevant to mechatronic engineering

Delivery and Resources

We will make use of Computer Aided Drafting, namely PTC CREO and MATLAB.

This is the first offering of this unit.

Learning and Teaching Activities

Group Project

Students choose a major project to complete

Assignments

Students will complete assignments as needed to consolidate learning

Technical report

Students will prepare and improve upon a brief technical report of relevance to their group project

Peer Review

Students will provide feedback to other students' technical reports.

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

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

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/

No extensions will be granted. Late tasks will be accepted up to 72* hours after the submission deadline. There will be a deduction of 20%* of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 40% penalty). This penalty does not apply for cases in which an application for special consideration is made and approved.

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://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

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

- Demonstrate planning, creativity, problem solving, initiative and time management skills in the completion of a major project

Learning and teaching activities

- Students choose a major project to complete
- Students will prepare and improve upon a brief technical report of relevance to their group project
- Students will provide feedback to other students' technical reports.

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

- demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical
- synthesize this knowledge and understanding in the design and creation of a mechatronic system
- Understand a wide range of advanced topics relevant to mechatronic engineering

Learning and teaching activities

- Students choose a major project to complete

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

- demonstrate your understanding of core concepts in three areas of engineering: software, electronic and mechanical
- Understand a wide range of advanced topics relevant to mechatronic engineering

Learning and teaching activities

- Students choose a major project to complete
- Students will complete assignments as needed to consolidate learning

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 outcome

- synthesize this knowledge and understanding in the design and creation of a mechatronic system

Learning and teaching activities

- Students choose a major project to complete
- Students will provide feedback to other students' technical reports.

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

- synthesize this knowledge and understanding in the design and creation of a mechatronic system

Learning and teaching activities

- Students choose a major project to complete
- Students will complete assignments as needed to consolidate learning

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

- synthesize this knowledge and understanding in the design and creation of a mechatronic system

Learning and teaching activities

- Students choose a major project to complete

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 outcome

- Evaluate and critique relevant data and technical writing

Assessment task

- Engagement

Learning and teaching activity

- Students choose a major project to complete
- Students will prepare and improve upon a brief technical report of relevance to their group project
- Students will provide feedback to other students' technical reports.

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:

Assessment task

- Engagement

Learning and teaching activity

- Students will complete assignments as needed to consolidate learning
- Students will provide feedback to other students' technical reports.