



COURSE OUTLINE

ENG103 Introduction to the Internet of Things

Course Coordinator: Kenneth Ang (lang@usc.edu.au) **School:** School of Science, Technology and Engineering

2021 | Semester 2

USC Sunshine Coast
USC Moreton Bay

ON CAMPUS

Most of your course is on campus but you may be able to do some components of this course online.

Online

ONLINE

You can do this course without coming onto campus.

Please go to the USC website for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

In this course you will start developing your micro-computing skills, which are critical for engineers to be able to logically analyze problems and implement solutions that are future focused. Computing and technology are rapidly changing and the technical professionals of the future will be expected to adapt to, and implement new technologies. Using a project-based format, you will develop your computing skills in the context of the rapidly developing Internet of Things (IoT) using micro-computers and controllers (eg. Raspberry Pi and Arduino).

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
ON CAMPUS			
Tutorial/Workshop 1	2hrs	Week 1	13 times
Lecture	2hrs	Week 1	13 times
ONLINE 1			
Tutorial/Workshop 1 – Online workshop	2hrs	Week 1	13 times
Lecture – Scheduled zoom lecture	2hrs	Week 1	13 times

1.3. Course Topics

Internet of Things, binary numbers, microprocessors, introduction to Raspberry Pi, GPIO

Python programming, variables, arithmetic, writing Python code on Pi

Electrical & electronics, current, voltage, resistance, sensors, actuators

2. What level is this course?

100 Level (Introductory)

Engaging with discipline knowledge and skills at foundational level, broad application of knowledge and skills in familiar contexts and with support. Limited or no prerequisites. Normally, associated with the first full-time study year of an undergraduate program.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...
1 Confidently navigate and manipulate computing architecture	Knowledgeable Creative and critical thinker
2 Implement and connect digital and analogue sensors and programmatically interpret their signals	Creative and critical thinker Engaged
3 Create automated solutions by finding and modifying simple microcontroller programs	Knowledgeable Empowered
4 Read and interpret code and bash scripts in a range of applications	Knowledgeable Creative and critical thinker
5 Navigate a command-line driven operating system to control a computer and configure a range of applications	Knowledgeable Engaged
6 Undertake a peer review and assess other's contributions to projects	Engaged

5. Am I eligible to enrol in this course?

Refer to the [USC Glossary of terms](#) for definitions of "pre-requisites, co-requisites and anti-requisites".

5.1. Pre-requisites

Not applicable

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Year 12 level Maths

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

In each of the first ten weeks of the course you are required to complete a workshop activity. Feedback from the tutor will be provided to you on your progress in each of these workshops.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Artefact - Technical and Scientific	Individual	18%	Each week you will be required to complete the workshop and demonstrate you have successfully addressed each step of the exercise.	Throughout teaching period (refer to Format)	In Class
All	2	Quiz/zes	Individual	32%	One hour and twenty minutes	Week 9	Online Assignment Submission
All	3	Artefact - Technical and Scientific, and Written Piece	Group	50%	Implement a major project using both the micro-computer and micro-controller with at least three sensors.	Week 13	In Class

All - Assessment Task 1: Micro-computer/controller Artefacts

GOAL:	The goal of this task is to incorporate a range of binary (e.g. on or off), digital and analogue sensors using the basic architecture, operating system and memory processes of the micro-computer and controller.		
PRODUCT:	Artefact - Technical and Scientific		
FORMAT:	A working version of the product demonstrated in the workshop that is coded to record and output a range of sensors. Weeks 1 - 10		
CRITERIA:	No.		Learning Outcome assessed
	1	The successful implementation of the workshop material will result in full marks.	
	2	Zero marks will be assigned for non-completion of the exercise each week, unless by prior arrangement or an appropriate medical certificate is furnished.	
	3	2.3 Application of systematic engineering synthesis and design processes within the technology domain	
	4	Assessment criteria are mapped to the course learning outcomes.	1 2 3 4 5 6

All - Assessment Task 2: Online Quiz

GOAL:	Engineering is often about solving problems using the latest technology. This task is designed for you to demonstrate your understanding of micro-computing elements in the context of the Internet of Things and how these can be utilised for engineering solutions.
PRODUCT:	Quiz/zes
FORMAT:	An online quiz delivered through Bb with a mix of multiple choice and short answer formats.

