



**UNSW**  
SYDNEY

Australia's  
Global  
University

School of Civil and Environmental Engineering  
Term 2, 2021

# CVEN9822 Steel and Composite Structures

## COURSE DETAILS

<b>Units of Credit</b>	6	
<b>Contact hours</b>	4 hours per week	
<b>Class</b>	Monday, 15:00 – 18:00	online
<b>Workshop</b>	Monday, 18:00-19:00	online
<b>Course Coordinator and Lecturer</b>		A/Prof Ehab Hamed email: e.hamed@unsw.edu.au office: Rm 716 Civil and Environmental Engineering Building (H20) phone: 93859765  Consultation times: By appointment (online and face-to-face)

## INFORMATION ABOUT THE COURSE

A course on the advanced analysis and design of structural elements for students looking towards a career in Structural Engineering. 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 structures. In particular, 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 LEARNING OUTCOMES

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in the Appendix.

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

Learning Outcome	EA Stage 1 Competencies
1. Become proficient in the design and analysis of steel connections	PE1.1, PE1.5, PE2.1, PE2.3
2. Be able to demonstrate an understanding of the elastic and plastic methods of analysis and design for composite structures	PE1.1, PE1.5, PE2.1, PE2.3
4. Demonstrate collaborative skills by working with other students in teams	PE3.2, PE3.6

## HANDBOOK DESCRIPTION

See link to virtual handbook:

<https://www.handbook.unsw.edu.au/undergraduate/courses/2020/CVEN9822/>

## TEACHING STRATEGIES

Private Study	<ul style="list-style-type: none"><li>• Review lecture material and textbook</li><li>• Do weekly set problems</li><li>• Reflect on class problems and practicing problems</li><li>• Download materials from Moodle</li><li>• Keep up with notices and find out marks via Moodle</li></ul>
Lectures	<ul style="list-style-type: none"><li>• Find out what you must learn</li><li>• See methods that are not in the textbook</li><li>• Follow worked examples</li><li>• Hear announcements on course changes</li></ul>
Workshops	<ul style="list-style-type: none"><li>• Be guided by Demonstrators</li><li>• Practice solving set problems</li><li>• Ask questions</li><li>• Teamwork</li></ul>
Assessments (quizzes, examination)	<ul style="list-style-type: none"><li>• Demonstrate your knowledge and skills</li><li>• Demonstrate higher understanding and problem solving</li></ul>

## ASSESSMENT

Assessment will be based on weekly assignments, mid-term exam, and a final exam. The Final Exam will take place in the UNSW examination week. A mark of at least 40% in the final examination is required before the marks for the mid-term exam and assignments are included in the final mark. If you score in the final exam higher than in the mid-term exam, then the mid-term exam will be disregarded and the weight of the final exam becomes 82%.

The relative value of each of the assessable tasks is as follows:

Item	Marks	Due date	Rational and Assessment criteria	Marks returned
9 Weekly Assignments	18	Weekly	<p>9 Homework Assignments will be available on moodle on a weekly basis. 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.</p> <p>Each assignment worth two marks of the total mark.</p> <p>These assignments will keep you up-to-date with the course material, and will encourage you to practice some problems on a weekly basis.</p>	Within one week after due date.
Mid-term exam	22	Week 5	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.	Within two weeks from the day of the exam

Final Exam	60		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. You need to score at least 40% in the final exam to be able to pass the course.	
	100		Total Mark for the course	

### PENALTIES

If you do not show up on the mid-term exam for any reason, the weight of the mid-term exam will be automatically allocated to the Final Exam. No need to contact the course coordinator in this regard.

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

### COURSE PROGRAM

Week	Date	Topic
1	31/05/2021	Introduction; Steel connections; Design of bolted steel connections
2	07/06/2021	Design of group of bolts in steel connections; Design of pin connections
3	14/06/2021	<b>Public holiday</b> – Design of welded connections (Lecture will be given at alternative day that will be discussed with the students)
4	21/06/2021	Introduction to composite structures and elastic analysis
5	28/06/2021	Serviceability of flexural composite structures
6	05/07/2021	<b>Mid-Term break</b>
7	12/07/2021	Rigid plastic analysis of composite beams
8	19/07/2021	Design for strength of composite beams (I)
9	26/07/2021	Design for strength of composite beams (II)
10	02/08/2021	Design of composite columns

### RELEVANT RESOURCES

These books are not compulsory as all material will be covered during the lectures. But they are recommended for further explanations and demonstrations. All students are encouraged (but not compulsory) to have copies of AS4100 and AS2327.

- **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.

### DATES TO NOTE

Mid-term exam – Week 5 (online, Wednesday 30/06/2020, 18:00-20:00)

Supplementary Examinations for Term 2 2021 will be held on Monday 06<sup>th</sup> September – Friday 10<sup>th</sup> September 2021 (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not make any personal or travel arrangements during this period.

Refer to MyUNSW for Important Dates available at:

<https://my.unsw.edu.au/student/resources/KeyDates.html>

### 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 ADVICE

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations,
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC.

Refer to Key Contacts on the Faculty website available at:

<https://www.unsw.edu.au/engineering/student-life/student-resources/key-contacts>

## Appendix: Engineers Australia (EA) Competencies

### Stage 1 Competencies for Professional Engineers

	<b>Program Intended Learning Outcomes</b>
<b>PE1: Knowledge and Skill Base</b>	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
<b>PE2: Engineering Application Ability</b>	PE2.1 Application of established engineering methods to complex 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
<b>PE3: Professional and Personal Attributes</b>	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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