COURSE OUTLINE

CIV200 Structural Analysis

School: School of Science, Technology and Engineering

2025 | 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 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

Civil engineers are responsible for designing solutions to complex problems that meet client requirements and regulatory standards. In this course you will learn the classical theory of structures and the Australian Standards design approach applying techniques to analyse responses of linear elastic structures under various loads and predict their behaviour. You will apply design codes to determine loads and load combinations for serviceability and ultimate limit states, preparing you to tackle real-world engineering challenges and ensuring the safety and functionality of structures.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Asynchronous learning material including videos, articles and readings	2hrs	Week 1	13 times
Information session – Online workshop	1hr	Week 1	13 times
Tutorial/Workshop 1 – On campus tutorial/ PC workshop	3hrs	Week 1	13 times

1.3. Course Topics

Topics may include:

- Analysis of statically determinate structures.
- Limit States Design incl. loads, load factors and load combination arrangements.
- Analysis of wind actions and wind effects on buildings.
- Analysis of statically determinate frames and trusses.
- Indeterminacy, analysis of statically indeterminate structures.
- Deflection analysis using double integration method.
- Principle of Work incl. Virtual Work for deformation analysis.
- Principle of Virtual Work incl. Integration table.
- Force method for the analysis of beams, frames, and trusses.
- Influence lines for beams and trusses .

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 MAPPING Completing these tasks successfully will contribute to you becoming...	PROFESSIONAL STANDARD MAPPING * Competencies from multiple Professional Bodies (see below) *
1 Apply an existing industry-standard computer program to model real structures, interpret the results and perform manual checks to validate the results.	Empowered	2, 2, 2.2.d, 2.2.d, 2.2, 2.2
2 Estimate internal and external wind loadings on typical portal-framed buildings for the purpose of analysis and design.	Empowered	2, 2, 2.2.b, 2.2.b, 2.2, 2.2
3 Produce a well-communicated and professionally-presented document including details of computer modelling, along with outcomes and conclusions.	Engaged	3, 3, 3.2.a, 3.2.a, 3.2, 3.2
4 Demonstrate competence in utilising Australian Standards and relevant loading guidelines.	Ethical	1, 1, 1.6.a, 1.6.a, 1.6, 1.6
5 Recognise the distinction between the allowable stress and strength limit state approaches and justify the adopted approach.	Knowledgeable	1, 1, 1.3.a, 1.3.a, 1.3, 1.3
6 Discern the importance of checking the validity of computer-generated structural analysis results and identify the structural principles by which this is done.	Knowledgeable	1, 1, 1.3.a, 1.3.a, 1.3, 1.3

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 ENGINEERING TECHNOLOGIST COMPETENCY STANDARDS	
1	Elements of competency: Knowledge and Skill Base
1.6.a	Knowledge and Skill Base - Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the technology domain: Understands the standards and codes of practice, as well as the legislative and statutory requirements associated with specialist practice area(s) of the technology domain.
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.

CODE	COMPETENCY
1.6	Knowledge and Skill Base: Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the technology domain.
2	Elements of competency: Engineering Application Ability
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.
2.2.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	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
1.6.a	Knowledge and Skill Base - Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline: Appreciates the basis and relevance of standards and codes of practice, as well as legislative and statutory requirements applicable to the engineering discipline.
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.
1.6	Knowledge and Skill Base: Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
2	Elements of competency: Engineering Application Ability
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.
2.2.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	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

ENG105 or ENG102

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

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

The engagement in weekly formative tutorial and workshop problems will demonstrate the level of proficiency and understanding of the course material.

