

CIV300 Structural Design

School: School of Science, Technology and Engineering

2024 | Semester 1

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

Civil engineers need to design timber and steel structures and infrastructures that meet regulatory standards. This course focuses on the design philosophy outlined in the Australian Standards. You will acquire the necessary skills to design timber and steel structures, including their members and connections, while considering limit states. The course also covers the detailing of connections for these structures in compliance with Australian Standards AS 1720.1 and AS 4100.

1.2. How will this course be delivered?

| ACTIVITY | HOURS | BEGINNING WEEK | FREQUENCY |
|---|-------|----------------|-----------|
| BLENDED LEARNING | | | |
| Learning materials – Asynchronous learning materials | 1hr | Week 1 | 13 times |
| Tutorial/Workshop 1 – Online workshops | 1hr | Week 1 | 13 times |
| Tutorial/Workshop 2 – On campus Tutorials | 2hrs | Week 1 | 13 times |

1.3. Course Topics

Topics may include:

- Introduction to Timber Structures, including materials, durability, and Engineered Wood Products (EWPs)
- Design of Timber Structures according to AS1170, encompassing the design of timber members and connections to limit state
- Introduction to Steel Materials and Structures
- Design of Steel Members and Connections to limit states according to AS4100

2. What level is this course?

300 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth 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 Use and apply design codes e.g. AS 1720.1 and AS 4100; determine design loads and load combinations for strength and serviceability and understand their importance in limit state design. | Knowledgeable Ethical | 2, 2, 2.1.g, 2.1.g, 2.1, 2.1 |
| 2 Analyse structures or structural members to determine the design actions developing in response to the design load combinations and arrangements. | Empowered Ethical | 2, 2, 2.3.a, 2.3.a, 2.3, 2.3 |
| 3 Design structures and structural elements in timber and steel for to relevant limit states, e.g. strength, stability and serviceability, compliantly to their relevant Australian Standards, guidelines and 'best' practices. | Empowered Ethical Sustainability-focused | 2, 2, 2.3.b, 2.3.b, 2.3, 2.3 |
| 4 Create design documentation outlining the outcomes of engineering design solutions to a professional standard to and communicate, by graphical means, the results of the design process in an interpretable manner. | Engaged | 3, 3, 3.2.b, 3.2.b, 3.1, 3.1, 3.2, 3.2 |
| 5 Collaborate with your Project team to design timber and steel structures (concept to optimised solutions), and produce and deliver a Design report and a Project presentation. | Creative and critical thinker Engaged | 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 |
| 1.3.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.g | Engineering Application Ability - Application of established engineering methods to broadly-defined problem solving within the technology domain: Interprets, applies and verifies compliance with relevant standards and codes of practice as well as legislative and statutory requirements underpinning specialist practice area(s) of the technology domain. |
| 2.3.a | Engineering Application Ability - Application of systematic synthesis and design processes within the technology domain: Proficiently applies technological knowledge and problem solving skills as well as established tools and procedures to design components, system elements, plant, facilities and/or processes to meet technical specifications and performance criteria. |
| 2.3.b | Engineering Application Ability - Application of systematic synthesis and design processes within the technology domain: Accommodates contextual factors that impact the technology domain, and in particular to ensure that health, safety and sustainability imperatives are addressed as an integral part of the design process. |
| 2.1 | Engineering Application Ability: Application of established engineering methods to broadly-defined problem solving within the technology domain. |

| CODE | COMPETENCY |
|--|--|
| 2.3 | Engineering Application Ability: Application of systematic synthesis and design processes within the technology domain. |
| 3 | Elements of competency: Professional and Personal Attributes |
| 3.2.b | Professional and Personal Attributes - Effective oral and written communication in professional and lay domains: Prepares high quality engineering documents such as progress and project reports, reports of investigations and feasibility studies, proposals, specifications, design records, drawings, technical descriptions and presentations pertinent to the technology domain. |
| 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. |
| 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.g | Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Critically reviews and applies relevant standards and codes of practice underpinning the engineering discipline and nominated specialisations. |
| 2.3.a | Engineering Application Ability - Application of systematic engineering synthesis and design processes: Proficiently applies technical knowledge and open ended problem solving skills as well as appropriate tools and resources to design components, elements, systems, plant, facilities and/or processes to satisfy user requirements. |
| 2.3.b | Engineering Application Ability - Application of systematic engineering synthesis and design processes: Addresses broad contextual constraints such as social, cultural, environmental, commercial, legal political and human factors, as well as health, safety and sustainability imperatives as an integral part of the design process. |
| 2.1 | Engineering Application Ability: Application of established engineering methods to complex engineering problem solving. |
| 2.3 | Engineering Application Ability: Application of systematic engineering synthesis and design processes. |
| 3 | Elements of competency: Professional and Personal Attributes |
| 3.2.b | Professional and Personal Attributes - Effective oral and written communication in professional and lay domains: Prepares high quality engineering documents such as progress and project reports, reports of investigations and feasibility studies, proposals, specifications, design records, drawings, technical descriptions and presentations pertinent to the engineering discipline. |
| 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. |

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

CV200

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

ENG212

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

Your engagement in weekly formative tutorial exercises will demonstrate your level of proficiency of the course material. You may peer-review the draft of your Tasks during the Tutorials.

