



# MTRN3026

## Mechatronic Systems

Session 2, In person-scheduled-weekday, North Ryde 2022

*School of Engineering*

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#### Disclaimer

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## General Information

Unit convenor and teaching staff

Unit convenor and lecturer

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Credit points

10

Prerequisites

(MTRN2060 or ELEC260) and completion of 130cp

Corequisites

Co-badged status

Unit description

This unit builds on the instrumentation foundation of MTRN2060 and the system control concepts of ELEC3024. It introduces a number of mechatronic specific topics including AC electric motors and drives, pneumatics, application specific integrated circuits, and advanced control. It requires the application of design and modelling procedures developed in prerequisites, and through medium-scale projects, prepares students to undertake advanced projects.

## 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:** Describe and differentiate the components of mechatronic systems

**ULO2:** analyse the performance of AC motor drives and controller

**ULO3:** apply pneumatics, and PLCs integrated with pneumatics, to control mechatronic systems

**ULO4:** demonstrate understanding of modelling of mechatronic systems and kinematics of robotic systems

## General Assessment Information

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).

Test#3 is equivalent to Final Examination. The final examination is a hurdle requirement. A grade of 50% or more in the final examination is a condition of passing this unit. If you are given a second opportunity to sit the final examination as a result of failing to meet the minimum mark required, you will be offered that chance during the supplementary examination period and will be notified of the exact day and time after the publication of final results for the unit. The second attempt at a hurdle assessment is graded as pass fail. **The maximum grade for a second attempt is the hurdle threshold grade.**

If you receive special consideration for the final exam, a supplementary exam will be scheduled by the faculty during a supplementary exam period, typically about 3 to 4 weeks after the normal exam period. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

You must attend and participate in at least 11 of the 13 weekly practical classes to pass this unit. This is a hurdle requirement.

Participation in practical sessions is a hurdle requirement and students are required to attend at least 11 out of 13 sessions to pass this unit.

### Late Assessment Submission

Late assessments are not accepted in this unit unless a Special Consideration has been submitted and approved.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Practical Laboratory Report #2</u>	10%	No	Week 7 and 9
<u>Self-study topic and presentation</u>	10%	No	Week 13

Name	Weighting	Hurdle	Due
<u>Test#1</u>	10%	No	Week 3
<u>Test#3</u>	30%	Yes	TBA
<u>Practical Laboratory Report #3</u>	10%	Yes	Week 11 and 13
<u>Practical Laboratory Report#1</u>	10%	Yes	Week 3 and 5
<u>Test#2</u>	20%	No	Week 8

## Practical Laboratory Report #2

Assessment Type <sup>1</sup>: Lab report

Indicative Time on Task <sup>2</sup>: 8 hours

Due: **Week 7 and 9**

Weighting: **10%**

The students will conduct practical laboratory and write a report on the 2nd activity. The report will be due on Week#9.

On successful completion you will be able to:

- Describe and differentiate the components of mechatronic systems
- apply pneumatics, and PLCs integrated with pneumatics, to control mechatronic systems

## Self-study topic and presentation

Assessment Type <sup>1</sup>: Presentation

Indicative Time on Task <sup>2</sup>: 12 hours

Due: **Week 13**

Weighting: **10%**

The student will choose a topic of their choice and study by themselves. On Week#12, they have to give a presentation. They also need to write a report of 2 pages including around 5 papers.

On successful completion you will be able to:

- Describe and differentiate the components of mechatronic systems
- analyse the performance of AC motor drives and controller

- apply pneumatics, and PLCs integrated with pneumatics, to control mechatronic systems
- demonstrate understanding of modelling of mechatronic systems and kinematics of robotic systems

## Test#1

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 6 hours

Due: **Week 3**

Weighting: **10%**

Test #1 on the taught topics from Week#1 to #3.

On successful completion you will be able to:

- Describe and differentiate the components of mechatronic systems
- demonstrate understanding of modelling of mechatronic systems and kinematics of robotic systems

## Test#3

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 20 hours

Due: **TBA**

Weighting: **30%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

Test#3 will be the equivalent of the Final examination and will be held on Week#14.

On successful completion you will be able to:

- Describe and differentiate the components of mechatronic systems
- apply pneumatics, and PLCs integrated with pneumatics, to control mechatronic systems

## Practical Laboratory Report #3

Assessment Type <sup>1</sup>: Lab report

Indicative Time on Task <sup>2</sup>: 8 hours

Due: **Week 11 and 13**

Weighting: **10%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

The students will conduct practical laboratory and write a report on the third activity. The report will be due on Week#13.

On successful completion you will be able to:

- Describe and differentiate the components of mechatronic systems
- demonstrate understanding of modelling of mechatronic systems and kinematics of robotic systems

## Practical Laboratory Report#1

Assessment Type <sup>1</sup>: Lab report

Indicative Time on Task <sup>2</sup>: 8 hours

Due: **Week 3 and 5**

Weighting: **10%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

The students will conduct practical laboratory and write a report on the first activity. The report will be due on Week#5.

On successful completion you will be able to:

- Describe and differentiate the components of mechatronic systems

## Test#2

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 8**

Weighting: **20%**

Test#2 will be on the topics from Week#4 to Week#8

On successful completion you will be able to:

- Describe and differentiate the components of mechatronic systems
- analyse the performance of AC motor drives and controller

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<sup>1</sup> 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.

<sup>2</sup> 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

The lecture materials, pracs guidelines and the recorded content for the unit will be uploaded in 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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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 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/](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 section on Robotic arms has been taken away from the unit from 2022. That part will now be covered in the new unit MTRN3060 Robotics and Automation. Due to that a few section will be explained in more details.

More emphasis on PLC will be given.

The self-study topic will be around PLC. A mini-project on PLC will be introduced from 2022. The students will implement their self-study topic using PLCs available. The project activities on PLC will be for 4 weeks.

## 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
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	
	1.3 In-depth understanding of specialist bodies of knowledge	#2, #3
	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.	
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	#1, #4
	2.2 Fluent application of engineering techniques, tools and resources.	

	2.3 Application of systematic engineering synthesis and design processes.	
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	
	3.2 Effective oral and written communication in professional and lay domains.	#3
	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	#4

## Engineers Australia Competency Mapping