

CVEN9822

Steel and Composite Structures

Term 2, 2023



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Ehab Hamed	e.hamed@unsw.edu.au			

Lecturers

Name	Email	Availability	Location	Phone
Ehab Hamed	e.hamed@unsw.edu.au			

School Contact Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students).

Course Details

Units of Credit 6

Summary of the Course

A course on the advanced analysis and design of structural elements for students looking towards a career in Structural Engineering. The course will build on your knowledge in structural steel design to introduce you to detailed design of bolt and weld connections, design of pin connections, and the design and analysis of composite steel-concrete structures at the serviceability and strength limit states.

Course Aims

The aim of this course is to extend the understanding of structural behaviour by studying new concepts in the context of design of steel and composite steel-concrete structures.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Demonstrate and identify stress transfer mechanisms in steel connections.	PE1.1, PE1.3, PE2.1
2. Analyse and design bolt, weld, and pin steel connections according to Australian Standards, AS4100.	PE1.5, PE2.3
3. Relate and explain differences between concrete, steel, and composite (steel-concrete) construction techniques	PE1.1, PE1.6
4. Compare between elastic and plastic methods used for analysing steel-concrete composite structures	PE1.1, PE2.1, PE2.3
5. Analyse and design composite beams and columns according to Australian Standard AS2723 for strength and serviceability	PE2.1, PE2.3, PE3.3

Teaching Strategies

Private Study

- Review lecture material and textbook
- Do weekly set problems
- Reflect on class problems and practicing problems
- Download materials from Moodle
- Keep up with notices and find out marks via Moodle

Lectures

- Find out what you must learn
- See methods that are not in the textbook

- Follow worked examples
- Hear announcements on course changes

Workshops

- Be guided by Demonstrators
- Practice solving set problems
- Ask questions

Assessments

- Demonstrate your knowledge and skills
- Demonstrate higher understanding and problem solving

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Weekly assignments	18%	Not Applicable	1, 2, 3, 4, 5
2. Final Exam	60%	Not Applicable	1, 2, 3, 4, 5
3. Quiz	22%	Not Applicable	1, 2, 3, 4, 5

Assessment 1: Weekly assignments

9 Homework Assignments will be available on moodle on a weekly basis, each worths two marks of the total mark.. You will need to submit these assignments online to the moodle link. The assignment should be hand-written and scanned. A general marking of Satisfactory = 100, Unsatisfactory = 50, Null = 0 will be given for each assignment and these will be posted on moodle on a weekly basis. A zero score will be given if you do not submit the assignment in due date.

These assignments will keep you up-to-date with the course material, and will encourage you to practice some problems on a weekly basis.

Additional details

If you do not submit any of the Weekly Assignments, you will lose the two marks allocated to that assignment.

Assessment 2: Final Exam

The course learning outcomes include a significant level of technical learning, calculations, and engineering understanding of problems. These outcomes can be effectively and ideally assessed in an exam environment that can reflect the students' understanding of concepts, and the students' abilities to make decisions and solve problems within limited time. The final exam will be held under open book conditions.

Hurdle requirement

A mark of at least 40% in the final examination is required before the class work is included in the final mark.

Assessment 3: Quiz

The mid-term exam will be assessed on the basis of technical accuracy of calculations and evidence of good engineering judgment. The mid-term exam will be held under open book conditions.

It will be held on Week 5 (Announcement will be date closer to the date for the exact timing)

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
O-Week: 22 May - 26 May		
Week 1: 29 May - 2 June	Topic	Introduction; Steel connections; Design of bolted steel connections
Week 2: 5 June - 9 June	Topic	Design of group of bolts in steel connections; Design of pin connections
Week 3: 12 June - 16 June	Topic	Design of welded connections
Week 4: 19 June - 23 June	Topic	Introduction to composite structures and elastic analysis
Week 5: 26 June - 30 June	Topic	Serviceability of flexural composite structures
Week 6: 3 July - 7 July	Topic	Mid-Term break
Week 7: 10 July - 14 July	Topic	Rigid plastic analysis of composite beams
Week 8: 17 July - 21 July	Topic	Design for strength of composite beams (I)
Week 9: 24 July - 28 July	Topic	Design for strength of composite beams (II) + Introduction to composite columns
Week 10: 31 July - 4 August	Topic	Design of composite columns

Resources

Recommended Resources

- **Textbooks:**

Trahair, N.S. and Bradford, M.A. "The Behaviour and Design of Steel Structures to AS4100", 3rd Australian edn., E&FN Spon, London, 1998.

Oehlers, D.J. and Bradford, M.A. "Elementary Behaviour of Composite Steel and Concrete Structural Members", Butterworth-Heinemann, Oxford, 1999.

Bradford, M.A., Bridge, R.Q., and Trahair, N.S., "Worked Examples for Steel Structures", 3rd edn, AISC, Sydney, 1997.

- **Standards:**

AS4100. 1998 "Steel Structures". Australian Standards.

AS2327. 2017: "Composite structures - Composite Steel-Concrete Construction in Buildings". Australian Standards.

Print:

<https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9780419229209>

<https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9780750632690>

Digital:

<https://unswbookshop.vitalsource.com/products/-v9781351990875>

<https://unswbookshop.vitalsource.com/products/-v9781136407031>

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and Plagiarism

Beware! An assignment that includes plagiarised material will receive a 0 fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

<https://student.unsw.edu.au/plagiarism>

Academic Information

Final Examinations:

Final Exams in T2 2023 will be held on campus between Friday 11th and Thursday 24th August (inclusive), and Supplementary Exams between Monday 4th and Friday 8th September (inclusive). You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

For students enrolled in the distance offering of a postgraduate course, and who reside further than 100km from UNSW Kensington campus, will be contacted regarding sitting an external exam. The school's External Exam Policy can be found on the Intranet.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): <https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw>
- [Key UNSW Dates](#) - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): <https://intranet.civeng.unsw.edu.au/student-intranet>
- Student Life at CVEN, including Student Societies: <https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life>
- Special Consideration: <https://student.unsw.edu.au/special-consideration>
- General and Program-Specific Questions: [The Nucleus: Student Hub](#)
- Book an Academic Advising session: <https://unswengacademicadvising.as.me/schedule.php>

Disclaimer

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Mike Gal.

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	
PE3.3 Creative, innovative and pro-active demeanour	✓
PE3.4 Professional use and management of information	
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	