COURSE OUTLINE

ENG104 Foundations of Engineering Design

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 introduces engineering design through a whole systems design cycle approach. Working on a real-life design brief, you will learn to apply basic design concepts, analyse human-centric needs and create feasible design solutions. It introduces fundamentals of communicating designs through technical drawings and implementation in discipline-specific engineering software.

Students completing an engineering technologist qualification will develop an applied approach to engineering design, whilst those in a professional engineering stream will undertake independent solution development.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – 2 X 30 mins narrated audio presentation of theory and principles of engineering design.	1hr	Week 1	12 times
Laboratory 1 – On Campus Computer Lab: Basics of using CAD for visualisation of Design	2hrs	Week 1	4 times
Tutorial/Workshop 1 – Supervised design group meetings to work on EWB humanitarian design.	2hrs	Week 5	8 times
Seminar – On campus course overview and workshop on group work in week 1	1hr	Week 1	Once Only

1.3. Course Topics

Topics may include:

- Basic techniques in technical drawing, incorporating third angle, isometric, sectioning, assembly drawings, dimensioning, tolerancing, component selection, layout and wiring.
- Communicating Engineering Design with CAD
- Groupwork in Engineering Design
- Formulating a Design problem
- Function and means representations
- Design objectives
- Optimizing alternatives using a decision matrix
- Product design and redesign
- Humanitarian design
- Reporting conceptual design

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 Identify the correct usage of isometric, third angle, oblique and sectional drawing styles.	Knowledgeable	2, 2, 2.1.a, 2.1.a, 2.1, 2.1
2 Demonstrate a sound knowledge of the principles of engineering design	Knowledgeable	1, 1, 1.3.a, 1.3.a, 1.3, 1.3
3 Evaluate the capabilities of engineering design software for solving specific engineering drafting problems.	Creative and critical thinker	2, 2, 2.1.a, 2.1.a, 2.1, 2.1
4 Critically analyse the design process in developing or creating an engineering device/system independently and within a team.	Creative and critical thinker Sustainability-focussed	2, 2, 2.1.a, 2.1.a, 2.1, 2.1
5 Interpret, analyse and evaluate engineering design alternatives.	Empowered Sustainability-focussed	2, 2, 2.2.b, 2.2.b, 2.2.d, 2.2.d, 2.2, 2.2

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) *
6 Respond to an Australian Indigenous or Regional international Humanitarian Engineering brief and create and justify a sustainable conceptual design solution to an identified need, considering human context, potential outcomes, constraints and risks.	Creative and critical thinker Engaged	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
1.3.a	Knowledge and Skill Base - In-depth understanding of specialist bodies of knowledge within the technology domain: Proficiently applies advanced technical knowledge and skills to deliver engineering outcomes in specialist area(s) of the technology domain and associated industry, commercial and community sectors.
1.3	Knowledge and Skill Base: In-depth understanding of specialist bodies of knowledge within 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.
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.
3.2.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
1.3.a	Knowledge and Skill Base - In-depth understanding of specialist bodies of knowledge within the engineering discipline: Proficiently applies advanced technical knowledge and skills in at least one specialist practice domain of the engineering discipline.
1.3	Knowledge and Skill Base: In-depth understanding of specialist bodies of knowledge within 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.

CODE	COMPETENCY
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

ENG202

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 Week 3 a draft copy of your task 1 (engineering drawing) will be reviewed by your tutor and a feedback will be provided.

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	25%	1 portfolio of technical drawings	Week 6	Online Assignment Submission with plagiarism check
All	2	Report	Individual	25%	1500 words	Week 8	Online Assignment Submission with plagiarism check
All	3a	Oral	Group	10%	10-minute group presentation	Week 12	Online Assignment Submission with plagiarism check
All	3b	Written Piece	Group	40%	3000 word limit	Week 12	Online Assignment Submission with plagiarism check

All - Assessment Task 1: Portfolio

GOAL:	To develop skills in technical drawing and communicate designs using discipline specialised software.
PRODUCT:	Portfolio
AUTHORSHIP STATEMENT:	
FORMAT:	Technical drawing focusing upon engineering componentry from a relevant engineering area, completed mid way through the study period.

CRITERIA:

No.		Learning Outcome assessed
1	Identification of the correct usage of isometric, third angle, oblique and sectional drawing styles.	1
2	Demonstration of a sound knowledge of the principles of engineering drafting including technical drawing fundamentals	2
3	Utilisation of advanced modeling techniques to produce 2D and 3D models of complex objects or structures and extraction of key information from these models.	5
4	Utilisation of knowledge of drafting principles to produce high quality engineering drawings that effectively communicate complex engineering ideas.	6

GENERIC SKILLS:	Communication, Problem solving, Applying technologies

All - Assessment Task 2: Report

GOAL:	To apply your understanding of the process of product redesign for continuous improvement and communicate it to an audience.
PRODUCT:	Report
AUTHORSHIP STATEMENT:	
FORMAT:	Intermediate engineering design focusing upon a relevant engineering area, completed mid way through the study period.
CRITERIA:	

No.		Learning Outcome assessed
1	Identification of the correct usage of isometric, third angle, oblique and sectional drawing styles.	1
2	Demonstration of a sound knowledge of the principles of engineering design including technical drawing fundamentals	2
3	Evaluation of the capabilities of engineering design software for solving specific engineering drafting problems.	3
4	Critical analysis of the information conveyed in models and utilisation of it to make informed decisions in the design process.	4
5	Utilisation of knowledge of drafting principles to produce high quality engineering drawings that effectively communicate complex engineering ideas.	6

GENERIC SKILLS:	Communication, Problem solving, Organisation

All - Assessment Task 3a: Presentation

GOAL:	To present a proposed human-centric solution to a technical audience.
PRODUCT:	Oral
AUTHORSHIP STATEMENT:	
FORMAT:	Each group will give a 10-minute oral presentation on the identified needs and proposed solution.
CRITERIA:	

No.		Learning Outcome assessed
1	Application of whole systems design cycle approach	4 5 6
2	Communication of design concept to a specialist audience.	4 5 6
3	Evaluation of the written design report of the proposed solution to a humanitarian design brief	3 4 5 6

GENERIC SKILLS:	Communication, Problem solving, Organisation

All - Assessment Task 3b: Design Report of Humanitarian Engineering Design

GOAL:	As a group, you will prepare a report to present solutions to identified needs in a humanitarian scenario involving either an Australian indigenous community or a Regional International community. The main goal is to learn how to work together as a team to solve a typical humanitarian engineering problem.
PRODUCT:	Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	A written report with engineering conventions.

CRITERIA:

No.		Learning Outcome assessed
1	Application of whole systems design cycle approach	3 4 5 6
2	Communication for specialist audiences: adhere to word limit English expression use of terminology follow referencing conventions	4 5
3	Adherence to professional and ethical behaviour during collaboration. This will have elements of peer and tutor assessment of effective group dynamics and participation.	6
4	Effective team membership and team leadership.	4

GENERIC SKILLS:	Communication, Collaboration, Organisation, Information literacy

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	Yousef Haik,Sangarappillai Sivaloganathan,Tamer M. Shahin	2015	Engineering Design Process	3rd ed.	Cengage Learning

8.2. Specific requirements

Not applicable

9. How are risks managed in this course?

Health and safety risks for this course have been assessed as low. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety 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