COURSE OUTLINE

ENG212 Structural Engineering

School: School of Science, Technology and Engineering

2026 | Semester 2

UniSC Sunshine Coast — 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

In this course you will learn about the design philosophy adopted by the Australian Standards. You will develop the capacity to use design codes to determine the appropriate types of loads and combinations of loads for service and ultimate limit state designs. You will learn to relate the code requirements to the physical behaviour of elements and assemblages and to apply your knowledge of structural analysis and understanding of materials to design fundamental steel and timber structural members and simple structures. You also learn to design structures for stability (bracing).

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Lecture	2hrs	Not applicable	Not Yet Determined
Tutorial/Workshop 1	2hrs	Not applicable	Not Yet Determined

2. What level is this course?

200 Level (Developing)

Building on and expanding the scope of introductory knowledge and skills, developing breadth or depth and applying knowledge and skills in a new context. May require pre-requisites where discipline specific introductory knowledge or skills is necessary. Normally, undertaken in the second or third full-time year of an undergraduate programs.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES On successful completion of this course, you should be able to...	GRADUATE QUALITIES Completing these tasks successfully will contribute to you becoming...
1 Competently and confidently use Australian Standards AS/NZS 1170.0, 1170.1 & 1170.2; and AS 1720.1 & 4100 for structural analysis and design with timber and steel.	Knowledgeable Empowered
2 Accurately and confidently use the structural principles of strength, stability and serviceability and identify the context of their design limit state.	Knowledgeable
3 Competently determine the adequate loads and load combinations acting on structures arising from the design actions of gravity, occupation and use, and wind.	Knowledgeable
4 Competently, adequately and accurately analyse structures of buildings to determine the design actions developing in their structural elements in response to the design load combinations and arrangements.	Creative and critical thinker
5 Competently and compliantly design structural elements in steel and timber for strength, stability and/or serviceability:Members such as beams, rafters, columns, etc.Connections with mechanical fasteners such nails, screws, bolts, etc.	Empowered
6 Collaborate and apply creativity and innovation in a project team to conceive adequate structures ie. most adequate solutions for steel or timber structures.	Creative and critical thinker Ethical Engaged
7 Collaborate effectively in a project team to competently and compliantly design steel and timber structures, draw construction details and produce engineering reports.	Creative and critical thinker Ethical Engaged
8 Effectively and clearly communicate (in your group or to an audience) your design procedures, outcomes and recommendations in a manner acceptable to the engineering profession.	Empowered Ethical

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

ENG221 or MEC221 and enrolled in Program SC410, SC425

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

CIV2503 (USQ equivalent course)

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 Tutorial, a draft copy or progress report of your assessment Task 2a will be peer reviewed.

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	Quiz/zes	Individual	20%	Six short design reports (max. 200 words).	Throughout teaching period (refer to Format)	In Class
All	2	Report	Group	40%	Three design reports (max. 1000 words).	Refer to Format	In Class
All	3	Examination - Centrally Scheduled	Individual	40%	2 Hours	Exam Period	Exam Venue

All - Assessment Task 1: Structural Engineering

GOAL:	Competently explain, demonstrate and apply steel and timber design procedures compliant with AS/NZS 1170.0, 1170.1 & 1170.2; and AS 1720.1 & 4100, and to the adequate design limit states (strength, serviceability, etc.)
PRODUCT:	Quiz/zes
AUTHORSHIP STATEMENT:	
FORMAT:	You determine the relevant limit state conditions of structural steel and timber elements, design these elements to these limit states, provide the detailing of these elements if applicable, and discuss the design procedures and/or your design. You complete your designs competently in compliance with AS/NZS 1170.0, 1170.1 & 1170.2; and AS 1720.1 & 4100: 1a)Structural engineering, 1b) Steel member under axial actions, 1c) Steel beam under flexural design action, 1d) Timber member under axial actions, 1e) Timber beam under flexural design action, 1f) TBC. You present your designs in short design reports of max. 200 words each or equivalent. Your reports adhere to the conventions of engineering reports, must be strictly handwritten (neat and legible) and ready for review by a senior engineer. If relevant, you may include captioned diagrams, tables of data, graphs, photographs, etc. as Appendices. Calculations must be in adequate significant figures and units throughout the reports. If applicable, your design detailings are complete with adequate specifications, dimensions and units (neat hand sketches are acceptable). Note the word count excludes Appendices. You may collaborate with peers to complete Task 1. Such collaboration will be clearly stated on the task coversheet. You also provide your details (names and student number) and signature on the cover page of each report. A coversheet template will be available on Blackboard. Submission in Weeks 3, 5, 6, 9, 10 & 13.
CRITERIA:	

