COMP8292

Sensor Networks, Cloud and Edge Computing in IoT

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Computing

Contents

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General Information

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By appointment

Lecturer
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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.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals (UNSDGs) Industry, Innovation and Infrastructure; Sustainable Cities and Communities

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 http://connect.mq.edu.au/.

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.

Release Dates

- Literature Review: To be released no later than 25th April.
- Major Project: To be released no later than 13th June.

Assessment Tasks

Name	Weighting	Hurdle	Due
Workshop-based Tasks	10%	No	Weekly
Literature Review	20%	No	04/04/2025
Major Project	30%	No	23/05/2025
Final Exam	40%	No	S1 Exam Period

Workshop-based Tasks

Assessment Type [1]: Practice-based task
Indicative Time on Task [2]: 10 hours
Due: **Weekly**
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.

Each week, students are required to complete a lab exercise in the on-campus lab. Upon finishing the exercise, students will demonstrate their work to the staff, who will assess and grade their performance during the class session.

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 [1]: Literature review
Indicative Time on Task [2]: 25 hours
Due: **04/04/2025**
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:
- 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.

Major Project

Assessment Type [1]: Practice-based task
Indicative Time on Task [2]: 25 hours
Due: **23/05/2025**
Weighting: **30%**

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

The group project assessment comprises two main components: a collective report and individual contributions. All team members receive an identical grade for the written project report, reflecting their collaborative effort in research, analysis, and documentation. Individual contributions are evaluated separately through oral presentations of specific project sections and demonstrations of technical implementations, such as code explanations or problem-solving. The final grade for each student is a combination of the shared report score and their individual assessment, ensuring a fair evaluation that balances teamwork with personal effort and discourages free-riding.

1.

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 [1]: Examination
Indicative Time on Task [2]: 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.

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[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

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 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 No.	Lecture / Activity	Assessment Timelines
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). 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). 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) 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 connect.mq.edu.au or if you are a Global MBA student contact 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 an d maths support, academic skills development and wellbeing consultations.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://stu dents.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 the Service Connect Portal, 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/.

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 2025.02 of the Handbook