



# COMP8292

## Sensor Networks, Cloud and Edge Computing in IoT

Session 1, In person-scheduled-weekday, North Ryde 2024

*School of Computing*

### Contents

---

<a href="#"><u>General Information</u></a>	2
<a href="#"><u>Learning Outcomes</u></a>	2
<a href="#"><u>General Assessment Information</u></a>	3
<a href="#"><u>Assessment Tasks</u></a>	4
<a href="#"><u>Delivery and Resources</u></a>	7
<a href="#"><u>Unit Schedule</u></a>	8
<a href="#"><u>Policies and Procedures</u></a>	8

---

#### **Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

Unit Convenor and Lecturer

Dr. Yan Li

[y.li@mq.edu.au](mailto:y.li@mq.edu.au)

Contact via +61 2 9850 9577

Room 353, 4 Research Park Drive

By Appointment

Lecturer

Dr. Adnan Mahmood

[adnan.mahmood@mq.edu.au](mailto:adnan.mahmood@mq.edu.au)

Contact via +61 2 9850 9079

Room 286, 4 Research Park Drive

By Appointment

Credit points

10

Prerequisites

Corequisites

Co-badged status

Unit description

This unit aims to provide a solid theoretical and practical understanding of wireless sensor networks (WSN), and cloud and edge technologies that augment the capabilities of such networks from an IoT context. This unit will provide a detailed understanding of WSN sensor communication architecture and technology, and will examine routing, power management, and security protocols that have been specifically designed for WSNs. The unit will further examine cloud, edge, and cellular technologies and investigate solutions that facilitate the convergence of cloud computing with IoT to create a mobile ecosystem that facilitates monitoring, data gathering, and enhanced connectivity.

## 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:** Configure, administer, and troubleshoot wireless sensor communication protocols and complex IoT networks.

**ULO2:** Design and implement cloud-/edge-based IoT solutions and applications based on the customer requirements, and in accordance with the principles of project management to ensure an efficient and timely delivery of the said solutions and applications.

**ULO3:** Implement cloud computing-related tools and techniques such as virtual machines, and mobile services to augment sensor network capabilities.

**ULO4:** Identify security vulnerabilities, and design and implement security features' controls to protect wireless sensor networks and safeguard data stored in the cloud/edge.

**ULO5:** Demonstrate an understanding of modern cellular network architecture and how it supports IoT and sensor networks.

**ULO6:** Demonstrate an understanding of power management in IoT devices and sensor networks.

## General Assessment Information

### Special Consideration

The [Special Consideration Policy](#) aims to support Students who have been impacted by short-term circumstances or events that are serious, unavoidable, and significantly disruptive, and which may affect their performance in an Assessment. If a Student experiences circumstances or events which affect their ability to complete the Assessments in this Unit on time, they should inform the Unit Convenor and subsequently submit a Special Consideration Request through [Ask MQ](#).

### Late Assessment Submission Penalty

From 1 July 2022, students enrolled in Session based units with written assessments will have the following late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration Request has been submitted and approved, a 5% Penalty (of the Total Possible Marks of an Assessment) would be applied for each day an Assessment has not been submitted, i.e., up until the 7th day (including the weekends). Subsequent to the 7th day, a Grade of '0' would be awarded even if the Assessment is submitted. The submission time for all uploaded Assessments is 11:55 PM. A 1-hour grace period would be provided to Students who experience a technical concern.

For any late submission of the time-sensitive tasks, such as scheduled Individual Presentation and scheduled Workshop-based Tasks in the context of this particular Unit, please apply for [Special Consideration](#).

In this unit, late submissions will be accepted for the following assessment tasks:

- Assignment 2 - Literature Review: YES, Standard Late Penalty applies
- Assignment 3 – Major Project: YES, Standard Late Penalty applies
- Exam: NO, unless Special Consideration is granted

## Requirements To Pass The Unit

It goes without saying, but we'll say it anyway, that there are no recorded lectures for you to use if you miss things. The unit has lectures, but the unit is **about you, group discussion** with your peers and your participation is essential for success.

To pass this unit you must:

- Achieve a total mark equal to or greater than 50%.

There are no hurdles in this unit.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Workshop-based Tasks</a>	10%	No	Weeks 2 - 10
<a href="#">Literature Review</a>	20%	No	Week 6
<a href="#">Assignment 3</a>	30%	No	Week 11
<a href="#">Final Exam</a>	40%	No	S1 Exam Period

### Workshop-based Tasks

Assessment Type <sup>1</sup>: Practice-based task

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

Due: **Weeks 2 - 10**

Weighting: **10%**

Workshops offer Students an opportunity to learn and subsequently practice via Hands-on Activities in a Lab Setting under the supervision of a Lab Supervisor/Instructor. They further allow the Students to discuss the problems effectively with their Peers and maximize the Feedback they get on their work.

On successful completion you will be able to:

- Configure, administer, and troubleshoot wireless sensor communication protocols and complex IoT networks.

- Design and implement cloud-/edge-based IoT solutions and applications based on the customer requirements, and in accordance with the principles of project management to ensure an efficient and timely delivery of the said solutions and applications.

## Literature Review

Assessment Type <sup>1</sup>: Literature review

Indicative Time on Task <sup>2</sup>: 25 hours

Due: **Week 6**

Weighting: **20%**

Students will critically analyze relevant state-of-the-art Research Literature pertinent to the Discipline to present succinct arguments and conclusions in a highly systematic manner.

