



MTRN2060

Introduction to Mechatronics

Session 2, Special circumstance, North Ryde 2020

School of Engineering

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Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff

Lecturer and Convenor

David Inglis

david.inglis@mq.edu.au

Contact via x9144

9WW-321

Tuesday 4-5pm, Thursday 8-9am

Tutor

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Tutor

Foez Ahmed

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Credit points

10

Prerequisites

((PHYS1510 or PHYS140) or ((PHYS1020 or PHYS106) and (PHYS1010 or PHYS107))) and (MATH1020 or MATH1025 or MATH136 or MATH133)

Corequisites

Co-badged status

Unit description

This unit introduces the basic components of mechatronic systems including sensors, actuators, decision-making components and the electronics that connect them. It details how these individual components work, and how they are integrated into simple systems. This process empowers students to be engineers and makers who see how instrumentation and automation surround us and enable modern life. The unit builds on foundations in electricity, mechanics, and programming and asks participants to learn how sensors and actuators work (physics), how they interact (signals), and how they behave (system response). The unit is essential for further study in the field of mechatronic engineering, where the simple systems examined and experimented with here are built into complex automated electromechanical machines.

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: Demonstrate theoretical and practical understanding of a modern micro-controller

ULO2: Demonstrate theoretical and practical use of a variety of sensors, actuators, and appropriate interfacing electronics.

ULO3: Demonstrate practical use and theoretical understanding of electromechanics and small DC motors.

ULO4: Apply creativity and initiative in building self-directed mechatronic systems.

ULO5: Demonstrate a qualitative understanding of system response, including 2nd order systems.

General Assessment Information

Grading and passing requirement for unit

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

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).

Late submissions and Resubmissions

Late submissions for assignments will attract a penalty of 10/100 marks per day. Extenuating circumstances will be considered upon lodgement of an application for special consideration. Re-submissions of work are not allowed.

There will be practical classes in week 1

Assessment Tasks

Name	Weighting	Hurdle	Due
Sensor Data Analysis	2%	No	Week 5
Final Exam	35%	No	Formal Exam Period
Self Directed Practical Project	7%	No	Week 13
Weekly Practical Tasks	40%	No	Weekly
Online Quizzes	16%	No	Weekly

Sensor Data Analysis

Assessment Type ¹: Problem set

Indicative Time on Task ²: 4 hours

Due: **Week 5**

Weighting: **2%**

students will be given raw data from an accelerometer and asked to analyze the data.

On successful completion you will be able to:

- Demonstrate theoretical and practical use of a variety of sensors, actuators, and appropriate interfacing electronics.
- Demonstrate a qualitative understanding of system response, including 2nd order systems.

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 18 hours

Due: **Formal Exam Period**

Weighting: **35%**

2 hour closed book exam. You will be permitted to bring one, double sided sheet of hand written notes and a calculator. No other formulas will be given during the exam.

On successful completion you will be able to:

- Demonstrate theoretical and practical understanding of a modern micro-controller
- Demonstrate theoretical and practical use of a variety of sensors, actuators, and appropriate interfacing electronics.
- Demonstrate practical use and theoretical understanding of electromechanics and small DC motors.
- Demonstrate a qualitative understanding of system response, including 2nd order systems.

Self Directed Practical Project

Assessment Type ¹: Project

Indicative Time on Task ²: 11 hours

Due: **Week 13**

Weighting: **7%**

In the final two weeks of term you will complete and present a mechatronic project of your own design. The rubric for this task will be posted on iLearn.

On successful completion you will be able to:

- Demonstrate theoretical and practical understanding of a modern micro-controller
- Demonstrate theoretical and practical use of a variety of sensors, actuators, and appropriate interfacing electronics.
- Apply creativity and initiative in building self-directed mechatronic systems.

Weekly Practical Tasks

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 33 hours

Due: **Weekly**

Weighting: **40%**

You will complete small projects in practical sessions with guidance provided by worksheets. Completion of the tasks during the allocated on-campus time will require significant preparation at home using the required electronics equipment.

On successful completion you will be able to:

- Demonstrate theoretical and practical understanding of a modern micro-controller
- Demonstrate theoretical and practical use of a variety of sensors, actuators, and appropriate interfacing electronics.
- Demonstrate practical use and theoretical understanding of electromechanics and small DC motors.
- Demonstrate a qualitative understanding of system response, including 2nd order systems.

Online Quizzes

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 22 hours

Due: **Weekly**

Weighting: **16%**

Weekly online quizzes can be taken outside of class and can be attempted multiple times. A delay between attempts may be imposed to encourage students to attempt the quiz before lecture.

On successful completion you will be able to:

- Demonstrate theoretical and practical understanding of a modern micro-controller
- Demonstrate theoretical and practical use of a variety of sensors, actuators, and appropriate interfacing electronics.
- Demonstrate practical use and theoretical understanding of electromechanics and small DC motors.
- Demonstrate a qualitative understanding of system response, including 2nd order 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

Textbook

Introduction to Mechatronics and Measurement Systems by Alciatore and Hstand. (3rd or 4th Edition is suitable)

Equipment

You must have your own Arduino electronics kit (as supplied to you in ENGG1000). It must contain the following items:

1 arduino, 1 breadboard, 30 wires, 10 LEDs various color, 10 330R, 2 10kR, 1 turnpot, 2 pushbottons, 1 buzzer,

You will be supplied with the following components. 1 photoresistor, 1 temperature sensor, 1 transistor (BJT or MOSFET) (500mA), 1 diode, 2 ~200R, 2 ~100R, 2 ~75R, 1 cheap DC motor, 1 INA125 instrumentation amplifier,

Textbook homepage: <http://mechatronics.colostate.edu/>

Technology and Software: We will use Arduino microcontrollers for all practical sessions. You will also be expected to analyse data using matlab, MS Excel or some other program of your choice.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

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

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/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

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 help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [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

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

If you are a Global MBA student contact globalmba.support@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/.

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

Deeper coverage of magnetic systems to include nonlinear materials in magnetic circuits.

Re-arrangement of prac topics to allow for less on-campus time