Course COMP6324: IoT Service Design and Engineering

Course Summary

IoT is an emerging technology that will transform business and societies across the world. Similar to AI, mobile or Cloud it will have a profound impact on the existing technology landscape, customer experience, operational processes and business models.
This course provides an overview of the topic from a business and technology perspective and allows the students to experience the full lifecycle of IoT, from the overall corporate strategy to the actual implementation of an IoT application.
This course is a project-based course and its design is based on the action-learning concept used at MIT and Harvard and the course design has been reviewed by professors at MIT and Harvard.

Assumed Knowledge

The students should be familiar with at least one modern programming language like C, C#, Java, PHP or Python.
At least high-level understanding of databases, Cloud and network technologies is necessary to achieve the course aims. In the absence of this understanding, students are advised to do appropriate reading before and/or after starting the course.
A high-level understanding of architecture and solution design is helpful for the assessments. Again, if this understanding is not in place, appropriate reading before and/or after starting the course.

Course Aims

The course aims to provide the students with a holistic understanding of IoT from a business and technology perspective and help them understand what potential career options are.

Learning outcomes

After completing this course, students will be able to:

- Be familiar with IoT terminology
- Understand the impact of IoT on selected industries
- Acquire knowledge on IoT strategy and strategy
- Understand the security risk of IoT
- Create an IoT application
- Select potential career options

Teaching Approach

Lecture

The lectures provide the necessary theoretical knowledge for the project work and course assessments. The students are encouraged to discuss the lecture content with their assigned industry mentors, as well as the lecturer.

The learning for the lectures is assessed through quizzes. The quizzes can be found on Piazza.

Project

The students need to form teams of 3-5 individuals in week 1 of the course. They then choose a business problem to solve as project assignment, from a list provided on Piazza. Every business problem has an associated industry mentor that is working with the teams to understand the business problem and create an IoT application. The teams will meet their assigned Industry Mentor during the class in week 2 and are required to reach out to them before the week 2 lecture to confirm availability and ways to engage, as some Industry Mentors may not be able to be on site.
Student teams are responsible for setting up weekly (virtual) meetings with the Industry Mentors. The role of the Industry Mentor is to provide their idea, expertise, experience and industry insights. The Industry Mentors are committed to spend around one hour per week with the student teams.
Besides creating an IoT application, the student teams need to present their solution in the last lecture and will be judged by a panel of IoT industry experts. The winning team will receive a price from an industry sponsor. The Industry Mentors will help the teams during the course also with creating a compelling presentation. Each presentation is limited to 5 minutes.

The MCIC has offered the student teams to conduct face to face session in their maker/event space. Please ask your Course Admin for a contact at MCIC to talk to about room availability.

The project has two main deliverables:

- An IoT solution design, where the solution architecture is documented. A template will be provided on Piazza.
- The code of an IoT application that will be stored on GitHub. The Student Mentor will provide the relevant links.

The students are free in their choice of technologies and hardware/software product for the IoT application. Some Industry Partners are providing IoT solution components together with technology coaches. A list can be found on Piazza.

Course Schedule

Week	Date/Time	Location	Module	Form	Assignment
1	20.02.19 | 6:00-7:30pm	OMB-151 (K-K15-151)	IoT 101	Lecture	IoT Quiz – Part 1
	20.02.19 | 7:30-8:30pm	OMB-151 or student organised location		Project	Team building, business problem selection, contact industry mentor
2	27.02.19 | 6:00-7:30pm	OMB-151 (K-K15-151)	IoT Strategy & IoT Application Development	Lecture	IoT Quiz – Part 2
	27.02.19 | 7:30-8:30pm	OMB-151 or student organised location		Project	Industry Mentor session
	Student organised	student organised location			IoT Solution Design Draft
3	6.03.19 | 6:00-7:30pm	OMB-151 (K-K15-151)	IoT Architecture & IoT Application Development	Lecture	IoT Quiz – Part 3
	6.03.19 | 7:30-8:30pm	OMB-151 or student organised location		Project	Industry Mentor session (Present IoT Solution Design Draft)
	Student organised	student organised location			IoT Solution Design v1.0
4	13.03.19 | 6:00-8:30pm	OMB-151 or student organised location	IoT Application Development	Project	Industry Mentor session (Present IoT Solution Design v1.0)
	Student organised	student organised location			IoT Application - Minimal Viable Product (MVP)

