SIT740 Research and Development in Information Technology
Unit Guide, Trimester 1, 2018

This unit guide is applicable for the year and teaching period specified above only.

Welcome

Dear Students

Welcome to **SIT740 Research and Development in Information Technology**.

Welcome to the future, or at least to an avenue for seeing how important aspects of the future get created. Alan Kay, an American computer scientist who won the ACM Turing Award in 2003 (often said to be the "Nobel Prize in Computing") and pioneer of object-oriented programming, says that the "best way to predict the future is to invent it". There have been many books on how innovation happens, such as Adam Grant's "Originals: How Non-Conformists Move the World" (2017) and Steven Johnson's "Where Good Ideas Come From: The Natural History of Innovation" (2011). Indeed, one's own attitude to be different and one's exposure and embeddedness in an innovative and complex conducive environment could play a role.

We can be simultaneously inspired by high-tech giant companies such as Google, Samsung, and Apple yet be amazed at recent upstarts, many of which we have not heard about. Tesla is a relatively young company but its co-founder Elon Musk has some extraordinary ideas. Microsoft has been around for a while and continues to innovate.

Information technology indeed has been shaping the future, and with the use of Artificial Intelligence, Internet communications and Web systems, productivity has been tremendously increased for commerce and business. The Web search engines have also enabled "intelligence" and "information" at one's fingertips, unprecedented in history. When in doubt, "just Google it" and this applies from checking the spelling and meaning of words to how to fix a bicycle. IT has had impact in almost every area of life. One only needs to look at our smartphones, and see how much IT has impacted our lives.

This unit will look at research and development methodologies and processes, at how innovation happens. In particular, the unit will draw on ideas and examples from three areas of active research in Information Technology, namely, Internet-of-Things, Artificial Intelligence and Robotics, and Intelligent Transport Systems and Autonomous Vehicles. Given the large field IT is, while these three areas are important, they are, by no means, exhaustive.

Use the imagination, think critically, work innovatively, and enjoy this unit!

We are more than happy to help you with your study, please feel free to contact us if you have any questions.
Dr Sasan Adibi (Unit Chair and Lead Educator).

This unit guide provides you with the key information about this unit. For the best chance of success, you should read it carefully and refer to it frequently throughout the trimester. Information about your rights and responsibilities is available on the FutureLearn Program page for this unit which can be accessed any time through DeakinSync. We will assume you have read this before the unit commences, and we expect you to refer to it throughout the trimester.

Who is the unit team?

Unit Chair: **leads the teaching team and is responsible for overall delivery of this unit.**
Sasan Adibi (Trimester 1), Seng Loke (Trimester 3)

Unit Chair	Dr Sasan Adibi
Campus	Melbourne Burwood Campus 221 Burwood Highway BURWOOD VIC 3125
Phone	+61 3 925 17616
Email	sasan.adibi@deakin.edu.au

Other members of the team and how to contact them
Throughout the unit you can post comments and questions. You are encouraged to do this including helping other students. You may want to contact the Unit Chair/Lead Educator if you have any questions about the unit and especially if you need some assistance.

Administrative queries

If you need help with any aspect of your life at Deakin, you can:

- Contact your Unit Chair or Unit Campus Leader
- Speak to a Student/Course Adviser
- Ask Watson (accessed in DeakinSync and your unit sites)
- Drop in or contact StudentCentral
- Visit the Division of Student Life

About this Unit

Many different sectors of the economy including health and transportation are being impacted by potentially game-changing IT innovations, fueled by IT Research and Development. Indeed, IT has pervaded into myriad fields of endeavor, including science, healthcare, humanities, architecture, economics, governance, commerce and everyday life. IT application in different fields has also sparked research and development at the intersection of Computer Science and other fields. This unit will be an introduction to the processes, issues and trends in IT R&D, including case studies in technologies and researching software tools in areas such as Internet of Things, Intelligent Transport Systems, and AI and Robotics. Students will learn IT R&D methodology and problem-solving processes, from conception to deployed systems and critically examine digital ethics to understand the ethical challenges that IT R&D can raise.

