School of Civil and Environmental Engineering

Summer Term, 2020

CVEN2303 Structural Analysis and Modelling

COURSE DETAILS

Units of Credit	6
Contact hours	12 hours per week
Class	Monday, 10:00 – 12:00 and 13:00 – 15:00 (Webster Theatre A) Wednesday, 10:00 – 12:00 and 13:00 - 15:00 (Webster Theatre B)
Workshop	Thursday, 10:00-12:00 and 13:00 – 15:00
Course Coordinator and Lecturers	Dr Ahsan Parvez Email: m.parvez@unsw.edu.au Office: Room 705 Civil and Environmental Engineering Building (H20) Dr Farshid Nouri Email: f.nouri@unsw.edu.au Office: Room 802. Civil and Environmental Engineering Building (H20)

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
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:

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

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 quiz, 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 quiz and assignments are included in the final mark. If you score in the final exam higher than in the quiz, then the quiz will be disregarded and the weight of the final exam becomes 70%.

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	20	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. Nine assignments worth total 20 marks, each assignment will have equal marks. These assignments will keep you up-to-date with the course material, and will encourage you to practice some workshop 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
Quiz	30	Week 3	The quiz will be assessed on the basis of technical accuracy of calculations and evidence of good engineering judgment. The entire solution procedure will be marked and not just the final answers. The quiz will be held under open book conditions.	Within two weeks from the day of the quiz

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 quiz for any reason, the weight of the quiz 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 2.20 marks allocated to that assignment.

COURSE PROGRAM

Week	Date	Topic
1	06/01/2020	Introduction. Structural analysis and design. Revision of internal forces diagrams. Statically determinate structures. Statically indeterminate structures.
1	08/01/2020	Conjugate beam method.
2	13/01/2020	The principle of work – Deformations in statically determinate structures.
2	15/01/2020	Force/Flexibility method for statically indeterminate trusses.
3	20/01/2020	Principles of stiffness analysis in trusses.
3	22/01/2020	Force/Flexibility method for statically indeterminate frames.
4	27/01/2020	Public holiday
4	29/01/2020	Moment Distribution Method.
5	03/02/2020	Temperature and fit loads in stiffness analysis of trusses.
5	05/02/2020	Stiffness analysis in frames.

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

Quiz – Week 3 on Friday 24/1/2020 between 15:00 – 16:00.

Supplementary Examinations for Summer Term 2020 will be held on Saturday 15th February 2020 (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to 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 Academic Advice on the School website available at:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

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