5	20.03.19 | 6:00-7:30pm	OMB-151 (K-K15-151)	IoT Security & IoT Application Development	Lecture	IoT Quiz – Part 4
	20.03.19 | 7:30-8:30pm	OMB-151 or student organised location		Project	Industry Mentor session (Present IoT Application Prototype)
	Student organised	student organised location			IoT Application – Prototype
6	27.03.19 | 6:00-8:30pm	OMB-151 or student organised location	IoT Application Development	Project	Industry Mentor session (Discuss IoT Project Pitch)
	Student organised	student organised location			IoT Application – MVP, Test cases v0.1, IoT Project Pitch
7	3.04.19 | 6:00-8:30pm	OMB-151 or student organised location	IoT Application Development	Project	Industry Mentor session (Present IoT Application MVP)
	Student organised	student organised location			IoT Application v0.7, Test cases v0.5, IoT Project Pitch
8	10.04.19 | 6:00-8:30pm	OMB-151 or student organised location	IoT Application Development	Project	Industry Mentor session (Present IoT Project Pitch and IoT Solution Design)
	Student organised	student organised location			IoT Application – v0.9, Test cases v0.9 IoT Project Pitch
9	17.04.19 | 6:00-8:30pm	OMB-151 or student organised location	IoT Application Development	Project	Industry Mentor session (Present updated IoT Project Pitch and IoT Application v0.9)
	Student organised	student organised location			IoT Application v1.0, Test cases v1.0, IoT Project Pitch
10	1.05.19 | 6:00-7:30pm	MCIC - MakerSpace	IoT Career Panel	Lecture	Reflection Paper
	1.05.19 | 7:30-9:00pm		IoT Project Pitches	Project	Judging by IoT Career Panel 5 minutes pitch + 5 minutes Q&A by panel

Industry Panel
The last class is an industry panel, with people from different kinds of organisations. The panel will discuss IoT careers and through the diversity of the panellist, students will see the breadth of career options in IoT. The industry panel is moderated by the CEO of the IoT Alliance Australia.

Assessment

The course assessment consists for 4 deliverables that are described in detail below.

The Course Admin assigns one Student Mentor in week 2 to each student and student team for support with the course information, assessments and collaboration infrastructure “Piazza”. She/He will answer any question in relation to the assignment and to mark the assignments.

IoT Quiz (20%)
Asks questions on the presented content in the lectures

- Has 4 parts: IoT 101, Strategy, Architecture and Security
- Part 1 has to be submitted on Piazza until Friday, 22.02.19, EOD
- Part 2 has to be submitted on Piazza until Friday, 01.03.19, EOD
- Part 3 has to be submitted on Piazza until Friday, 08.03.19, EOD
- Part 4 has to be submitted on Piazza until Friday, 22.03.19, EOD

- The IoT Quiz is an individual assignment.
- A template can be found on Piazza
- Each part of the quiz has 5 questions and each question represents 1% of the final mark. Submitting all parts in "Piazza" counts another 1% to the final mark.

Marking criteria:
Answers to the questions are either right or wrong. Each question is worth 1 point = 1% of the final mark.

IoT Solution Design (20%)

- Asks the student teams to create an IoT solution design that is the basis for the IoT Application the students implement
- A first version of the IoT Solution Design has to be submitted on Piazza on Friday, the 20th of March 2019. The final version on Wednesday, 1st of May.
- The IoT Solution Design is a deliverable created by the student teams.
- A template can be found on Piazza
- It counts for 10% of final mark

Marking criteria – IoT Solution Design:

- Full (20 points): The solution design shows the business and technology perspective of the IoT solution. Each solution design diagram has an explanation of all its components. Standard modelling notations are used for solution design diagrams. Each solution design component has a link to its implementation in GitHub or another repository. Test cases are documented and link back to solution design components.
- Partial: Based on the 5 criteria above. Each missing criteria means 20% off the "design mark", so 4% (as the whole design part counts 20% towards the overall mark)

IoT Application Implementation (40%)

- Asks the student teams to create an IoT application based on the solution design for the business problem they have chosen
- The student teams are free in their choice of technologies and products. Industry sponsors have agreed to provide hardware and/or software, as laid out earlier in this document. The teams get access to the technology vendors via their assigned Student Mentor.
- There will be technology coaches from DXC and its IoT partner eco-system available if the student team decides to choses products/technologies provided by DXC or one of its industry partners that support the course.
- The code for the solution has to be submitted on GitHub or another source code repository. The IoT Solution Design document needs to contain a link to the relevant GitHub folder. Each team will get their own GitHub folder and the URL will be provided by the Student Mentor.
- The source code and a running application for each version needs to be on GitHub (or another repository) on the day a specific version is presented to the Industry Mentor according to the course schedule.