Unit development in response to student feedback

Every trimester, we ask students to tell us, through eVALUate, what helped and hindered their learning in each Unit. You are strongly encouraged to provide constructive feedback for this Unit when eVALUate opens (you will be emailed a link).

In a previous version of this unit, students mentioned they would like more ideas about how to develop innovative solutions and would like more materials about research.
So this is what we have done:

- The subject is being completely revised to widen the range of research activities one could do in the discipline within the industry. In addition, case studies of innovations and research, as well as ideas on how innovation happens have been added.

If you have any concerns about the Unit during the trimester, please contact the unit teaching team - preferably early in the trimester - so we can discuss your concerns, and make adjustments, if appropriate.

Your course and Deakin's Graduate Learning Outcomes

⚙	**Discipline knowledge and capabilities**	Appropriate to the level of study related to a discipline or profession
💬	**Communication**	Using oral, written and interpersonal communication to inform, motivate and effect change
🖥	**Digital literacy**	Using technologies to find, use and disseminate information
💡	**Critical thinking**	Evaluating information using critical and analytical thinking and judgement
❓	**Problem solving**	Creating solutions to authentic (real world and ill-defined) problems
👤	**Self-management**	Working and learning independently, and taking responsibility for personal actions
👥	**Teamwork**	Working and learning with others from different disciplines and backgrounds
🌐	**Global citizenship**	Engaging ethically and productively in the professional context and with diverse communities and cultures in a global context

Each Deakin course has **course learning outcomes** which explain what the Deakin Learning Outcomes mean in your discipline. Learning in each unit builds towards the course learning outcomes.

Your Unit Learning Outcomes

Each Unit in your course is a building block towards these Graduate Learning Outcomes – not all units develop and assess every Graduate Learning Outcome.

These are the Learning Outcomes for this unit. At the completion of this unit, successful students can:		Deakin Graduate Learning Outcomes							
		⚙	💬	🖥	💡	❓	👤	👥	🌐
1	Research a range of R&D methodologies and processes and apply those processes to solve problems.	✓		✓					
2	Evaluate products, services and solutions and propose evidence-based improvements to R&D processes.				✓				
3	Experiment new technologies in a particular IT field to realise its potential and suggest solutions to real-world problems.	✓			✓				
4	Design technological solutions that satisfies requirements, functional and non-functional constraints and persuade stakeholders of the merits of that solution.		✓			✓			
5	Justify achieved outcomes by providing relevant evidence and critiquing the quality of that evidence against given criteria.						✓		

Assessing your achievement of the unit learning outcomes

Overview

In brief, these are the assessment tasks for this Unit (details below):
Learning Portfolio 100%

Summative assessments

(tasks that will be graded or marked)
NOTE: It is <u>your responsibility</u> to keep a backup copy of every assignment where it is possible (e.g. written/digital reports, essays, videos, images). In the unusual event that one of your assignments is misplaced, you will need to submit the backup copy. Any work you submit may be checked by electronic or other means for the purposes of detecting collusion and/or plagiarism.

When you are required to submit an assignment through your unit site (accessed in DeakinSync), you should receive an email to your Deakin email address confirming that it has been submitted. You should check that you can see your assignment in the Submissions view of the Assignment folder after upload, and check for, and keep, the email receipt for the submission.