No.		Learning Outcome assessed
1	Accurate explanation of design procedures and principles.	
2	Correct choice of design methods and codes.	
3	Correct application of design methods and procedures through the correct use of formulae and codes to analyse and design a concrete member to limit states.	
4	Inclusion of all workings showing a logical sequence to the problem solution and presentation of design calculations to a professional engineering standard.	
5	Report format and presentation to a professional engineering standard.	
6	1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	
7	2.1 Application of established engineering methods to complex engineering problem solving.	
8	2.2 Fluent application of engineering techniques, tools and resources.	
9	3.2 Effective oral and written communication in professional and lay domains.	
10	Assessment criteria are mapped to the course learning outcomes.	1 2 3 4 5 6 7 8

GENERIC SKILLS:	

All - Assessment Task 2: Design Project

GOAL:	Effectively and professionally collaborate with your peers to undertake the detailed engineering design of steel and timber structures (buildings, bridges, etc.) or aspects of these to relevant limit states in compliance with Australian Design Codes: AS/NZS 1170.0, 1170.1 & 1170.2; and AS 1720.1 & 4100.
PRODUCT:	Report
AUTHORSHIP STATEMENT:	

FORMAT:	Engineers work in project teams! This challenging design project will allow you to demonstrate your (structural) design abilities by developing, designing and drawing the structural elements of a building, and will contribute to developing and/or improving your collaboration skills. 2a)Structural engineering 2b)Steel design and construction 2c)Timber design and construction Site details, architectural drawings and full project description will be supplied on Blackboard and/or discussed in class. In your group (3-4 members), you collaborate effectively and professionally to write three design reports that adhere to the conventions of engineering reports, of a maximum of 1000 words or equivalent, your reports must be ready for review by a senior engineer. Your report may include calculations - ensure calculations are in adequate significant figures and units throughout the reports (scanned copies of hand calculations are acceptable), diagrams, tables of data, graphs and photographs adequately captioned and referenced, and shop drawings of your design (if required). All drawings and detailings (shop drawings) are prepared with AutoCAD or an equivalent CAD program and placed in an Appendix. Task 2a - Structural engineering Your team determine the design parameters of the Limit State Design of a proposed building. To this end, you investigate and identify the loads (incl. wind load) and design load combinations for ultimate and service limit states applicable to the building in compliance with the Australian Loading Code: AS/NZS 1170 set, you conceive a solution for the structure of the proposed building, including the stability concept, and you complete the pre-analysis of the primary structure (stability members excludes). Note further details about the building/structure will be provided on Blackboard and/or in class. Task 2b - Steel design and construction Your team engineer and design a structural solution using steel products. Your steel solution is adapted to your primary structure (refer to Task 2a). Your design must comply with Australian Design Code AS 4100-1998 Steel Structures. Note further details will be provided on Blackboard and/or in class. Task 2c - Timber design and construction Your team engineer and design a timber structure adapted to the primary structure of the proposed building (refer to Task 2a). Your design must comply with Australian Design Code AS 1720.1-2010 Timber Structures. Note further details will be provided on Blackboard and/or in class. The design project will be completed without the help of specialised structural analysis software and design aids such as span tables. Note design capacity tables and aids may be used as a check of your design solutions. Note: These tools are obviously used in practice but until you have enough experience to appreciate their limitations and/or critically assess their results, eg. whether or not a software output is reasonable, it is best that you design 'manually' and check/discuss your design solutions with your peers. The names and student numbers of all team members are listed on the cover page of each report and each team member must sign the cover page. The contributions of each team member will also be clearly stated on the coversheets. Coversheet templates will be available on Blackboard. Submission in Weeks 4, 8 & 12

