

### CIVL4521: Structural Engineering Project

Callaghan

Semester 2 - 2023



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA

## OVERVIEW

### Course Description

This course provides a practical introduction to design techniques in structural engineering. The emphasis is on realistic design problems, such as the structural design of a new commercial or industrial building. Problems are set and supervised by practicing engineers in consultation with departmental staff and test most aspects of structural design.

### Requisites

This course is only available to students active in one of the programs -

[12282] Bachelor Engineering(Hons)(Civil)/Bachelor Engineering(Hons)(Surveying)

[12288] B Engineering (Honours) (Civil)

[12289] Bachelor of Engineering (Honours)(Civil)/Bachelor of Business

[12290] Bachelor of Eng (Hons)(Civil)/Bachelor of Eng (Hons)(Environmental)

[40054] Bachelor of Civil Engineering (Honours)

[40082] Bachelor of Civil Engineering (Honours)/Bachelor of Business

[40083] Bachelor of Civil Eng (Honours)/ Bachelor of Environmental Eng (Honours)

[40084] Bachelor of Civil Engineering (Honours)/Bachelor of Mathematics

[40085] Bachelor of Civil Engineering (Honours)/Bachelor of Surveying (Honours)

[40231] Bachelor of Civil Engineering (Honours)

[40353] Bachelor of Civil Eng (Honours)/ Bachelor of Environmental Eng (Honours)

[40354] Bachelor of Civil Engineering (Honours)

[40356] Bachelor of Civil Engineering (Honours)/Bachelor of Business

[40357] Bachelor of Civil Engineering (Honours)/Bachelor of Mathematics

[40358] Bachelor of Civil Engineering (Honours)/Bachelor of Surveying (Honours)

Pre-requisite - successful completion of CIVL3160 and CIVL3170

### Contact Hours

#### Studio

Face to Face On Campus

4 hour(s) per Week for Full Term

Design studio.

### Unit Weighting Workload

10

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

# COURSE OUTLINE

[www.newcastle.edu.au](http://www.newcastle.edu.au)

CRICOS Provider 00109J

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# CONTACTS

<b>Course Coordinator</b>	<b>Callaghan</b> Prof Mark Masia Mark.Masia@newcastle.edu.au (02) 4921 5295 Consultation: via email or phone or in person at EA115.
<b>Teaching Staff</b>	Mark Masia and Matthew Allen. Matthew (from Northrop Consulting Engineers) is available in person during timetabled studio sessions. Please contact Mark Masia in the first instance outside of scheduled class times.
<b>School Office</b>	<b>School of Engineering</b> EAG02 EA Building Callaghan +61 2 4921 5798 9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

# SYLLABUS

<b>Course Content</b>	Structural design: <ul style="list-style-type: none"><li>• Conceptual structural design</li><li>• Steel design</li><li>• Concrete design</li><li>• Timber and masonry design</li></ul>
<b>Course Learning Outcomes</b>	<b>On successful completion of this course, students will be able to:</b> <ol style="list-style-type: none"><li>1. Demonstrate knowledge of the basics of conceptual design.</li><li>2. Apply the research and design skills acquired in earlier courses for the solution of realistic practical problems as a part of the team.</li><li>3. Identify and use the major Australian Standards for structural engineering design.</li><li>4. Critically analyse the features and limitations of the most common software used in professional practice at design stage.</li><li>5. Communicate design outcomes at a professional level.</li></ol>
<b>Course Materials</b>	<b>Lecture Materials:</b> <ul style="list-style-type: none"><li>- As this course is taught in studio mode as a problem-based learning exercise, the number of formal lectures will be limited. However, the limited lecture materials presented, including lecture recordings, will be made available after the lecture on Canvas.</li></ul> <b>Other Resources:</b> <ul style="list-style-type: none"><li>- Students will be provided with architectural drawings and a design brief describing the structural system to be designed and the design tasks to be completed. To complete this course you will need to download several Australian Standards from the Standards Australia website (to be advised) and consult your previous course notes and texts, particularly for CIVL3170 Steel Design and CIVL3160 Reinforced Concrete Design.</li></ul>

# ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Stage 1 - Preliminary	Monday Week 5	Individual	35%	1, 2, 3, 5
2	Stage 2 - Detailed	Monday Week 11 followed by group interview in Week 14	Group	60%	2, 3, 4, 5
3	Site Visit	To be advised, dependent on timing of site visit	Individual	5%	1, 2

## Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

## Assessment 1 - Stage 1 - Preliminary

Assessment Type	Project
Purpose	Structural concept design and preliminary member sizing
Description	The objective is to develop a structural concept design for a building structure and be able to describe the way in which the structure safely transfers gravity and lateral loads to the supporting foundation. This task is completed individually and is designed to develop the student's understanding of the structural behaviour of a complete building. The submission must detail the structural system chosen, including a description of how the structural load resisting system safely transfers loads to ground. This task also requires preliminary member sizing and lateral load analysis in preparation for the detailed design task below.
Weighting	35%
Due Date	Monday Week 5
Submission Method	Specific Location
	In person to course coordinator at EA115
Assessment Criteria	To be advised
Return Method	In Class
Feedback Provided	In Class - two weeks after submission. General comments to class together with marks against each marking criterion

## Assessment 2 - Stage 2 - Detailed

Assessment Type	Project
Purpose	Detailed structural design and documentation
Description	The objective is to develop skills in interpreting and using Australian Standards for the structural analysis, design and detailing of a realistic building project working as part of a design team. This task is completed in groups of four students and requires the detailed structural design and documentation of selected structural members and connections in accordance with the design brief. The task develops students' ability in applying the Australian standard design codes for structural design of a real building while working in a group environment.
Weighting	60%
Due Date	Monday Week 11 followed by group interview in Week 14
Submission Method	Specific Location
	In person to course coordinator at EA115
Assessment Criteria	To be advised
Return Method	In Person
Feedback Provided	In Person - three weeks after submission. Design group interview together with marks against each design criterion

## Assessment 3 - Site Visit

<b>Assessment Type</b>	Written Assignment
<b>Purpose</b>	Observe current construction practices
<b>Description</b>	The objective is to observe engineering construction with the aim to better understand issues such as project management, site logistics, construction challenges, detailing. The site visit exposes students to current construction practices via visiting a working construction site. Students will observe the construction of reinforced concrete, structural steel and /or masonry and timber building elements and the nature and challenges associated with the project are described by a site engineer / project manager. Students must submit a site diary in which they record their observations. Marking of the diary forms the basis for the assessment.
<b>Weighting</b>	5%
<b>Due Date</b>	To be advised, dependent on timing of site visit
<b>Submission Method</b>	Specific Location
<b>Assessment Criteria</b>	Site diaries will be collected at the completion of the site visit.
<b>Return Method</b>	To be advised
<b>Feedback Provided</b>	In Class Returned Work - two weeks after site visit.

## ADDITIONAL INFORMATION

### Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

\*Skills are those identified for the purposes of assessment task(s).

### Attendance

Attendance/participation will be recorded in the following components:

- Studio (Method of recording: Attendance is not recorded but is strongly encouraged)

### Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

### Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

<b>Oral Interviews (Vivas)</b>	As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the <a href="#">Oral Examination (viva) Procedure</a> . In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the <a href="#">Student Conduct Rule</a> .
<b>Academic Misconduct</b>	All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to <a href="https://policies.newcastle.edu.au/document/view-current.php?id=35">https://policies.newcastle.edu.au/document/view-current.php?id=35</a> .
<b>Adverse Circumstances</b>	<p>The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:</p> <ol style="list-style-type: none"><li>1. the assessment item is a major assessment item; or</li><li>2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;</li><li>3. you are requesting a change of placement; or</li><li>4. the course has a compulsory attendance requirement.</li></ol> <p>Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: <a href="https://policies.newcastle.edu.au/document/view-current.php?id=236">https://policies.newcastle.edu.au/document/view-current.php?id=236</a></p>
<b>Important Policy Information</b>	The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at <a href="https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures">https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures</a> that support a safe and respectful environment at the University.

## Graduate Profile Statements

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UON Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	<b>Professional Attributes</b>				
11	3.1. Ethical conduct and professional accountability		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
12	3.2. Effective oral and written communication in professional and lay domains.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
13	3.3. Creative, innovative and pro-active demeanour.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
14	3.4. Professional use and management of information.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
15	3.5. Orderly management of self, and professional conduct.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
16	3.6. Effective team membership and team leadership.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
	<b>Engineering Ability</b>				
7	2.1. Application of established engineering methods to complex engineering problem solving.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
8	2.2. Fluent application of engineering techniques, tools and resources.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
9	2.3. Application of systematic engineering synthesis and design processes.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
	<b>Knowledge Base</b>				
1	1.1. Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
2	1.2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
5	1.5. Knowledge of contextual factors impacting the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4

*This course outline was approved by the Head of School on the 28/06/2023. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.*

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