Course Outline (Higher Education)

Institute: Institute of Innovation Science and Sustainability

Course Title: MODELLING AND SIMULATION

Course ID: ENGIN5302

Credit Points: 15.00

Prerequisite(s): (MATHS3001 or MATHS3040) (ENGIN2301)

Co-requisite(s): Nil

Exclusion(s): (ENCOR4050)

ASCED: 030701

Description of the Course:
This course qualifies participants to apply an advanced body of knowledge in the area of computational mechanics and equips them with highly developed skills for computational modelling in engineering problems. The course will focus particularly on the finite element method, its theory, limitations and practical application. The course also equips participants with basic skills for research in computational mechanics.

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. Develop comprehensive understanding of the mathematical representation and principles of finite element modelling techniques in solid mechanics and seepage flow

K2. Investigate new developments and/or application of various computational techniques in problem solving in engineering

Skills:

S1. Formulate simple finite element models using structural and continuum elements and fluently apply mathematical analysis to problem solving

S2. Construct finite element models and solve engineering problems using commercial finite element packages

S3. Assess and justify the reliability of simulated results obtained from a finite element analysis

Application of knowledge and skills:

A1. Apply finite element analysis as a tool to synthesise an optimal design solution

A2. Communicate professionally literature review findings and problem solving outcomes of finite element analysis through written reports

A3. Solve simple problems in engineering using the finite element method

Course Content:

Topics may include:

- Introduction to computer modelling and simulation
- Finite element formulation for one-dimensional potential-based problems
- Finite element formulation for two-dimensional potential-based problems
- Application of energy principles in the finite element method: truss elements & beam elements
- Finite element formulation for continuum problems in elasticity
- Isoparametric finite element formulation
- Modelling issues in finite element simulations
- Introduction to finite-element software/programming

Values:

V1. Appreciate the use of computational techniques to solve engineering problems.

V2. Appreciate the limitations of computational tools under specific circumstances when applied to solve engineering problems.

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, K2, K3, S1, S2, S3 and A3	1, 2 and 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.	A1	2
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.	Not applicable	Not applicable
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.	K3, A2	2
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	Learning Tasks	Assessment Type	Weighting
K1, S1, A3	Engagement in all learning activities including attendance and participation in classes, exercises, recommended and supplementary readings and other activities as suggested.	Quizzes/Class test/Assessed tutorials	20% - 30%
K2, K3, S2, S3, A1 and A2	Undertake literature review of current trends in computer modelling. Introduction to finite element analysis software use and application of finite element analysis software to an extended problem solving	Written report consisting of literature survey and results of computer modelling	20% - 50%
K1, S1, A3	Engagement in all learning activities including attendance and participation in classes, exercises, recommended and supplementary readings and other activities as suggested.	Examination/Final Test	30% - 60%

Adopted Reference Style:

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

Refer to the library website for more information

Fed Cite - referencing tool