Summative assessment task 1

	Learning Portfolio
Brief description of assessment task	In this unit, assessment is designed to encourage and reward you for demonstrating achievement of the unit learning outcomes; with higher grades representing better achievement of these outcomes. We will be using OnTrack, which is a web application designed specifically to support your completion of learning and assessment activities. Working regularly and completing the tasks on time will help you collect evidence for your portfolio. Your portfolio will consist of work that you complete in response to the unit's **tasks**. These tasks are designed to help you learn, and demonstrate achievement of the unit learning outcomes. Tasks will include the following kinds of activities: • Research • Case analysis • Evaluation • Experimentation with technologies • Designing solutions • Presenting and reporting finding
Detail of student output	While studying in this unit, student will work through tasks and case studies. You will work through a number of tasks throughout this unit and produce a range of artefacts that demonstrates the student's understanding of the range of IT R&D processes and methodologies, the student's ability to select and apply appropriate research methods and processes to solving problems, the student's ability to comprehend and critically analyse and evaluate research, and the student's ability to use, apply, and devise well-considered IT tools to solve problems.
Grading and weighting (% total mark for unit)	100% - marked and graded Each task in the unit is associated with a grade: either Pass, Credit, Distinction, or High Distinction. Complete all the **Pass Tasks** to get a Pass. Complete all the **Pass and Credit** tasks to get a Credit, complete all the **Pass, Credit, and Distinction** tasks to get a Distinction, and complete all **Pass, Credit, Distinction and High Distinction** tasks for a High Distinction. OnTrack lets you select a target grade, and will show you only the tasks you need to complete in order to achieve that grade.

This task assesses your achievement of these Unit Learning Outcome(s)	The portfolio must demonstrate that you have achieved all unit learning outcomes by proving evidence and self-reflection against each outcome. 1: Research a range of R&D methodologies and processes and apply those processes to solve problems. 2: Evaluate products, services and solutions and propose evidence-based improvements to R&D processes. 3: Experiment new technologies in a particular IT field to realise its potential and suggest solutions to real-world problems. 4: Design technological solutions that satisfies requirements, functional and non-functional constraints and persuade stakeholders of the merits of that solution. 5: Justify achieved outcomes by providing relevant evidence and critiquing the quality of that evidence against given criteria.
This task assesses your achievement of these Graduate Learning Outcome(s)	**Discipline knowledge and capabilities** Through student ability to demonstrate specific knowledge and skills to analyse and approach problems from an IT R&D perspective, to research and synthesize solutions in line with current technology trends, and to identify future areas of IT R&D. **Communication** Through student ability to communicate well-developed and well-justified research and development IT solutions and future opportunities. **Digital literacy** Through student ability to use Web tools for research, and to employ and evaluate IT tools and systems for solving problems and reporting. **Critical thinking** Through student ability to critically evaluate research on a given topic, to select the appropriate approach to analyse an issue. **Problem solving** Through student ability to synthesize and design IT solutions to real-world problems, taking into account stakeholder requirements. **Self-management** Through student ability to reflect on their learning to determine areas of growth and areas that still require development.
How and when you will receive feedback on your work	To complete a high-quality portfolio, students should have completed all the related module tasks. Students are advised to check the examples (where provided) in each module. The teaching team will review your work and provide feedback to assist you in completing the tasks and achieving your target grade for the unit.
When and how to submit your work	At the end of the unit you will use OnTrack to combine together the artefacts you have created and a learning summary report into a single portfolio for assessment by the end of Week 12.

Your learning experiences in this unit – and your expected commitment

To be successful in this unit, you must:

- read all materials in preparation for your classes or seminars, and follow up each with further study and research on the topic;
- start your assessment tasks well ahead of the due date;
- read or listen to all feedback carefully, and use it in your future work;
- attend and engage in all timetabled learning experiences as follows:

Contact hours

Campus: 1 x 1 hour scheduled online seminar per fortnight, and 1 x 1-hour face-to-face workshop each week.
Cloud (online): 1 x 1 hour scheduled online seminar per fortnight

Students will on average spend 150 hours studying this unit. This includes engaging in online learning activities, assessment activities, readings and study time. Students are expected to complete all allocated learning and assessment tasks for each week and actively engage in discussions with other students and their teaching staff. This unit requires students to complete milestones as they progress through the unit. This requirement is to ensure that students engage with teaching staff throughout the unit. This unit has been designed to provide all students with a high level of interaction and feedback from teaching staff as a strategy to support student success. It includes the following resources organised for 10 weeks of learning activities to enable you achieve the unit learning outcomes:

In FutureLearn:

- Videos introducing unit content

- Links to readings and associated texts

- Recordings of seminars

- Web links

- Discussion forum

In OnTrack:

- Task sheets

- Task resources, as required

- Individual feedback

- Alignment of tasks to unit learning outcomes

- Visualisations of your progress to help keep you on track

Your work in this unit starts on Day 1 of the trimester. You are expected to complete the prescribed readings, watch the concept videos, and complete unit tasks in OnTrack. As you complete the tasks, you will be able to collect evidence for justifying how you have met the unit learning outcomes through your portfolio. The process of developing your portfolio is simple and easy, so keep that in mind as you read the assessment instructions below.

In order to understand how assessment in this unit works, let's consider standard assessment practices. A typical unit has assignments and tests that you submit and get marks for. The problem is, you only get one chance to succeed, and any marks you lose are gone. This focuses your attention on marks, rather than on working to achieve good learning outcomes.

To focus your attention on learning in this unit, we avoid having marks for tasks during the unit and instead assess your final work to see how well you have achieved the outcomes at the end of the unit. This is the summative assessment at the end of the unit, where your grade is determined by the evidence you present in your portfolio.

We will work with you by providing formative feedback for these tasks as you submit them week by week. When you submit a task, we will review your work and provide you with feedback. Where your work does not correctly demonstrate the required outcomes, we will give you feedback to help enhance your learning and improve your work for your final portfolio submission. You then need to fix and resubmit the work, so we can check it again and sign it off as Complete when you have achieved the required standard.

We will keep track of all of this in OnTrack, which is where you submit work, receive feedback, resubmit it, and then finally see it signed off as Complete. The process for you is then just a matter of working through the required tasks week by week, and work with us to make sure they are ready for your final portfolio submission.

So, learning in this unit is as simple as setting your target grade, and completing the unit tasks associated with that grade in OnTrack. The teaching team will work with you in providing weekly feedback so that you can achieve the goals you set, demonstrate your ability to complete the unit tasks and discuss your performance with confidence.

Note

At Deakin,

- *Lectures* are referred to as *classes* (definition: a general meeting for all students, for which students do not need to register and where students are engaged through presentations and learning activities).
- *Tutorials*, *workshops* and *seminars* are referred to as seminars (definition: more interactive meetings for smaller groups of students).
- For the complete list of agreed definitions for learning experiences, see the Course Design and Delivery Procedure.

Unit learning resources

Your unit learning resources are available in your unit site accessed in DeakinSync.

Essential learning resources

There is no prescribed textbook for this unit.

Recommended learning resources

Main Reference Sources - Professional magazines and journals in IEEE Xplore Digital Library and selected Springer journals are freely available via the University Library.

1. IEEE journals and magazines: http://www.ieee.org/web/publications/journmag/index.html
2. ACM journals and magazines: http://www.acm.org/publications
3. Conference Proceedings
4. Scholar Google: https://scholar.google.com.au/
5. MIT Technology Review: https://www.technologyreview.com/
6. Nature (Technology): https://www.nature.com/subjects/technology
7. The Conversation (Technology): https://theconversation.com/au/technology
8. Science&Technology Research News: http://www.scienceandtechnologyresearchnews.com/
9. Phys.org (Technology): https://phys.org/technology-news/
10. Science Robotics: http://robotics.sciencemag.org/
11. Ethics and Information Technology Journal (Springer): https://link.springer.com/journal/10676

Key dates for this trimester

Trimester begins (classes begin)	Monday 5 March 2018
Intra-trimester break (a short break during trimester)	Friday 30 March - Sunday 8 April 2018
Trimester ends (classes cease)	Friday 25 May 2018
Study period (examination preparation period)	Monday 28 May - Friday 1 June 2018
Examinations begin	Monday 4 June 2018
Examinations end	Friday 15 June 2018
Inter-trimester break (the period between trimesters)	Monday 18 June - Friday 6 July 2018
Unit results released	Thursday 5 July 2018 (6pm)

