

ENG106 Engineering Computing

School: School of Science, Technology and Engineering

2026 | Trimester 2

UniSC Sunshine Coast
UniSC Moreton Bay

**BLENDED
LEARNING**

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

Please go to unisc.edu.au 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

This course is designed to demonstrate how the theory developed within your first year courses can be used to simulate engineering systems. Using a project-based format, you will develop your computing skills in the context of rapidly developing technologies (e.g., Internet of Things (IoT), artificial intelligence (AI), computer vision using micro-computers and controllers). The approach used in this course will expose you to the methods used by engineers in the real world to understand physical systems, predict their performance and ensure that they are safe.

1.2. How will this course be delivered?

| ACTIVITY | HOURS | BEGINNING WEEK | FREQUENCY |
|---|-------|----------------|-----------|
| BLENDED LEARNING | | | |
| Learning materials – Asynchronous weekly learning material | 1hr | Week 1 | 12 times |
| Seminar – On campus | 1hr | Week 1 | 3 times |
| Tutorial/Workshop 1 – On-campus | 2hrs | Week 1 | 10 times |
| Laboratory 1 – On campus | 2hrs | Week 2 | 5 times |

1.3. Course Topics

Topics may include:

- Introduction to Python Computing
- Python Scripts and Data Types
- Python Programming Features
- Python Data Structures
- Python Objects and Classes
- AI and Machine Learning in Python
- Computer Vision in Python
- Microprocessor Technologies
- Electronic and Sensor Technologies
- Internet of Things Technologies
- Networking Technologies

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 MAPPING | PROFESSIONAL STANDARD MAPPING * |
|--|--|--|
| On successful completion of this course, you should be able to... | Completing these tasks successfully will contribute to you becoming... | Competencies from multiple Professional Bodies (see below) * |
| 1 Describe the range of engineering computing tools commonly available to aid in, and solve, engineering problems. | Knowledgeable | 1, 1, 1.2.a, 1.2.a, 1.2, 1.2 |
| 2 Explain the common strategies for modelling real world engineering systems and problems. | Knowledgeable | 1, 1, 1.2.a, 1.2.a, 1.2, 1.2 |
| 3 Evaluate engineering systems by selecting appropriate analytical techniques in computer programs. | Creative and critical thinker | 2, 2, 2.1.a, 2.1.a, 2.1, 2.1 |
| 4 Solve engineering problems through developing and using computer code. | Creative and critical thinker | 2, 2, 2.1.a, 2.1.a, 2.1, 2.1 |
| 5 Develop a computer program to implement an engineering model. | Empowered | 2, 2, 2.2.b, 2.2.b, 2.2, 2.2 |
| 6 Simulate an engineering system and generate appropriate graphs of the results. | Engaged | 2, 2, 2.2.d, 2.2.d, 2.2, 2.2, 3, 3, 3.2.a, 3.2.a, 3.2, 3.2 |

* Competencies by Professional Body

| CODE | COMPETENCY |
|--|--|
| ENGINEERS AUSTRALIA STAGE 1 ENGINEERING TECHNOLOGIST COMPETENCY STANDARDS | |
| 1 | Elements of competency: Knowledge and Skill Base |
| 1.2.a | Knowledge and Skill Base - Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the technology domain: Fluently applies relevant investigation, analysis, interpretation, assessment, characterisation, prediction, evaluation, modelling, decision making, measurement, evaluation, knowledge management and communication tools and techniques pertinent to the technology domain. |
| 1.2 | Knowledge and Skill Base: Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the technology domain. |
| 2 | Elements of competency: Engineering Application Ability |
| 2.1.a | Engineering Application Ability - Application of established engineering methods to broadly-defined problem solving within the technology domain: Identifies, discerns and characterises salient issues, determines and analyses causes and effects, justifies and applies appropriate simplifying assumptions, predicts performance and behaviour, synthesises solution strategies and develops substantiated conclusions. |
| 2.2.b | Engineering Application Ability - Application of engineering techniques, tools and resources within the technology domain: Understands the principles, limitations and accuracy of mathematical, physical or computational modelling. |
| 2.2.d | Engineering Application Ability - Application of engineering techniques, tools and resources within the technology domain: Determines properties, performance, safe working limits, failure modes, and other inherent parameters of materials, components and systems relevant to specialist area(s) of the technology domain. |

CODE COMPETENCY

2.1 Engineering Application Ability: Application of established engineering methods to broadly-defined problem solving within the technology domain.