CRITERIA:	No.	Learning Outcome assessed
	1	You will be assessed on your ability to clearly communicate your understanding of: basic computer architecture,
	2	micro-computing operating system,
	3	sensor use and data collection and dissemination,
	4	managing memory processes for technical applications.
	5	1.5 Knowledge of contextual factors impacting the engineering discipline.

All - Assessment Task 3: Major Project

GOAL:	Establish a team to navigate a command-line driven operating system to control a computer and configure a range of applications														
PRODUCT:	Artefact - Technical and Scientific, and Written Piece														
FORMAT:	Implement a major project using both the micro-computer and controller with at least three sensors and provide individual reports outlining your contribution into the completed project and complete a peer assessment of the contribution from other members of your group. Students will be graded on the quality of their peer review and contribution to the project. However, the peer review of others will be to produce formative feedback and will not affect the grade of the students who are receiving the feedback. Guidance will be provided on teamwork skills, how to manage group processes, and giving and receiving constructive feedback.														
CRITERIA:	<table border="1"> <thead> <tr> <th>No.</th> <th>Learning Outcome assessed</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>You will be assessed on: the configuration of your 'product' using digital and/or analogue sensors,</td> </tr> <tr> <td>2</td> <td>connection of the sensors to micro-computers and microcontrollers,</td> </tr> <tr> <td>3</td> <td>the implementation of code and bash scripts to automate the operation of the sensors and collection of data, in the context of the IoT,</td> </tr> <tr> <td>4</td> <td>the effectiveness of the 'product' to monitor changes and provide some response,</td> </tr> <tr> <td>5</td> <td>Peer review and contribution to the project.</td> </tr> <tr> <td>6</td> <td>3.3 Creative, innovative, and pro-active demeanour</td> </tr> </tbody> </table>	No.	Learning Outcome assessed	1	You will be assessed on: the configuration of your 'product' using digital and/or analogue sensors,	2	connection of the sensors to micro-computers and microcontrollers,	3	the implementation of code and bash scripts to automate the operation of the sensors and collection of data, in the context of the IoT,	4	the effectiveness of the 'product' to monitor changes and provide some response,	5	Peer review and contribution to the project.	6	3.3 Creative, innovative, and pro-active demeanour
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6	3.3 Creative, innovative, and pro-active demeanour														

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Directed study hours may vary by location. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Blackboard site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	PUBLISHER
Required	Simon Monk	2015	Programming the Raspberry Pi, Second Edition: Getting Started with Python	McGraw-Hill Education TAB

8.2. Specific requirements

A micro-computer (Raspberry Pi), micro-controller (Arduino) and a range of sensors (depending on what you wish to build) will be required for this course. You can purchase your own or borrow from a 'technical' library.

9. How are risks managed in this course?

Risk assessments have been performed for all laboratory classes and a low level of health and safety risk exists. Some risk concerns may include equipment, instruments, and tools; as well as manual handling items within the laboratory. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the [online induction training for students](#), and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

10.2. Assessment: Additional Requirements

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

The final mark is in the percentage range 47% to 49.4%

The course is graded using the Standard Grading scale

You have not failed an assessment task in the course due to academic misconduct

10.3. Assessment: Submission penalties

Late submission of assessment tasks may be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.

- 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.

- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

10.4. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the [Learning Advisers](#) web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.5. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to [Student Hub](#), email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.6. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, [AccessAbility Services](#) can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to [Student Hub](#), email AccessAbility@usc.edu.au or call 07 5430 2890.

10.7. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website: <http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.8. General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **USC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **USC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **USC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au