

School of Engineering

CIVL4110: Advanced Structural Analysis

Singapore BCA and Callaghan
Semester 1 - 2024



OVERVIEW

Course Description This course Introduces students to higher-level theory of structures. Topics include: elementary plastic theory of structures with application for slab analysis and design, dynamics of structures, stability of structural elements and structural systems. Where possible, topics are linked to the requirements of Australian Standards. The most common software used in the work force for advanced structural analysis is also investigated.

Academic Progress Requirements Nil

Assumed Knowledge Content covered in courses CIVL2130 Theory of Structures 1; CIVL3180 Theory of Structures 2.

Contact Hours

**Singapore BCA
Computer Lab**
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1
Please note that students will use the computer lab most weeks but on occasions a tutorial room will be required. The academic will contact the Timetable Officer in the Faculty when a tutorial room is specifically required.

Lecture
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

**Callaghan
Computer Lab**
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1
Please note that students will use the computer lab most weeks but on occasions a tutorial room will be required. The academic will contact the Timetable Officer in the Faculty when a tutorial room is specifically required.

Lecture
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

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

CONTACTS

Course Coordinator **Singapore BCA and Callaghan**
Dr Robert Petersen
Robert.Petersen@newcastle.edu.au
(02) 4921 6960
Consultation: For Callaghan students: Open door policy. Room EA127.
For BCA students: Correspondence via email

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Engineering**
EAG02
EA Building
Callaghan
9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

School of Engineering (Callaghan)
SENG-ADMIN@newcastle.edu.au

SYLLABUS

Course Content

1. Plastic theory of structures
 - Upper bound theorem (yield line method)
 - Lower bound theorem
 - Applications to framed structures
 - Hillerborg strip method for slab design
2. Structural dynamics
 - Basic dynamic theory
 - Design principles for dynamic loading
 - Specific dynamic loadings
 - Computer methods for dynamic analysis
3. Stability of structures
 - Basic theory of stability
 - Stability functions
 - Stability of framed systems
 - Computer methods for structural stability

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Identify the terminology of higher level Theory of Structures at a professional level
2. Apply Plastic Theory, Structural Dynamics Theory and Stability Theory to solve structure-related problems
3. Identify the major requirements of relevant Australian Standards
4. Describe features and limitations of common software used in professional practice for advanced structural analysis

Course Materials **Required Text:**

- Course notes are available in electronic format for download from the Canvas site.

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Assignment 1	Friday 5 pm in Week 6	Individual	10%	1, 2, 3, 4
2	Assignment 2	Friday 5 pm in Week 10	Individual	20%	1, 2, 3, 4
3	Assignment 3	Friday 5 pm in Week 13	Individual	20%	1, 2, 3, 4
4	Formal Examination	Formal examination period	Individual	50%	1, 2, 3

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 - Assignment 1

Assessment Type Written Assignment
Description Formulate and solve plastic analysis problems based on the problem descriptions provided.
Weighting 10%
Due Date Friday 5 pm in Week 6
Submission Method Online
The assignment question will be posted on Canvas at least two weeks prior to the submission date. You are required to submit your assignment online through Canvas. Your submission must show your NAME and STUDENT NUMBER, CLEARLY, at the top of the first sheet. Please write legibly and show all calculation steps. It is expected that you will submit work that is your own. This does not preclude you consulting your colleagues or tutors. However, plagiarism and copying are not acceptable. Neither are they helpful to your academic progress. Individual difficulties should be discussed with the tutors or lecturer.

Assessment Criteria Marks for questions will be weighted according to time taken/steps involved. part marks will be awarded for correct working even if final answer is incorrect.

Return Method Online
Feedback Provided Online - Two weeks from the due date..

Assessment 2 - Assignment 2

Assessment Type Written Assignment
Description Formulate and solve structural dynamics problems based on the problem descriptions provided.
Weighting 20%
Due Date Friday 5 pm in Week 10
Submission Method Online
The assignment question will be posted on Canvas at least two weeks prior to the submission date. You are required to submit your assignment online through Canvas. Your submission must show your NAME and STUDENT NUMBER, CLEARLY, at the top of the first sheet. Please write legibly and show all calculation steps. It is expected that you will submit work that is your own. This does not preclude you consulting your colleagues or tutors. However, plagiarism and copying are not acceptable. Neither are they helpful to your academic progress. Individual difficulties should be discussed with the tutors or lecturer.

Assessment Criteria Marks for questions will be weighted according to time taken/steps involved. part marks will be awarded for correct working even if final answer is incorrect.

Return Method Online
Feedback Provided Online - Two weeks from the due date.

Assessment 3 - Assignment 3

Assessment Type	Written Assignment
Description	Formulate and solve stability of frames problems based on the problem descriptions provided.
Weighting	20%
Due Date	Friday 5 pm in Week 13
Submission Method	Online
	The assignment question will be posted on Canvas at least two weeks prior to the submission date. You are required to submit your assignment online through Canvas. Your submission must show your NAME and STUDENT NUMBER, CLEARLY, at the top of the first sheet. Please write legibly and show all calculation steps. It is expected that you will submit work that is your own. This does not preclude you consulting your colleagues or tutors. However, plagiarism and copying are not acceptable. Neither are they helpful to your academic progress. Individual difficulties should be discussed with the tutors or lecturer.
Assessment Criteria	Marks for questions will be weighted according to time taken/steps involved. part marks will be awarded for correct working even if final answer is incorrect.
Return Method	Online
Feedback Provided	Online - Two weeks from the due date.

Assessment 4 - Formal Examination

Assessment Type	Formal Examination
Description	The final formal examination is designed to test the individual student's knowledge of the course material and their ability to describe, analyse and hypothesise from this material.
Weighting	50%
Due Date	Formal examination period
Submission Method	Formal Exam
Assessment Criteria	The final formal examination is designed to test the individual student's knowledge of the course material. Marks for questions will be weighted according to time taken/steps involved. part marks will be awarded for correct working even if final answer is incorrect.
Return Method	Not Returned
Feedback Provided	Online -. Online - at the same time as course marks released to students. Feedback is via mark achieved.

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).

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.

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.

Oral Interviews (Vivas)

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 [Oral Examination \(viva\) Procedure](#). 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 [Student Conduct Rule](#).

Academic Misconduct

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 <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

Adverse Circumstances

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:

1. the assessment item is a major assessment item; or
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;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

Important Policy Information

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 <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> 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)
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.		x	x	4
13	3.3. Creative, innovative and pro-active demeanour.		x	x	4
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.		x	x	4
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	x	x	x	4
8	2.2. Fluent application of engineering techniques, tools and resources.	x	x	x	4
9	2.3. Application of systematic engineering synthesis and design processes.				
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.				
	Knowledge Base				
1	1.1. Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	x	x	x	4
2	1.2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.				
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	x	x	x	4
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.				
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				

This course outline was approved by the Head of School on the 19/01/2024. 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.

© 2024 The University of Newcastle, Australia