

ENG104 Introduction to Engineering Design

School: School of Science, Technology and Engineering

2023 | Semester 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 usc.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

Engineering design is the practice of turning “dreams” into reality. It involves conceptualising and interpreting ideas and providing a feasible solution. This course introduces you to the whole systems design cycle approach in which you apply basic design concepts, analyse human-centric needs and solve problems to meet these needs. You will also learn how to communicate engineering designs using CAD. Using a design brief from a real-life challenge, you will work together in a group to come up with well-reasoned feasible solution to the identified problems.

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	13 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	9 times
Seminar – On campus course overview and workshop on group work in week 1	1hr	Week 1	Once Only
Information session – Online workshop on product redesign in week 7	2hrs	Week 7	Once Only

1.3. Course Topics

- Communicating Engineering Design with CAD
- Groupwork in Engineering Design
- Formulating Design problem
- Function and means representation
- 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...	Engineers Australia Stage 1 Professional Engineer Competency Standards
1 Solve human-centric engineering problems to improve life by taking and applying a whole systems design cycle approach	Sustainability-focussed	2.3, 3.1, 3.5
2 Respond to a regional or international engineering brief and create and justify a conceptual design, considering human context, potential outcomes, constraints and risks.	Engaged	3.3, 3.4
3 Demonstrate basic skills in engineering drawing methods and techniques	Empowered	1.2, 3.2
4 Interpret, analyse and evaluate engineering design alternatives.	Empowered	1.4, 1.5, 3.2
5 Communicate design solutions using engineering drawings, written reports and a presentation to specialist audiences.	Engaged	3.1, 3.2, 3.6
6 Act professionally by: functioning autonomously and in teams, and adhering to the engineering code of ethics and sustainability practices	Ethical	1.3, 3.5, 3.6

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
1.2	Knowledge and Skill Base: Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
1.3	Knowledge and Skill Base: In-depth understanding of specialist bodies of knowledge within the engineering discipline.
1.4	Knowledge and Skill Base: Discernment of knowledge development and research directions within the engineering discipline.

1.5	Knowledge and Skill Base: Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
2.3	Engineering Application Ability: Application of systematic engineering synthesis and design processes.
3.1	Professional and Personal Attributes: Ethical conduct and professional accountability.
3.2	Professional and Personal Attributes: Effective oral and written communication in professional and lay domains.
3.3	Professional and Personal Attributes: Creative, innovative and pro-active demeanour.
3.4	Professional and Personal Attributes: Professional use and management of information.
3.5	Professional and Personal Attributes: Orderly management of self, and professional conduct.
3.6	Professional and Personal Attributes: Effective team membership and team leadership.

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

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%	(i) Multi views(ii) Isometric drawing	Week 6	Online Submission
All	2	Written Piece	Individual	25%	1500 - 2000 words	Week 8	Online Assignment Submission with plagiarism check
All	3	Report	Group	50%	Final report- 2000 words per student. 10 minutes, 5 slides, 200 words equivalent including diagrams	Refer to Format	Online Assignment Submission with plagiarism check

All - Assessment Task 1: Engineering Drawing

GOAL:	You will develop skills for drafting to communicate design using specialised software					
PRODUCT:	Portfolio					
FORMAT:	You individually produce CAD and freehand drawings based on pictorial views of engineering components related to design problems. CAD drawings include orthographic projections, auxiliary views and isometric drawings. Week 3 - Formative feedback given on multi-view projections to assist in Task 1 submission.					
CRITERIA:	No.					Learning Outcome assessed
	1	Application of software				3
	2	Evidence of Engineering design principles				5
	3	Relevance to given problem				4
	4	Accuracy of multi –views application				4
	5	2.1 Application of established engineering methods to complex engineering problem solving.				5

All - Assessment Task 2: Product design analysis and redesign

GOAL:	You will apply your understanding of the process of product redesign for continuous improvement and communicate it to a specific audience.					
PRODUCT:	Written Piece					
FORMAT:	This individual task requires you to write a report by following the steps below: Choose an engineering product from a given list and state the need for the product Explain how the product evolved by referring to research, e.g. from literature, product websites Evaluate the functions/subfunctions and the means used in the product Propose what will be the next iteration of this product following the essential design steps. You may wish to sketch this object, but detailed engineering drawings are not necessary.					

CRITERIA:	No.	Learning Outcome assessed
	1 Interpretation of engineering design to explain how the product evolved	1 4
	2 Application of a whole system design cycle approach to engineering problems to: evaluate the role engineering design played in the evolution of the product:	1 4 5
	3 propose and justify the next iteration (conceptual design) of the product taking into account human needs and outcomes	4 5
	4 Communication of your evaluation in a written report to specialist audiences: adhere to report template and word limit	1 5
	5 English expression	5
	6 1.4 Discernment of knowledge development and research directions within the engineering discipline.	6

All - Assessment Task 3: Case study design brief and oral presentation

GOAL:	You will work in a group to solve a human-centric engineering problem to improve life by applying the whole system design cycle approach. Further, you will develop the important and complex skills of collaboration and communication that are invaluable professional engineering competencies.	
PRODUCT:	Report	
FORMAT:	<p>Submit: Draft report Monday Week 10 Oral presentation Week 12 Final report Friday Week 13. You are given a brief describing the lifestyle of real human community. Your group of 3-4 will analyse the brief and come to identify a need in this community. You will apply basic concepts of design to propose a solution to meet that need. You are encouraged to be creative in responding to this real-life challenge to improve human living conditions. Ensure your design would be sustainable in the community and that you behaved ethically as a group in developing your design. Your group will be given assistance during tutorials to help clarify any concerns about choosing and defining a design problem from the brief. You will be given feedback on the preliminary draft of your design and your justification so that you can revise it and develop into your final report. 10% of your mark: One member of your group presents the group's conceptual design response to the brief and a completed collaboration log outlining where report elements and project benchmarks were planned, met and evidenced by your group members. The presentation is to be 10 minutes using no more than 5 PowerPoint slides. 40% of your mark: The final report is a revision of the preliminary report and an update to the collaboration log. It takes into account your tutor's feedback on the preliminary report and peer feedback from the oral presentation and shows further development of the design and justification.</p> <p>Draft report due Monday Week 10 Oral presentation due Week 12 Final report Friday due Week 13</p>	
CRITERIA:	No.	Learning Outcome assessed
	1 Application of whole systems design cycle approach	1 4
	2 Communication for specialist audiences: adhere to word limit English expression use of terminology follow referencing conventions	2 6
	3 Adherence to professional and ethical behaviour during collaboration. This will have elements of peer and tutor assessment of effective group dynamics and participation.	1 5 6
	4 2.3 Application of systematic engineering synthesis and design processes.	1 2 3
	5 3.2 Effective oral and written communication in professional and lay domains	1 5 6
	6 3.6 Effective team membership and team leadership.	2 4 6

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

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	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

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. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: [07 5430 1168](tel:0754301168) or using the [SafeZone](#) app. For general enquires contact the SafeUniSC team by phone [07 5456 3864](tel:0754563864) or email safe@usc.edu.au.

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call [07 5430 1226](tel:0754301226) or email studentwellbeing@usc.edu.au.

10.5. 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.

10.6. 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.

10.7. 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.

10.8. 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>

10.9. 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.

10.10. General Enquiries

In person:

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

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au