School of Civil and Environmental Engineering
Term 2, 2021

CVEN2303 Structural Analysis and Modelling

COURSE DETAILS	

Units of Credit	6
Contact hours	6 hours per week
Class	Tuesday, 11:00 – 13:00 Online Wednesday, 9:00 – 11:00
Workshop	Wednesday, 11:00 – 13:00 Online Wednesday, 13:00 – 15:00 Online and Face-to-Face Thursday, 12:00-14:00 Online and Face-to-Face Thursday, 14:00-16:00 Online and Face-to-Face
Course Coordinator and Lecturer	A/Prof Ehab Hamed email: e.hamed@unsw.edu.au office: Rm 716 Civil and Environmental Engineering Building (H20) phone: 93859765 Consultation times: Wednesday 14:00 – 15:00 (online and face-to-face)

INFORMATION ABOUT THE COURSE

This course introduces students to structural analysis and computer modelling of structures. It explains the theory and physics behind existing computer software that are used for the analysis of complicated structures. It also provides students with a better understanding of the structural behaviour of beams, frames and trusses under different loading conditions. The tools and knowledge gained in this course are inevitable for the design of structures. The topics that are covered in this course include revision of statics with emphasise on drawing internal forces diagrams; conjugate beam method, energy of structures, principles of virtual work; the force (flexibility) method; stiffness method; and moment distribution method applied to continuous beams.

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.	Demonstrate and understand concepts of structural analysis	PE1.1, PE1.2, PE2.1
2.	Become proficient in developing and drawing internal actions diagrams, solve statically indeterminate structures, determine and calculate structural deformations.	PE1.1, PE1.2, PE2.1

			PE1.5, PE2.1, PE2.2
3.	Become proficient in solving structures with large number of degrees of freedom using computer based codes		PE1.5, PE2.1, PE2.2
4.	Demonstrate collaborative skills by working with other students in teams		PE3.2, PE3.6

HANDBOOK DESCRIPTION

See link to virtual handbook:

http://www.handbook.unsw.edu.au/undergraduate/courses/2020/CVEN2303.html

TEACHING STRATEGIES

Private Study	• Review lecture material and textbook • Do set problems on Moodle • 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 • Teamwork
Assessments (quizzes, examination)	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving

ASSESSMENT

Assessment will be based on weekly assignments, mid-term exam, a lab assignment, 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 65%.

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	27	Weekly	9 Assignments will be available online on moodle. You need to submit the assignments online by the due date shown on moodle. No late submission will be accepted. Each assignment worth three marks of the total mark. These assignments will keep you up-to-date with the course material, and will encourage you to practice some problems on a weekly basis. Each assignment includes a number of questions. Only final answer is needed and it is checked online. You have the chance to attempt the solution as much as you want to get a full mark of each assignment.	Instantly

Mid-term exam	15	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
Lab assignment	8	Week 8	The lab assignment will be issued on week 8 and will be due on week 10. Only a lab simulation will be conducted followed by a video that describes the test. You will not do the test yourself but would need to submit an assignment related to the lab simulation. You will need to submit the assignment online to the moodle link. The assignment can be hand-written and scanned or typed. This assignment would give you the chance to see actual testing of a truss, and to compare theoretical calculations with experimental measurements taken in the laboratory. A video of the test will be available to view at your convenience. The assignment will be assessed on the basis of technical accuracy of calculations and evidence of good engineering judgment with assumptions and problem simplification.	Within two weeks from submission day
Final Exam	50		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 the Lab Assignment on time, a deduction of 15 marks/day will apply.

If you do not submit any of the Weekly Assignments, you will lose the 3 marks allocated to that assignment.

COURSE PROGRAM

Week	Date	Topic
1	31/05/2021	Introduction. Structural analysis and design. Revision of internal forces diagrams. Statically determinate structures. Statically indeterminate structures.
2	07/06/2021	Conjugate beam method.

3	14/06/2021	The principle of work – Deformations in statically determinate structures.
4	21/06/2021	Force/Flexibility method for statically indeterminate trusses.
5	28/06/2021	Force/Flexibility method for statically indeterminate frames.
6	05/07/2021	**Mid-Term break**
7	12/07/2021	Principles of stiffness analysis in trusses.
8	19/07/2021	Temperature, and Fit loads in stiffness analysis of trusses.
9	26/07/2021	Stiffness analysis in Frames.
10	02/08/2021	Moment Distribution Method.

RELEVANT RESOURCES

- **Textbooks:** Any "Structural Analysis" textbook**;** Online resources
- **Reference textbook :** Structural Analysis: Principles, Methods and Modelling, CRC Press, Gianluca Ranzi, Raymond Ian Gilbert

DATES TO NOTE

Mid-term exam – Week 5 (online, Wednesday 29/06/2021, During the lecture between 9:30-11:00am)

Supplementary Examinations for Term 2 2021 will be held on Monday 06th September – Friday 10th 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

		Program Intended Learning Outcomes
PE1: Knowledge and Skill Base		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
PE2: Engineering Application Ability		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
PE3: Professional and Personal Attributes		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