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	Written Piece	Individual	50%	Equivalent to max. 800 words each.	Refer to Format	Online Assignment Submission with plagiarism check
All	2	Examination - Centrally Scheduled	Individual	50%	2 hours	Exam Period	Online Assignment Submission with plagiarism check

All - Assessment Task 1: Written Piece

GOAL:	These assignments (take-home tasks) develop your understanding of core theory and its application to practical problems and enable you to identify and address gaps in your skills and knowledge.
PRODUCT:	Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	You will use the material presented in the Learning Material and Workshops, and applied in the Tutorials to complete your assignment. Your submissions will be assessed individually. This assignment helps you to test your knowledge to ensure that you understand the basic concepts of load theory. You will hand sections of this task progressively on the indicated weeks to ensure you receive early, regular, and timely feedback on the progress of your work. Due Weeks 3, 6, 9 & 12.
CRITERIA:	

No.		Learning Outcome assessed
1	Application of an existing industry-standard computer program to model real structures, interpretation of the results and performance of manual checks to validate the results.	1
2	Estimation of internal and external wind loadings on typical portal-framed buildings for the purpose of analysis and design.	2
3	Demonstration of competence in utilising Australian Standards and relevant loading guidelines.	4
4	Recognition of the distinction between the allowable stress and strength limit state approaches and justification of the adopted approach.	5
5	Production of a well-communicated and professionally-presented document including details of computer modelling, along with outcomes and conclusions.	3

GENERIC SKILLS:	Problem solving, Organisation

All - Assessment Task 2: Final Exam

GOAL:	The final exam will build your skills to analyse statically indeterminate structures by first principles independently and with confidence within a set time limit and with limited access to additional resources.
PRODUCT:	Examination - Centrally Scheduled
AUTHORSHIP STATEMENT:	
FORMAT:	The final exam assesses the material covered in the course (workshops, tutorials and assignments) and the self-study material (e.g. prescribed reading). You will be required to analyse indeterminate structures. With your solutions you will demonstrate your understanding and ability to apply advanced methods of structural analysis. 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 Canvas.
CRITERIA:	

No.		Learning Outcome assessed
1	Estimation of internal and external wind loadings on typical portal-framed buildings for the purpose of analysis and design.	2
2	Demonstration of competence in utilising Australian Standards and relevant loading guidelines.	4
3	Recognition of the distinction between the allowable stress and strength limit state approaches and justification of the adopted approach.	5
4	Discernment of the importance of checking the validity of computer-generated structural analysis results and identify the structural principles by which this is done.	6

GENERIC SKILLS:	Problem solving

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.

7.1. Schedule

PERIOD AND TOPIC	ACTIVITIES
Week 1	Analysis of statically determinate structures, and Limit States Design incl. loads, load combinations, and load combination arrangements; Computer modelling fundamentals.
Week 2	Analysis of statically determinate structures, and Limit States Design incl. wind effects on buildings; Computer modelling – analysis of statically determinate beams.
Week 3	Analysis of statically determinate structures, and Limit States Design incl. wind actions on structures; Computer modelling – analysis of statically determinate beams (deflection).
Week 4	Analysis of statically determinate trusses and frames; Computer modelling – analysis of statically determinate compound beams; Computer modelling – analysis of statically indeterminate beams.
Week 5	Indeterminacy, analysis of statically indeterminate structures; Computer modelling – analysis of statically determinate and indeterminate trusses.
Week 6	Deflection by double integration method; Computer modelling – group project.
Week 7	Principle of Work incl. Virtual Work (deformation); Computer modelling – group project.
Week 8	Principle of Virtual work (Integration table); Computer modelling – group project.
Week 9	Force method (beams); Computer modelling – group project.
Week 10	Force method (frames & trusses); Computer modelling – group project.
Week 11	Influence lines (beams); Computer modelling – group project.
Week 12	Influence lines (trusses); Computer modelling – group project.
Week 13	Revision

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	Russell C. Hibbeler	0	Structural Analysis in SI Units	n/a	n/a
Recommended	AS/NZS	0	AS/NZS 1170.0 Structural design actions - General principles	n/a	n/a
Recommended	AS/NZS	0	AS/NZS 1170.1 Structural design actions - Permanent, imposed and other actions	n/a	n/a
Recommended	AS/NZS	0	AS/NZS 1170.2 Structural design actions - Wind actions	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

Eligibility for Supplementary Assessment 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

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au