



## UNSW Course Outline

# COMP6733 Internet of Things Experimental Design Studio - 2024

Published on the 30 May 2024

## General Course Information

Course Code : COMP6733

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Computer Science and Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate, Undergraduate

Units of Credit : 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

Internet of Things (IoT) will play a key role in the next frontier of computing. The new course will provide an experimental approach to cover fundamental design principles behind building IoT applications, with hands-on experience with a popular end-to-end IoT platform. Topics covered

will include a selection from: IoT technology and services, IoT system architecture, Low Power communications (Bluetooth Low Energy and 6LoWPAN) and security issues, sensors and sensor data smoothing and filtering, light-weight in-situ machine learning and data fusion, inertial sensing, activity recognition and fitness monitoring, voice-based stress level sensing, biometric authentication, anonymity, cloud services for IoT. This course assumes familiarity with a high level programming language such as Java and Python AND a low level programming language such as C.

## Course Aims

The course aims to introduce students to sophisticated IoT wireless networked embedded hardware and services and their use in solving real-world problems.

## Relationship to Other Courses

### Pre-requisites

- COMP9331 or COMP3331 (Computer Networks and Applications)

## Course Learning Outcomes

Course Learning Outcomes
CLO1 : Have a working knowledge of the fundamental building blocks of Internet of Things such as low power communications and networking, light-weight in-situ signal processing, classification and data fusion, security and privacy, and cloud services.
CLO2 : Will be able to demonstrate their knowledge by both describing aspects of IoT building blocks and solving real-world problems using end-to-end IoT solutions.
CLO3 : Will have practical experience with IoT technologies covered in the laboratory exercises and final project undertaken.
CLO4 : Will have practical experience with teamwork and project management with final project undertaken.

Course Learning Outcomes	Assessment Item
CLO1 : Have a working knowledge of the fundamental building blocks of Internet of Things such as low power communications and networking, light-weight in-situ signal processing, classification and data fusion, security and privacy, and cloud services.	• Lab assignments
CLO2 : Will be able to demonstrate their knowledge by both describing aspects of IoT building blocks and solving real-world problems using end-to-end IoT solutions.	• Final demonstration
CLO3 : Will have practical experience with IoT technologies covered in the laboratory exercises and final project undertaken.	• Final project report • Final demonstration
CLO4 : Will have practical experience with teamwork and project management with final project undertaken.	• Project milestones • Final project report

## Learning and Teaching Technologies

Echo 360 | Webcms | Moodle - Learning Management System

## Other Professional Outcomes

N/A

## Additional Course Information

Please see <https://webcms3.cse.unsw.edu.au/COMP6733/24T2/outline> for more details.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Lab assignments	30%	
Project milestones	10%	
Final demonstration	30%	
Final project report	30%	

## Assessment Details

### Lab assignments

#### Course Learning Outcomes

- CL01 : Have a working knowledge of the fundamental building blocks of Internet of Things such as low power communications and networking, light-weight in-situ signal processing, classification and data fusion, security and privacy, and cloud services.

#### Detailed Assessment Description

Please refer to WebCMS or General assessment information below for the correct Assessment Name and Weighting.

### Project milestones

#### Course Learning Outcomes

- CL04 : Will have practical experience with teamwork and project management with final project undertaken.

#### Detailed Assessment Description

Please refer to WebCMS or General assessment information below for the correct Assessment Name and Weighting.

### Final demonstration

#### Assessment Overview

The demonstration will be assessed and the project awarded an overall mark. Each student will be required to identify which parts of the project they contributed to, and each student's mark for the demonstration will be modified according to their level of contribution.

#### Course Learning Outcomes

- CL02 : Will be able to demonstrate their knowledge by both describing aspects of IoT building

blocks and solving real-world problems using end-to-end IoT solutions.

- CLO3 : Will have practical experience with IoT technologies covered in the laboratory exercises and final project undertaken.

#### Detailed Assessment Description

Please refer to WebCMS or General assessment information below for the correct Assessment Name and Weighting.

### Final project report

#### Assessment Overview

Each student in the group will be required to identify which part of the report they were responsible for, and will be allocated a mark based on the quality of that component.

#### Course Learning Outcomes

- CLO3 : Will have practical experience with IoT technologies covered in the laboratory exercises and final project undertaken.
- CLO4 : Will have practical experience with teamwork and project management with final project undertaken.

#### Detailed Assessment Description

Please refer to WebCMS or General assessment information below for the correct Assessment Name and Weighting.

## General Assessment Information

- Lab Exercises 25%
- Problem Set 15%
- Project plan and preliminary founding class presentation 10%
- Project milestone class presentation 10%
- Project final report (15%) and demo (25%)

#### Grading Basis

Standard

#### Requirements to pass course

You must attempt all assessment components. Your raw score is computed as the weighted sum (with the weightings listed above) of the score for each assessment component. Your final score will be computed according to the following rules: If you obtain 40% or more for all three assessment components, your final score equals to your raw score. If you obtain less than 40% for any one of the three assessment components, your final score is the smaller of your raw score and 64. For example, If at least one of your assessment components is less than 40% and

your raw score is 70, your final score will be 64. If at least one of your assessment components is less than 40% and your raw score is 50, your final score will be 50.

## Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	Lecture <ul style="list-style-type: none"><li>• Course organisation</li><li>• Introduction to Internet of Things (IoT) and</li><li>• Foundation topics on</li></ul>
	Laboratory	Getting started and Arduino fundamentals
Week 2 : 3 June - 9 June	Lecture	<ul style="list-style-type: none"><li>• Low Power Communications: IEEE 802.15.4, Bluetooth Low Energy</li><li>• RPL</li></ul>
	Laboratory	Networking
Week 3 : 10 June - 16 June	Lecture	<ul style="list-style-type: none"><li>• LPWAN, CoAP, Web Services for Internet of Things</li></ul>
	Laboratory	AWS Web services
Week 4 : 17 June - 23 June	Lecture	<ul style="list-style-type: none"><li>• Localisation</li><li>• Time synchronisation</li></ul>
	Laboratory	Ranging
Week 5 : 24 June - 30 June	Presentation	<ul style="list-style-type: none"><li>• Project presentation (I)</li></ul>
Week 6 : 1 July - 7 July	Other	Break
Week 7 : 8 July - 14 July	Lecture	<ul style="list-style-type: none"><li>• Light-weight machine learning and Signal Processing</li></ul>
	Laboratory	Machine Learning in the Edge (Not accessible)
Week 8 : 15 July - 21 July	Presentation	<ul style="list-style-type: none"><li>• Project presentation (II)</li></ul>
Week 9 : 22 July - 28 July	Lecture	<ul style="list-style-type: none"><li>• Environmental AIOT systems.</li><li>• Smart Grid IoT systems</li></ul>
Week 10 : 29 July - 4 August	Project	
Week 11 : 5 August - 11 August	Seminar	5 Aug: Project demo and interview in K17 B09 innovation hub

## Attendance Requirements

### CSE Attendance Guidelines :

Students are expected to be regular and punctual in attendance at all classes for the Computer Science and Engineering courses in which they are enrolled. For lab classes and tutorials, in particular, this provides the opportunity to get assistance from the demonstrator/tutor. Students who do not attend classes regularly run the risk of failing a course.

## General Schedule Information

There will be 4 hours of lectures every week:

(i) 2-hour lecture on Monday 15:00 - 17:00 (Ainsworth 102) and

(ii) 2-hour lecture on Thursday 09:00 - 11:00 (Ainsworth 102)

There will be 4-hour labs in Weeks 1-5.

# Course Resources

## Prescribed Resources

IoT is a rapidly evolving field. Thus, the course materials will draw from books, professional journals and conference papers.

You will find the following books in the library to be of interest:

- Bahga and Madiseti, Internet of Things: A Hands-On Approach
- McEwen and Cassimally, Designing the Internet of Things

They are also available at UNSW bookstore:

- <https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9780996025522>
- <https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9781118430620>

We will be using a number of journal or conference papers in this course. These will be provided on the course web site and you can access them using your zpass.

### Guided laboratory and laboratory assessment:

Students are required to attend a guided laboratory from Weeks 1- 5 where they will learn programming IoT devices. Laboratory worksheets will be available on the course website. There will be a lab demonstrator assisting in the laboratory.

The equipment to be used is the Arduino Nano. Each student will be loaned one Arduino Nano for doing the laboratory and the project. The students will need to sign a loan form and undertake to return these notes in good condition. The notes will be handed out in the laboratory session in the first lab. You must return them at the end of your project demo and interview.

The first lab will provide a basic overview of Arduino Nano and its programming environments (e.g., micro python) . Each lab has an assessment exercise that comes with it. You are given a week to complete these exercises and you will need to demonstrate this to the lab demonstrator in the next laboratory session. Although there is no laboratory exercise for Week 5, you will still need to attend the laboratory to do the demonstration. Apart from the demonstration, you are **NOT** required to attend the full lab sessions.

# Course Evaluation and Development

Student feedback on this course, and on the effectiveness of lectures in this course, is obtained via electronic survey at the end of each term. Student feedback is taken seriously. Continual improvements are made to the course based in part on this feedback, and **will be discussed in the Week 1's lecture** . Students are strongly encouraged to let the lecturer in charge know of any problems as soon as they arise. Suggestions and criticisms will be listened to openly, and every action will be taken to correct any issue or improve the students' learning experience.

Feedback from pervious years indicates that students would prefer to use Python as programming language. We will address this by changing the lab equipment from Sensortag to Arduino Nano BLE sense, which supports micropython programming environment.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Wen Hu					Yes	Yes

## Other Useful Information

### Academic Information

#### I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

#### II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:



- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

### III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

### IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

*Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

### Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website

with a wealth of resources to support students to understand and avoid plagiarism, visit: [student.unsw.edu.au/plagiarism](https://student.unsw.edu.au/plagiarism). The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](https://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that

- has an absolute submission date; and,
- Pass/Fail assessment tasks.

## Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

## Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

## School Contact Information

**CSE Help! - on the Ground Floor of K17**

- For assistance with coursework assessments.

**The Nucleus Student Hub** - <https://nucleus.unsw.edu.au/en/contact-us>

- Course enrolment queries.

**Grievance Officer** - [grievance-officer@cse.unsw.edu.au](mailto:grievance-officer@cse.unsw.edu.au)

- If the course convenor gives an inadequate response to a query or when the courses convenor does not respond to a query about assessment.

**Student Reps** - [stureps@cse.unsw.edu.au](mailto:stureps@cse.unsw.edu.au)

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum

queries, cannot understand the lecturer)

You should **never** contact any of the following people directly:

- Vice Chancellor
- Pro-vice Chancellor Education (PVCE)
- Head of School
- CSE administrative staff
- CSE teaching support staff

They will simply bounce the email to one of the above, thereby creating an unnecessary level of indirection and a delay in the response.