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 | 30% | Four short design reports of max. 250 words. Word limit excludes calculations, diagrams, sketches & Appendices. | Refer to Format | In Class |
| All | 2 | Oral and Written Piece | Individual | 30% | 1000-words report and 5-minutes presentation | Week 13 | Online Assignment Submission with plagiarism check |
| All | 3 | Examination - not Centrally Scheduled | Individual | 40% | 2 hours | Week 12 | In Class |

All - Assessment Task 1: Written Piece

| | | |
|------------------|--|---|
| GOAL: | Determine the relevant limit state conditions of structural timber and steel elements, design these elements to their relevant limit states and Australian Standards, provide the detailing of these elements if applicable, and discuss the design procedures and/or your design. | |
| PRODUCT: | Written Piece | |
| FORMAT: | Submission: Weeks 2, 4, 6 & 8 | |
| | You determine the relevant limit state conditions of structural timber and steel elements, design these elements to their relevant limit states and Australian Standards, provide the detailing of these elements if applicable, and discuss the design procedures and/or your design. | |
| CRITERIA: | No. | Learning Outcome assessed |
| | 1 | Demonstration of competence in utilising Australian Standards, relevant design guidelines and design handbooks where they are appropriate and applicable. 1 |
| | 2 | Design of simple timber beams and columns within the context of practical applications, in accordance with AS1720 Timber Structures and presentation of the computations and drawings to a professional standard 2 |

All - Assessment Task 2: Oral and Written Report

| | | |
|------------------|--|--|
| GOAL: | Advance your skill and competencies, working towards meeting your Engineers Australia competencies. | |
| PRODUCT: | Oral and Written Piece | |
| FORMAT: | The Design project will allow you to advance your skill and competencies, working towards meeting your Engineers Australia competencies. You will demonstrate your (structural) design abilities by developing, designing and drawing the structure of a building, and will contribute to further developing and/or improving your collaboration skills. | |
| CRITERIA: | No. | Learning Outcome assessed |
| | 1 | Demonstration of competence in utilising Australian Standards, relevant design guidelines and design handbooks where they are appropriate and applicable. 1 |
| | 2 | Design of simple timber beams and columns within the context of practical applications, in accordance with AS1720 Timber Structures and presentation of the computations and drawings to a professional standard 2 |
| | 3 | Proposal of structural designs for steel beams and columns in accordance with AS4100 with regard to various requirements such as safety, economy and durability 3 |
| | 4 | Creation of a report outlining the outcomes of engineering design computations to a professional standard and communication, by graphical means, of the results of the design process. 4 |
| | 5 | Appraisal of the principles of strength limit state design used in the design of steel beams, columns, reinforced concrete beams and slabs and identification of the types of failures possible in steel and reinforced concrete structural elements. 5 |

All - Assessment Task 3: Examination

| | | |
|------------------|--|--|
| GOAL: | Demonstrate your understanding and ability to apply methods of structural analysis and design. | |
| PRODUCT: | Examination - not Centrally Scheduled | |
| FORMAT: | The final exam assesses the material (learning material, tutorials and assignments) covered in the course and the self-study material. You will be required to analyse structures and design steel and timber members. With your solutions you will demonstrate your understanding and ability to apply methods of structural analysis and design. | |
| CRITERIA: | No. | Learning Outcome assessed |
| | 1 | Demonstration of competence in utilising Australian Standards, relevant design guidelines and design handbooks where they are appropriate and applicable. 1 |
| | 2 | Design of simple timber beams and columns within the context of practical applications, in accordance with AS1720 Timber Structures and presentation of the computations and drawings to a professional standard 2 |
| | 3 | Proposal of structural designs for steel beams and columns in accordance with AS4100 with regard to various requirements such as safety, economy and durability 3 |
| | 4 | Appraisal of the principles of strength limit state design used in the design of steel beams, columns, reinforced concrete beams and slabs and identification of the types of failures possible in steel and reinforced concrete structural elements. 5 |

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 | 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 |
| Recommended | AS/NZS | 0 | AS 1720.1 Timber structures, Part 1: Design methods.AS 1720.1 | n/a | n/a |
| Recommended | AS/NZS | 0 | AS 4100 Steel structures | n/a | n/a |
| Recommended | Kirke, B. and Al-Jamel, I. H. | 2004 | Steel Structures Design Manual to AS 4100 | 1st | 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. 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