



# Course Outline (Higher Education)

<b>Institute / School:</b>	Institute of Innovation, Science & Sustainability
<b>Course Title:</b>	STRUCTURAL ANALYSIS
<b>Course ID:</b>	ENGIN2203
<b>Credit Points:</b>	15.00
<b>Prerequisite(s):</b>	(ENCOR2030 or ENGIN2301)
<b>Co-requisite(s):</b>	Nil
<b>Exclusion(s):</b>	(ENCIV2310)
<b>ASCED:</b>	030903

## Description of the Course:

This course 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 course then continues to develop skills in structural analysis with application to real structural engineering situations. The course 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 course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

## Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory	■	■	■	■	■	■
Intermediate	■	■	✓	■	■	■
Advanced	■	■	■	■	■	■

**Learning Outcomes:**

On successful completion of the course 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.

**Course 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

**Values:**

- V1.** Recognise that prudent and responsible design requires a rational approach to the achievement of safety margins acceptable to society.
- V2.** Appreciate that the engineering designer must be thorough, to ensure all realistic eventualities are considered in the design process.
- V3.** Understand that design standards and accepted engineering practise are the product of the considerable accumulated wisdom.
- V4.** Appreciate that the engineering designer requires judgement and an ability to apply a sound fundamental understanding to the analysis of every situation, each of which is unique.
- V5.** Appreciate that the successful representation of real structures by mathematical models requires judgement and a sound understanding of structural behaviour.
- V6.** Understand that whilst computer-based analysis is a powerful tool, the validity of the information generated is only as sound as that of the model used to represent the reality.
- V7.** Appreciate that uncertainty in analysis and design must be recognised and allowed for in a rational and appropriate way.

### Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the [Higher Education Graduate Attributes Policy](#) (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K5, S1-S3, A1-A4	1-3
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	K1-K5, S1-S3, A1-A4	1
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	K1-K5, S1-S3, A1-A4	1-3
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K1-K5, S1-S3, A1-A4	1
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	Not applicable	Not applicable

### 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 course.	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](#)