Course Outline (Higher Education)

School:	School of Engineering, Information Technology and Physical Sciences
Course Title:	ENGINEERING COMPUTER APPLICATIONS AND INTERACTIVE MODELLING
Course ID:	ENGIN3401
Credit Points:	15.00
Prerequisite(s):	(ENCOR1021 or ENGIN1006)
Co-requisite(s):	Nil
Exclusion(s):	(ENMTX3010 and ITECH1000)
ASCED:	030101

Description of the Course:

This course provides students with solid foundation in advanced level programming techniques, computer applications and interactive modelling in engineering. With the advancement of time and technology, there has been a much greater involvement of different computer applications and interactive modelling techniques in a wide range of engineering applications, especially mechatronics. Rigorous development of such applications and modelling techniques have helped enormously in improving the performance and efficiency of a mechatronic system and enhanced its reliability. Through this course students will get the opportunity to extensively use programming languages, such as C/C++, and software tools, such as MATLAB/SimuLink and LabVIEW, to perform programming, interactive modelling and simulation to analyse and solve physical engineering problems. This will help in the development of their fundamental theoretical knowledge and skills in different areas of mechatronic systems engineering.

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. Explain the fundamentals of computer programming and modelling in solving engineering problems.

K2. Reflect on the understanding of modular, object oriented and structured programming techniques.

K3. Explain the concepts of program flow control, memory management, arrays, unions and elementary data structures.

K4. Explain user defined functions, library functions, file I/O, number systems, expressions and statements.

K5. Explain vectors, matrix algebra and numerical methods in the context of engineering.

K6. Understand the role and application of computational numerical and statistical methods for solving complex engineering problems.

K7. Reflect on the operations and applications of engineering software (such as C/C++, MATLAB/SimuLink, LabView) in formulating, modelling and analysing wide range of physical engineering problems and applications.

Skills:

S1. Identify, formulate and solve engineering problems using computational techniques.

S2. Design and model engineering applications using available software tools.

S3. Develop and debug algorithms for engineering applications.

S4. Analyse and interpret performance of the designed engineering algorithm / models with alterations of critical model parameters.

S5. Simulate and analyse the influence of external parameters on the performance of the designed model.

Application of knowledge and skills:

A1. Apply theoretical knowledge and skills to design and model a complex mechatronic process to benefit industrial applications.

A2. Identify and efficiently solve engineering problems using computational techniques.

Course Content:

Topics may include:

- Advanced computer programming and modelling methodologies in engineering.
- Introduction to software tools such as C/C++, MATLAB / SimuLink, LabView.
- Modelling and interpreting physical engineering concepts into computational problems.

- Analysing and solving physical engineering problems using computer programming / modelling techniques.
- Object oriented programming, software modelling and structured programming techniques in formulating and solving engineering applications.
- Modular programming and data structures.
- Algorithm development for engineering applications.
- Computational numerical and statistical analysis of different engineering problems.

Values:

V1. Appreciate the use of appropriate computer applications in solving a wide range of complex and monotonous engineering problems.

V2. Appreciate the contribution of interactive design, programming and modelling in simplification of a complex mechatronic process to enhance user involvement and improve process performance.

Graduate Attributes

The Federation University FedUni 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-K7 S1-S5 A1-A2	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-K7 S1-S5 A1-A2	1-3
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.	S1-S5	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-K7 S1-S5 A1-A2	1-3

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
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.	S1-S5 A1-A2	1-3

Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
S1-S5, A1-A2	Experiment work on modelling and programming to verify students ability to apply the acquired knowledge and skills	Reports, demonstrations	30 - 50%
K1-K7, S1-S5	Relevant problems to enforce understanding of the students	Assignments / quizzes	20 - 40%
K1-K7, S1-S5, A1-A2	Design exercises	Reports, demonstrations / presentation	40 - 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