



# ENGG4201

## Internet of Things Systems Design

Session 1, In person-scheduled-weekday, North Ryde 2022

*School of Engineering*

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## General Information

Unit convenor and teaching staff

Lecturer

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Credit points

10

Prerequisites

Completion of 200CP at 1000 level or above or Admission in MEngElecEng

Corequisites

Co-badged status

ENGG8201 IoT System Design

Unit description

This unit will broadly explore the underlying technologies, applications, and systems design principles underlying the Internet of Things. Students will explore the principles of IoT systems while engaging in their own group-based design and build of a practical IoT system. To support the design and build process, the principles covered will begin with foundation knowledge in IoT devices and systems, including network architectures and technologies, sensors, embedded processing and actuators. Concepts will then build towards notions of IoT communications and data protocols, security, data visualization, Machine Learning and Artificial Intelligence techniques for IoT data, all highlighted by IoT application case studies.

## 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:** Apply knowledge of fundamental components to implement IoT system such as sensors, embedded processors, interfacing electronics and wireless communicating devices, in designing and building a simple IoT system.

**ULO2:** Select proper hardware to design and implement IoT systems for remote monitoring and control

**ULO3:** Explain critical IoT communications technologies and network protocols, security and implementation

**ULO4:** Demonstrate understanding of data management, visualization and analysis techniques for IoT Data

**ULO5:** Investigate, critically evaluate, and communicate the effectiveness and performance of different IoT systems and their constituent components.

## General Assessment Information

Individual research report: Student needs to write all activities on their note book individually. The log on activities will be checked every week, from Week#1 to till week#12. The first report is based on the actual problem they are going to solve. The students need to present it in the form of ppt presentation. The presentation will be held on Week#3. They have to write a small report. This activity is worth of 20%.

Demonstration of project work: Students will work on learning fundamental of IoT system during week #1 to #7. From Week#8 to Week#12, they will work on the project. They will be the demonstrating the outcome of the project on Week#13 during the pracs time. This activity is worth of 20%.

Final Examination: The Final examination will be based on the weekly lectorial which will be delivered during the time of the lecture.

Report on practical implementation of IoT project: Students will need to write a report on the final implementation of the project. The details guidelines will be provided later.

### Grading and passing requirement for unit

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).

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.

### Hurdle Requirements

There is no hurdle requirement in the unit.

### Late submissions and Resubmissions

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date.

Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark in accordance with the late submission policy as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Individual research report</u>	20%	No	WEEK#3
<u>Report on practical implementation of IoT project</u>	30%	No	Week#13
<u>Final Examination</u>	30%	No	TBA
<u>Demonstration of project work</u>	20%	No	Week#13

### Individual research report

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

Indicative Time on Task <sup>2</sup>: 9 hours

Due: **WEEK#3**

Weighting: **20%**

Individual research report on IoT literature and application case studies

On successful completion you will be able to:

- Investigate, critically evaluate, and communicate the effectiveness and performance of different IoT systems and their constituent components.

## Report on practical implementation of IoT project

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

Indicative Time on Task <sup>2</sup>: 14 hours

Due: **Week#13**

Weighting: **30%**

Working in groups, students will present the design problem and solution in the form of written report

On successful completion you will be able to:

- Apply knowledge of fundamental components to implement IoT system such as sensors, embedded processors, interfacing electronics and wireless communicating devices, in designing and building a simple IoT system.
- Select proper hardware to design and implement IoT systems for remote monitoring and control
- Explain critical IoT communications technologies and network protocols, security and implementation
- Demonstrate understanding of data management, visualization and analysis techniques for IoT Data

## Final Examination

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

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

Due: **TBA**

Weighting: **30%**

## Final Examination

On successful completion you will be able to:

- Apply knowledge of fundamental components to implement IoT system such as sensors, embedded processors, interfacing electronics and wireless communicating devices, in designing and building a simple IoT system.
- Select proper hardware to design and implement IoT systems for remote monitoring and control
- Explain critical IoT communications technologies and network protocols, security and implementation
- Demonstrate understanding of data management, visualization and analysis techniques for IoT Data

## Demonstration of project work

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

Indicative Time on Task <sup>2</sup>: 9 hours

Due: **Week#13**

Weighting: **20%**

Group-based demonstration of project work

On successful completion you will be able to:

- Apply knowledge of fundamental components to implement IoT system such as sensors, embedded processors, interfacing electronics and wireless communicating devices, in designing and building a simple IoT system.
- Select proper hardware to design and implement IoT systems for remote monitoring and control
- Explain critical IoT communications technologies and network protocols, security and implementation
- Demonstrate understanding of data management, visualization and analysis techniques for IoT Data

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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, tutorial and pracs materials 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](https://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

In 2021, the project activities were kept only for 3 weeks and the students could not complete the project.

In 2022, the project activities have been made for 5 weeks, starting from Week#8. In fact the students can start the project activities from the mid-semester break.

## 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.	#2
	1.3 In-depth understanding of specialist bodies of knowledge	#1, #2
	1.4 Discernment of knowledge development and research directions	#3
	1.5 Knowledge of engineering design practice	#1, #4
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	#2
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	#2, #3
	2.2 Fluent application of engineering techniques, tools and resources.	#3
	2.3 Application of systematic engineering synthesis and design processes.	#4
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	#1, #5
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	#2, #4
	3.2 Effective oral and written communication in professional and lay domains.	#2, #5

	3.3 Creative, innovative and pro-active demeanour.	#5
	3.4 Professional use and management of information.	#5
	3.5 Orderly management of self, and professional conduct.	#2, #4
	3.6 Effective team membership and team leadership	#1, #3