Unit weekly activities

Week	Commencing	Special learning activities	Assessment activity
1	05 March 2018	**IT R&D Processes and Methodologies**	Submit week 1 tasks
2	12 March	**IT R&D Processes and Methodologies**	Submit week 2 tasks, aim to complete week 1 tasks
3	19 March	**Internet of things – from good wine to good health**	Submit week 3 tasks, aim to complete week 2 tasks
4	26 March	**Internet of things – from good wine to good health**	Submit week 4 tasks, aim to complete week 3 tasks
Easter vacation/intra-trimester break: Friday 30 March - Sunday 8 April 2018			
5	9 April	**Intelligent Transport Systems and Autonomous Vehicles**	Submit week 5 tasks, aim to complete week 4 tasks; aim to complete all Pass tasks up to and including week 5
6	16 April	**Intelligent Transport Systems and Autonomous Vehicles**	Submit week 6 tasks, aim to complete week 5 tasks
7	23 April	**Artificial Intelligence and Robotics**	Submit week 7 tasks, aim to complete week 6 tasks
8	30 April	**Artificial Intelligence and Robotics**	Submit week 8 tasks, aim to complete week 7 tasks
9	7 May	**Digital Ethics**	Submit week 9 tasks, aim to complete week 8 tasks
10	14 May	**Digital Ethics**	Submit week 10 tasks, aim to complete week 9 tasks; aim to complete all Pass tasks
11	21 May		Complete all Tasks and prepare portfolio for submission
12	28 May		Ensure Portfolio is submitted in OnTrack

*ANZAC Day observed, **Wednesday 25 April - University closed**

This unit is delivered through five FutureLearn courses.

SIT740.1 IT R&D PROCESSES AND METHODOLOGY

Explore IT R&D processes and methodology, and how research is documented
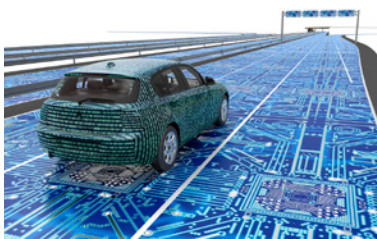
📅 5 Mar   ⧖ 2 Weeks   🕐 3 hrs pw

SIT740.2 THE INTERNET OF THINGS (IOT) R&D - FROM GOOD WINE TO GOOD HEALTH

Discover, unpack and analyse technology trends in the Internet of Things, and types of research and case studies of R&D in Internet of Things

📅 12 Mar   ⧖ 3 Weeks   🕐 10 hrs pw

📅 **30 Mar — BREAK**

SIT740.3 INTELLIGENT TRANSPORT SYSTEMS AND AUTONOMOUS VEHICLES

Discover, unpack and analyse technology trends in Intelligent Transport Systems and Autonomous Vehicles, and types of research and case studies of R&D in this area.
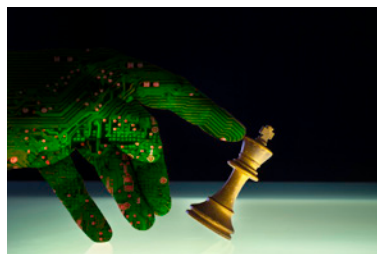
📅 9 April   ⧖ 2 Weeks   🕐 10 hrs pw

SIT740.4 ARTIFICIAL INTELLIGENCE AND ROBOTICS

Discover, unpack and analyse technology trends in Artificial Intelligence and Robotics, and the types of research and case studies of R&D in this area.

📅 23 April   ⧖ 2 Weeks   🕐 10 hrs pw

SIT740.5 DIGITAL ETHICS

Examine ethics in IT R&D, including how to consider ethical issues in research.

📅 7 May   ⧖ 2 Weeks   🕐 10 hrs pw

📅 **28 May — STUDY PERIOD**

📅 **1 June — PORTFOLIO DUE**

📅 **4 Jun — 15 Jun EXAM PERIOD**