



Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Unit Title:	Structural Analysis
Unit ID:	ENGIN2203
Credit Points:	15.00
Prerequisite(s):	(ENCOR2030 or ENGIN2301)
Co-requisite(s):	Nil
Exclusion(s):	(ENCIV2310)
ASCED:	030903

Description of the Unit:

This unit introduces civil engineering students to the estimation of design permanent and imposed loadings as well as estimation of wind loadings on portal-frame buildings that are needed for the design of structures. The unit then continues to develop skills in structural analysis with application to real structural engineering situations. The unit deals with the analysis of indeterminate structures using both manual methods and an industry-standard computer program.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	■	■	■	■	■	■
Intermediate	■	■	✓	■	■	■

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Advanced	■	■	■	■	■	■

Learning Outcomes:

On successful completion of the unit the students are expected to be able to:

Knowledge:

- K1.** Recognise the distinction between the allowable stress and strength limit state approaches and justify the adopted approach.
- K2.** Identify and explain the nature of loadings to which structures are subjected.
- K3.** Elaborate on the nature of wind loads on the various parts of portal frame buildings.
- K4.** Differentiate between the complexities and methods by which determinate and indeterminate structural systems are analysed.
- K5.** Discern the importance of checking the validity of computer-generated structural analysis results and identify the structural principles by which this is done.
- K6.** Demonstrate the way in which structural frames may be modelled and analysed by current industry standard computer software.

Skills:

- S1.** Demonstrate competence in utilising Australian Standards and relevant loading guidelines.
- S2.** Analyse structural systems using computer software.
- S3.** Undertake complex calculations (relevant to structural analysis) with accuracy.
- S4.** Produce a well-communicated and professionally-presented document including details of computer modelling, along with outcomes and conclusions.

Application of knowledge and skills:

- A1.** Estimate design loadings for a range of small structures, in accordance with AS1170 SAA Loading Code.
- A2.** Analyse structures for the purpose of obtaining results necessary for structural design.
- A3.** Model and analyse real structures using an existing industry-standard computer program, interpret the results and perform manual checks to validate the results.
- A4.** Estimate internal and external wind loadings on typical portal-framed buildings for the purpose of analysis and design.

Unit Content:

Topics may include:

- Introduction to Strength Design Concepts, Loading Factors and Combinations
- Estimation of Loads for Structural Design: Permanent (Dead) and Imposed (Live) Loads
- Estimation of Loads for Structural Design: Wind Loads and other Loads
- Basic Concepts of Structural Analysis
- Introduction to Analysis of Indeterminate Structures
- Manual Analysis of Indeterminate Structures by Slope-Deflection Method
- Computer Analysis of Simple Plane Frames
- Analysis by Simplified Code Coefficients
- Introduction to plastic analysis

- Flexural analysis of concrete beams

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1-K6, S1-S4, A1-A4	An assignment based around a laboratory or design task in structural analysis	Report	30 - 40%
K1-K3, S1, S3, A1, A2, A4	Mid-semester class test	Open book test	10 - 20%
K1-K5, S1-S3, A1-A4	An examination on any or all of the material covered in the unit.	Examination / Final test	40 - 50%

Adopted Reference Style:

Other (Refer to the library website for more information: IEEE)

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)