Course Outline (Higher Education)

Institute:	Institute of Innovation, Science & Sustainability
Course Title:	MODELLING AND CHANGE (ADVANCED LEVEL)
Course ID:	MATHS3001
Credit Points:	15.00
Prerequisite(s):	(MATHS1001) (At least 15 credit points from MATHS subject-area at any level)
Co-requisite(s):	Nil
Exclusion(s):	(MATHS2006)
ASCED:	010101

Description of the Course:

This course will cover advanced topics in mathematics, building upon the foundations that students would have obtained in calculus in earlier courses. The student will be given examples on how mathematics, in particular advanced calculus, can be used to model real life situations and study techniques for solving these models. The material covered in this course give a strong theoretical grounding for techniques widely applied in business, industry, economics and defence.

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						

Level of course in Program	AQF Level of Program					
	5	**6**	**7**	**8**	**9**	**10**
Advanced			✔			

Learning Outcomes:

Knowledge:

K1. Recognise the common principles in a variety of real-life applications of mathematical modelling.

K2. Express the important concepts of multivariate calculus coherently and effectively in the written form.

K3. Recognise the importance of rigour and structure in the calculus context.

Skills:

S1. llustrate the convergence or divergence of given sequences or series and calculate the limits of convergent sequences and series.

S2. Construct power series representations for given functions.

S3. Evaluate partial derivatives and gradients of functions.

S4. Evaluate multiple integrals and other notions of integrals using Cartesian, polar, cylindrical, and spherical coordinates.

S5. Solve problems using the Green's, Stokes' and Divergence theorems.

S6. Utilise appropriate technology to assist in the solution and investigation of mathematical problems.

Application of knowledge and skills:

A1. Apply concepts of single variable and multivariable calculus to model and analyse simple problems in science and technology.

A2. Interpret results produced by a mathematical model.

Course Content:

Topics may include:

- Functions of several variables.
- Areas and volumes.
- Parametric curves.
- Spherical and cylindrical co-ordinates.
- Multiple integrals.
- Vectors and their algebraic properties.
- Vector calculus.

Values:

V1. Appreciate the use of mathematical concepts to solve problems in science and technology.

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-K3, S1-S6, A1-A2	1, 2
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-K3, S1-S6, A1-A2	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.	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.	K1-K3, S1-S6, A1-A2	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	Learning Tasks	Assessment Type	Weighting
K1-K3, S1-S6, A1-A2	A range of tasks and problems explored individually or in groups to support the understanding of the content and the development of skills and knowledge throughout the course.	Assignments/Projects/Presentations/Quizzes	40 - 50%
K1-K3, S1-S5	A test and/or examination on any part of or all the material covered in the course.	Test(s)/Examination(s)	50 - 60%

Adopted Reference Style:

APA

Refer to the library website for more information

Fed Cite - referencing tool