Marking criteria:

- Full (40 points): All parts of the solution design are implemented. The running IoT application is demonstrated to the Industry Mentor, based on the documented test cases. The code is available in GitHub or another repository. The Industry Mentor confirms to the Student Mentor that the business problem would be solvable with such a solution. The source code has inline documentation and a link back to the relevant sections of the IoT solution design.
- Partial: Based on the 5 criteria above. Each missing criteria means 8% off the mark.

IoT Project Pitch (10%)

- Ensures that students learn how to position IoT solutions to users in a compelling way.
- Current version is on "Piazza" on the day it is presented to the Industry Mentor/IoT Career Panel.

Marking criteria:

- Full (10 points): IoT Project Pitch presented at last lecture. All team members are present at last lecture to answer questions of the IoT Career Panel.
- Partial: Not all team members are at the IoT Career Panel (5 point). IoT Project Pitch not presented at IoT Career Panel (0 points)

Course Participation (10%)

- Ensures that everyone has the opportunity to follow the lectures and everyone in the team contributes to the assessment.

Marking criteria:

- Full (10 points): Individual student was in each lecture and each meeting with the Student Mentor and Industry Mentors.
- Partial: Every lecture/meeting that is not attended, reduces the point count by 2. Exception is a letter from a doctor, laying out the reason for not being able to attend.
- Student Mentors keep track of the participation.

Mapping from outcomes to assessment

Assessment / Learning Outcome	IoT Quiz	IoT Solution Design	IoT Application Implementation	IoT Project Pitch	Reflection Paper	Course participation
Be familiar with IoT terminology	X				X	X
Understand the impact of IoT on selected industries	X				X	X
Acquire knowledge on IoT strategy and strategy	X	X				X
Understand the security risk of IoT	X	X	X			X
Create an IoT application		X	X	X		X
Select potential career options				X	X	X

Student Conduct Statement

The **Student Code of Conduct** (Information , Policy) sets out what the University expects from students as members of the UNSW community. As well as the learning, teaching and research environment, the University aims to provide an environment that enables students to achieve their full potential and to provide an experience consistent with the University's values and guiding principles. A condition of enrolment is that students *inform themselves* of the University's rules and policies affecting them and conduct themselves accordingly.

In particular, students have the responsibility to observe standards of equity and respect in dealing with every member of the University community. This applies to all activities on UNSW premises and all external activities related to study and research. This includes behaviour in person as well as behaviour on social media, for example Facebook groups set up for the purpose of discussing UNSW courses or course work. Behaviour that is considered in breach of the Student Code Policy as discriminatory, sexually inappropriate, bullying, harassing, invading another's privacy or causing any person to fear for their personal safety is serious misconduct and can lead to severe penalties, including suspension or exclusion from UNSW.

If you have any concerns, you may raise them with your lecturer, or approach the School Ethics Officer , Grievance Officer , or one of the student representatives.

Academic Honesty and Plagiarism

Plagiarism is defined as using the words or ideas of others and presenting them as your own. UNSW and CSE treat plagiarism as academic misconduct, which means that it carries penalties

as severe as being excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Plagiarism and Academic Integrity
- UNSW Plagiarism Procedure

Make sure that you read and understand these. Ignorance is not accepted as an excuse for plagiarism. In particular, you are also responsible that your assignment files are not accessible by anyone but you by setting the correct permissions in your CSE directory and code repository, if using. Note also that plagiarism includes paying or asking another person to do a piece of work for you and then submitting it as your own work.

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and 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.

If you haven't done so yet, please take the time to read the full text of

- UNSW's policy regarding academic honesty and plagiarism

The pages below describe the policies and procedures in more detail:

- Student Code Policy
- Student Misconduct Procedure
- Plagiarism Policy Statement
- Plagiarism Procedure

You should also read the following page which describes your rights and responsibilities in the CSE context:

- Essential Advice for CSE Students

Course staff details

A/Senior Lecturer: Peter Klement, p.klement@unsw.edu.au
Guest lecturers: TBC
Course Admin: Mortada Al-Banna, m.al-banna@unsw.edu.au
MCIC contact: TBC
Technology Mentor: TBC