2.2 Engineering Application Ability: Application of engineering techniques, tools and resources within the technology domain.

3 Elements of competency: Professional and Personal Attributes

3.2.a Professional and Personal Attributes - Effective oral and written communication in professional and lay domains: Is proficient in listening, speaking, reading and writing English.

3.2 Professional and Personal Attributes: Effective oral and written communication in professional and lay domains.

ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS

1 Elements of competency: Knowledge and Skill Base

1.2.a Knowledge and Skill Base - Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline: Develops and fluently applies relevant investigation analysis, interpretation, assessment, characterisation, prediction, evaluation, modelling, decision making, measurement, evaluation, knowledge management and communication tools and techniques pertinent to the engineering discipline.

1.2 Knowledge and Skill Base: Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.

2 Elements of competency: Engineering Application Ability

2.1.a Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Identifies, discerns and characterises salient issues, determines and analyses causes and effects, justifies and applies appropriate simplifying assumptions, predicts performance and behaviour, synthesises solution strategies and develops substantiated conclusions.

2.2.b Engineering Application Ability - Fluent application of engineering techniques, tools and resources: Constructs or selects and applies from a qualitative description of a phenomenon, process, system, component or device a mathematical, physical or computational model based on fundamental scientific principles and justifiable simplifying assumptions.

2.2.d Engineering Application Ability - Fluent application of engineering techniques, tools and resources: Applies a wide range of engineering tools for analysis, simulation, visualisation, synthesis and design, including assessing the accuracy and limitations of such tools, and validation of their results.

2.1 Engineering Application Ability: Application of established engineering methods to complex engineering problem solving.

2.2 Engineering Application Ability: Fluent application of engineering techniques, tools and resources.

3 Elements of competency: Professional and Personal Attributes

3.2.a Professional and Personal Attributes - Effective oral and written communication in professional and lay domains: Is proficient in listening, speaking, reading and writing English.

3.2 Professional and Personal Attributes: Effective oral and written communication in professional and lay domains.

5. Am I eligible to enrol in this course?

Refer to the [UniSC 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

ENG103

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

Not applicable

5.5. Microcredential Information

Not applicable

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 | Portfolio | Individual | 30% | 1500 words | Week 8 | Online Assignment Submission with plagiarism check |
| All | 2 | Quiz/zes | Individual | 20% | 6 x quizzes | Throughout teaching period (refer to Format) | Online Test (Quiz) |
| All | 3 | Artefact - Technical and Scientific, and Written Piece | Individual | 50% | 1 x Artefact + 1500 words | Week 12 | Online Assignment Submission with plagiarism check |

All - Assessment Task 1: Portfolio

| GOAL: | | | | | | | | | | |
|------------------------------|---|---------------------------|--|---------------------------|---|--|---|---|---|---|
| PRODUCT: | Portfolio | | | | | | | | | |
| AUTHORSHIP STATEMENT: | | | | | | | | | | |
| FORMAT: | n/a | | | | | | | | | |
| CRITERIA: | <table border="1"> <thead> <tr> <th>No.</th> <th></th> <th>Learning Outcome assessed</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Description of the range of engineering computing tools commonly available to aid in, and solve, engineering problems.</td> <td>1</td> </tr> <tr> <td>2</td> <td>Explanation of the common strategies for modelling real world engineering systems and problems.</td> <td>2</td> </tr> </tbody> </table> | No. | | Learning Outcome assessed | 1 | Description of the range of engineering computing tools commonly available to aid in, and solve, engineering problems. | 1 | 2 | Explanation of the common strategies for modelling real world engineering systems and problems. | 2 |
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| 2 | Explanation of the common strategies for modelling real world engineering systems and problems. | 2 | | | | | | | | |
| GENERIC SKILLS: | Organisation | | | | | | | | | |