CRITERIA:	No.		Learning Outcome assessed
	1	Innovative conceptualisation of the building structure(s).	
	2	Correct choice of design methods and codes.	
	3	Correct application of design methods and procedures through the correct use of formulae and codes to analyse and design a concrete structures to limit states.	
	4	Inclusion of all workings showing a logical sequence to the problem solution to allow a professional review (and sign-off) of the design.	
	5	Presentation of design calculations and drawings to a professional engineering standard.	
	6	Acting professionally by functioning in teams when carrying out the designs and writing up the reports.	
	7	Design reports are prepared for revision ie. review by a senior engineer.	
	8	You are awarded an individual grade for each Task.	
	9	Upon request individual marks can be moderated with an algorithm that uses the Reviewer's mark for the task plus a rating of your contribution by your group peers (a self and peer assessment based evaluation).	
	10	Marks are recorded and made available to you on Blackboard.	
	11	1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	
	12	2.1 Application of established engineering methods to complex engineering problem solving.	
	13	2.2 Fluent application of engineering techniques, tools and resources.	
	14	3.1 Ethical conduct and professional accountability.	
	15	3.2 Effective oral and written communication in professional and lay domains.	
	16	3.3 Creative, innovative and pro-active demeanour.	
	17	3.5 Orderly management of self, and professional conduct.	
	18	3.6 Effective team membership and team leadership.	
GENERIC SKILLS:			

All - Assessment Task 3: Final Exam

GOAL:	Demonstrate the competencies and skills to competently and compliantly determine Limit State Design parameters, and to competently and compliantly design steel and timber structural elements.
PRODUCT:	Examination - Centrally Scheduled
AUTHORSHIP STATEMENT:	
FORMAT:	The final exam assesses the material (lectures, tutorials and assignments) covered in the course and the self-study material. The exam will be partially open book. Full details of what may be taken into the exam venue will be explained in class during the semester and posted on Blackboard. You will be required to solve a number of typical Structural Engineering design problems similar to the Lecture examples, Tutorial questions and/or those you undertook in your design projects.Past exam papers may be available on Blackboard.
CRITERIA:	

No.		Learning Outcome assessed
1	Appropriateness and correctness of design solutions;	
2	Correct use of design methods and codes;	
3	Inclusion of all workings showing a logical sequence to the problem solution.	
4	Demonstration of adequate and competent application of design process through use of correct formulae;	
5	Competent and accurate explanation of design aspects and phenomena.	
6	1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	
7	2.1 Application of established engineering methods to complex engineering problem solving.	
8	2.2 Fluent application of engineering techniques, tools and resources.	
9	3.2 Effective oral and written communication in professional and lay domains.	

GENERIC SKILLS:	

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
Required	AS/NZS	0	AS/NZS 1170.0 Structural design actions - General principles.		
Required	AS/NZS	0	AS/NZS 1170.1 Structural design actions - Permanent, imposed and other actions.		
Required	Kirke, B and Al-Jamel, I H	2004	Steel Structures Design Manual To AS 4100'	1st Edition	
Required	AS/NZS	0	AS 4100 Steel structures.		
Required	AS/NZS	0	AS 1720.1 Timber structures, Part 1: Design methods.		
Required	AS/NZS	0	AS/NZS 1170.2 Structural design actions - Wind actions.	n/a	n/a
Recommended	Brian Kirke and Iyad Hassan Al-Jamel	2004	Steel Structures Design Manual to AS4100	1st	(https://wiki.csiamerica.com/download/attachments/7636185/Steel%20Structures%20Design%20Manual version=1&modificationDate=1308592778198&api=v2)
Recommended	n/a	0	HB2.2-2003 (Incorporating Amendments 1 and 2), 'Australian Standards for Civil Engineering Students, Part 2: Structural Engineering' (Incorporating Amendments 1 and 2).	n/a	n/a

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. 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

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

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