Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Unit Title:	Modelling and Change (Advanced Level)
Unit 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 Unit:

This unit will cover advanced topics in mathematics, building upon the foundations that students would have obtained in calculus in earlier units. 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 unit 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

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:

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. Illustrate 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.

Unit Content:

Topics may include:
1. Functions of several variables.
2. Areas and volumes.
3. Parametric curves.
4. Spherical and cylindrical co-ordinates.
5. Multiple integrals.
6. Vectors and their algebraic properties.
7. Vector calculus.

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**ttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are be embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly*

assessed in each Course.

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	**Assessment task (AT#)**
FEDTASK 1 Interpersonal	Students will demonstrate the ability to effectively communicate, inter-act and work with others both individually and in groups. Students will be required to display skills in-person and/or online in: • Using effective verbal and non-verbal communication • Listening for meaning and influencing via active listening • Showing empathy for others • Negotiating and demonstrating conflict resolution skills • Working respectfully in cross-cultural and diverse teams.	Not applicable	Not applicable
FEDTASK 2 Leadership	Students will demonstrate the ability to apply professional skills and behaviours in leading others. Students will be required to display skills in: • Creating a collegial environment • Showing self -awareness and the ability to self-reflect • Inspiring and convincing others • Making informed decisions • Displaying initiative	Not applicable	Not applicable
FEDTASK 3 Critical Thinking and Creativity	Students will demonstrate an ability to work in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: • Reflecting critically • Evaluating ideas, concepts and information • Considering alternative perspectives to refine ideas • Challenging conventional thinking to clarify concepts • Forming creative solutions in problem solving.	Not applicable	Not applicable
FEDTASK 4 Digital Literacy	Students will demonstrate the ability to work fluently across a range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: • Finding, evaluating, managing, curating, organising and sharing digital information • Collating, managing, accessing and using digital data securely • Receiving and responding to messages in a range of digital media • Contributing actively to digital teams and working groups • Participating in and benefiting from digital learning opportunities.	Not applicable	Not applicable
FEDTASK 5 Sustainable and Ethical Mindset	Students will demonstrate the ability to consider and assess the consequences and impact of ideas and actions in enacting ethical and sustainable decisions. Students will be required to display skills in: • Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts • Committing to social responsibility as a professional and a citizen • Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses • Embracing lifelong, life-wide and life-deep learning to be open to diverse others • Implementing required actions to foster sustainability in their professional and personal life.	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K3, S1, S2, S3, S4, S5, 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 unit.	Assignments/Projects/Presentations/Quizzes	40 - 50%
K1, K2, K3, S1, S2, S3, S4, S5	A test and/or examination on any part of or all the material covered in the unit.	Test(s)/Examination(s)	50 - 60%

Adopted Reference Style:

APA ()

Refer to the library website for more information

Fed Cite - referencing tool