School of Engineering

ELEC4740: Internet of Things

Callaghan
Semester 1 - 2024

COURSE OUTLINE

OVERVIEW

Course Description
This course provides a sound introduction to the Internet of Things (IoT) technologies and system design concepts. The course will focus on important IoT topics, which includes: industrial standards, sensor/actuator/data devices, hardware, software, security, system design and performance analysis techniques.

Academic Progress Requirements
Nil

Requisites
This course has similarities to ELEC4700. If you have completed ELEC4700 you cannot enrol in this course.

Assumed Knowledge
ELEC2320 Electrical and Electronic Circuits, ELEC2720 Introduction to Embedded Computing, ELEC3500 Telecommunication Networks.

Contact Hours

Callaghan
Computer Lab
Face to Face On Campus
2 hour(s) per week(s) for 12 week(s) starting Week 2

Lecture
Face to Face On Campus
3 hour(s) per week(s) for 13 week(s) starting Week 1

Unit Weighting
10

Workload
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan
Prof Sarah Johnson
Sarah.Johnson@newcastle.edu.au
(02) 4921 6028
Consultation: EAG14 4pm Wednesdays

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Engineering
EAG02
EA Building
Callaghan
+61 2 4921 5798
9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

SYLLABUS

Course Content

- Sensors, actuators and data devices
- IoT Communication networks and protocols
- Embedded wireless communication
- Low power embedded systems
- Distributed systems
- Cloud and Edge IoT systems
- Basics of IoT security
- Performance analysis of IoT systems
- Real-time IoT system design

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Design IoT system hardware and software.
2. Interpret and apply national and International IoT standards.
3. Apply professional skills to solve industry problems using IoT approaches.
4. Analyse performance of industrial IoT systems.
5. Implement IoT firmware using embedded systems.

ASSESSMENTS

This course has 2 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Class Test x 2	Each quiz will be conducted during the lecture period. Details will be advised during the lecture period and on Canvas.	Individual	40%	1, 2, 3, 4
2	Design Project x 2	Details will be advised during the lecture period and on Canvas.	Group	60%	1, 2, 3, 4, 5

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Class Test x 2

Assessment Type Quiz
Purpose The quizzes serve to provide students with feedback on their learning of the course material. The quizzes are intended to highlight any areas of concern and may stimulate discussions with the tutors and lecturer.
Description
Weighting 40%
Length 1 hour each
Due Date Each quiz will be conducted during the lecture period. Details will be advised during the lecture period and on Canvas.
Submission Method In Class
Assessment Criteria The quiz will be assessed on the correctness of the solutions and the methodology used to obtain solutions.
Return Method In Class
Feedback Provided Returned Work
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment

Assessment 2 - Design Project x 2

Assessment Type Project
Purpose The project allows students to demonstrate that they have acquired skills in working with software and hardware tools for designing and simulating digital circuits. The project work also enables students to demonstrate their creativity and innovation in the context of digital design, and to develop designs with a level of complexity beyond that which can reasonably be demonstrated in a formal examination setting.
Description Throughout the semester you will design, build and program digital circuits. Details will be advised during the lecture period and on Canvas. Example project solutions will be provided during the lecture periods and/or on CANVAS.
Weighting 60%
Due Date Details will be advised during the lecture period and on Canvas.
Submission Method Online
Submission of report will be online via CANVAS.
Demonstration will be during a scheduled lab period.
Assessment Criteria You will be assessed on both your written design work (submitted via Canvas) and on the functioning of your built circuits (assessed in person during the lab sessions.)
Return Method In Person
Online
Feedback Provided Online
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.
As a result of student feedback, the following changes have been made to this offering of the course:

- Final exam removed
- Project changed

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

This course outline was approved by the Head of School on 30.01.2024. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

Graduate Profile Statements – ELEC4740 – S1 2024

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UON Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.		✓	✓	4
13	3.3. Creative, innovative and pro-active demeanour.				
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.		✓	✓	4
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	✓	✓	✓	4
8	2.2. Fluent application of engineering techniques, tools and resources.	✓	✓	✓	4
9	2.3. Application of systematic engineering synthesis and design processes.	✓	✓	✓	4
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.	✓	✓	✓	4
	Knowledge Base				
1	1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.				
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.				
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	✓	✓	✓	4
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	✓	✓	✓	4
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				