On successful completion you will be able to:

- Configure, administer, and troubleshoot wireless sensor communication protocols and complex IoT networks.
- Identify security vulnerabilities, and design and implement security features' controls to protect wireless sensor networks and safeguard data stored in the cloud/edge.
- Demonstrate an understanding of modern cellular network architecture and how it supports IoT and sensor networks.
- Demonstrate an understanding of power management in IoT devices and sensor networks.

## Assignment 3

Assessment Type <sup>1</sup>: Practice-based task

Indicative Time on Task <sup>2</sup>: 25 hours

Due: **Week 11**

Weighting: **30%**

Students will Design, Implement, and subsequently Test a Real-world Cloud-based IoT Scenario using various tools.

On successful completion you will be able to:

- Configure, administer, and troubleshoot wireless sensor communication protocols and complex IoT networks.

- Design and implement cloud-/edge-based IoT solutions and applications based on the customer requirements, and in accordance with the principles of project management to ensure an efficient and timely delivery of the said solutions and applications.
- Implement cloud computing-related tools and techniques such as virtual machines, and mobile services to augment sensor network capabilities.
- Demonstrate an understanding of power management in IoT devices and sensor networks.

## Final Exam

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

Indicative Time on Task <sup>2</sup>: 40 hours

Due: **S1 Exam Period**

Weighting: **40%**

A Final Exam assessing the Students' overall mastery of the Unit's Content.

On successful completion you will be able to:

- Design and implement cloud-/edge-based IoT solutions and applications based on the customer requirements, and in accordance with the principles of project management to ensure an efficient and timely delivery of the said solutions and applications.
- Implement cloud computing-related tools and techniques such as virtual machines, and mobile services to augment sensor network capabilities.
- Identify security vulnerabilities, and design and implement security features' controls to protect wireless sensor networks and safeguard data stored in the cloud/edge.
- Demonstrate an understanding of modern cellular network architecture and how it supports IoT and sensor networks.
- Demonstrate an understanding of power management in IoT devices and sensor networks.

---

<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**

### **Lectures**

Live (In-person) Lecture Sessions will be held from Week 1- 13, and would provide an opportunity for students to ask questions pertinent to the weekly topics and to clarify anything that they might not be sure of. The on-campus Lecture Sessions encourage students to engage in a number of brainstorming activities, group discussion and, therefore, participation in these lecture sessions is of the essence and highly recommended.

While weekly lecture notes will be provided, students are urged to view them as a guide rather than a substitute for personal notes or the recommended reading list. Active engagement with the material is encouraged, supplementing understanding through provided lecture notes, personal notes, and suggested readings. This proactive approach is crucial for a robust comprehension of the syllabus topics and contributes to an enriched learning experience in sensor networks, cloud and edge computing in IoT.

### **Workshops**

Workshops (In-person) commence from Week 2 and would offer Students an opportunity to learn, develop, and subsequently practice concepts pertinent to the Unit's Content via Hands-on Tasks in a Lab Setting under the Supervision of the Lecturer/ Demonstrator.

This workshop component contributes 10% to the overall score, with each meeting assigned a value of 1 marks, making a maximum of 10 marks for the entire workshop.

Each week you will be given a number of problems to work on; it is important that you keep up with these problems as doing so will help you understand the material in the unit and prepare you for the work in assignments. Workshops would also facilitate Students to discuss their respective Problems effectively with the Peers and maximize the Feedback they get on their Work.

Please note that Assessment 3 – Major Project depends, to a considerable extent, on the Learnings embedded in the Workshop Sessions. Therefore, participation in these Sessions is critical to success in this Unit.

### **Assignments**

Assignments will be made available on iLearn and would be submitted via Turnitin where students can see Turnitin similarity reports.

### **Recommended Text**

Please be aware that there isn't a single textbook covering all the content for this unit. However, your lecturer will provide comprehensive reading materials and detailed notes corresponding to each week's lecture topics. These resources will be provided every week for your convenience.

The Unit's Content has been drawn from the Research Papers, White Papers, and Standards' Documents. Students are, therefore, highly encouraged to read the recommended respective

Weekly Reading List in a bid to gain a solid understanding of the Weekly Topics.

## Methods of Communication

The Unit Convenor / Lecturer will communicate with the Students via their respective Macquarie University's Email or through Announcements on iLearn. Queries may either be placed on the iLearn Discussion Board or could be sent to the unit convenor via the contact email on iLearn.

## COVID Information

For latest information on the University's response to COVID-19, please refer to the Coronavirus Infection Page on the Macquarie University's [website](#). Remember to check this Page regularly in case the information and requirements change during Semester 1, 2024. If there are any changes to this Unit in relation to COVID, these will be communicated via iLearn.

## Unit Schedule

Week No.	Lecture / Activity	Assessment Timelines
Week 1	The Internet of Things (IoT)	
Week 2	Cloud, Fog, and Edge Computing – Part I	
Week 3	Cloud, Fog, and Edge Computing – Part II	
Week 4	IoT Security – A Case Study	
Week 5	IoT Project Management	
Week 6	Cellular IoT	Assignment 2: Literature Review – Due Week 6
Week 7	Introduction to Sensor Network: Motivation & Applications	
Week 8	Introduction to Sensor Network: Architecture & Protocol Stack	
Week 9	Routing Protocols in Sensor Networks	
Week 10	Localization Techniques in Wireless Sensor Networks	
Week 11/12	Presentation/Guest Lecture	Assignment 3: Major Project – Due Week 11
Week 13	Unit Review	

## 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 Advocacy](#) provides independent advice on MQ policies, procedures, and processes

## 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.

---

Unit information based on version 2024.04 of the [Handbook](#)