Unit Outline (Higher Education)

Institute / School: Institute of Innovation Science and Sustainability

Unit Title: MODELLING AND SIMULATION

Unit ID: ENGIN5302

Credit Points: 15.00

Prerequisite(s): (ENGIN2301 for undergraduate Students only)

Co-requisite(s): Nil

Exclusion(s): (ENCOR4050)

ASCED: 030701

Description of the Unit:
This unit 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 unit will focus particularly on the finite element method, its theory, limitations and practical application. The unit 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 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						
Advanced					✔	

Learning Outcomes:

On successful completion of the unit 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

Unit 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

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment 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%

Learning Outcomes Assessed	Assessment 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.	Examination/Final Test	30% - 60%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit No

Date:

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