All - Assessment Task 2: Quiz/zes

| GOAL: | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|---|---------------------------|--|---------------------------|---|--|---|---|---|---|---|--|---|---|--|---|---|--|---|---|--|---|
| PRODUCT: | Quiz/zes | | | | | | | | | | | | | | | | | | | | | |
| AUTHORSHIP STATEMENT: | | | | | | | | | | | | | | | | | | | | | | |
| FORMAT: | Online Quizzes. Weeks 2,4,6,8,10,12 | | | | | | | | | | | | | | | | | | | | | |
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| 2 | Explanation of the common strategies for modelling real world engineering systems and problems. | 2 | | | | | | | | | | | | | | | | | | | | |
| 3 | Evaluation of engineering systems by selecting appropriate analytical techniques in computer programs. | 3 | | | | | | | | | | | | | | | | | | | | |
| 4 | Solve engineering problems through developing and using computer code. | 4 | | | | | | | | | | | | | | | | | | | | |
| 5 | Development of a computer program to implement an engineering model. | 5 | | | | | | | | | | | | | | | | | | | | |
| 6 | Simulation of an engineering system and generation of appropriate graphs of the results. | 6 | | | | | | | | | | | | | | | | | | | | |
| GENERIC SKILLS: | Problem solving | | | | | | | | | | | | | | | | | | | | | |

All - Assessment Task 3: Artefact

| GOAL: | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|---|---------------------------|--|---------------------------|---|--|---|---|---|---|---|--|---|---|--|---|---|--|---|---|--|---|
| PRODUCT: | Artefact - Technical and Scientific, and Written Piece | | | | | | | | | | | | | | | | | | | | | |
| AUTHORSHIP STATEMENT: | | | | | | | | | | | | | | | | | | | | | | |
| FORMAT: | n/a | | | | | | | | | | | | | | | | | | | | | |
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| 6 | Simulation of an engineering system and generation of appropriate graphs of the results. | 6 | | | | | | | | | | | | | | | | | | | | |
| GENERIC SKILLS: | Organisation, Applying technologies | | | | | | | | | | | | | | | | | | | | | |

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. 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 Canvas site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

You need regular access to the resource(s) below. Many texts are available as ebooks through the [Library](#) at no additional cost.

| REQUIRED? | AUTHOR | YEAR | TITLE | EDITION | PUBLISHER |
|-------------|------------|------|---|---------|---------------------------|
| Recommended | Simon Monk | 2015 | Programming the Raspberry Pi, Second Edition: Getting Started with Python | n/a | 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 studio and 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 Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

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

- (a) The final mark is in the percentage range 47% to 49.4%; and
- (b) The course is graded using the Standard Grading scale

10.3. Assessment: Submission penalties

Late submissions may be penalised up to and including the following maximum percentage of the assessment task's identified value, with weekdays and weekends included in the calculation of days late:

- (a) One day: deduct 5%;
- (b) Two days: deduct 10%;
- (c) Three days: deduct 20%;
- (d) Four days: deduct 40%;
- (e) Five days: deduct 60%;
- (f) Six days: deduct 80%;
- (g) Seven days: A result of zero is awarded for the assessment task.

The following penalties will apply for a late submission for an online examination:

- Less than 15 minutes: No penalty
- From 15 minutes to 30 minutes: 20% penalty
- More than 30 minutes: 100% penalty

10.4. 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
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit <https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.5. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The [Student Charter](#) sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.6. General Enquiries

For course-specific questions, contact your teaching staff or Course Coordinator.

For other enquiries or to access support, please contact Student Central:

- [UniSC Student Central](#)
- [UniSC Adelaide Student Central](#)