



Course Outline (Higher Education)

Institute:	Institute of Innovation, Science & Sustainability
Course Title:	MODELLING CONTINUOUS CHANGE
Course ID:	MATHS2016
Credit Points:	15.00
Prerequisite(s):	(MATHS1001)
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	010101

Description of the Course:

This course forms part of a general sequence of mathematics courses which provides mathematical tools to model phenomena in the physical, engineering, biological and mathematical sciences. It will be taught at an intermediate level. It is aimed at an audience with sound mathematical background and interest in solving real world problems. The main focus will be on differential equations, the tools to solve them, and their applications to model motion, growth and change. We will also consider problems whose solution may require both basic and advanced mathematics or statistics techniques. The course will be particularly valuable to science and engineering students, prospective senior secondary school mathematics teachers, and any student interested in improving their understanding of these commonly encountered concepts and applications of mathematics.

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	■	■	■	■	■	■

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Intermediate	■	■	✓	■	■	■
Advanced	■	■	■	■	■	■

Learning Outcomes:

Knowledge:

- K1.** Recognise common principles in a variety of real-life applications of mathematical modelling.
- K2.** Describe how mathematics can model phenomena in nature and science.
- K3.** Describe important concepts of advanced mathematics, including ordinary differential equations.
- K4.** Recognise the importance of rigour and structure when solving mathematics problems.

Skills:

- S1.** Distinguish the solution structure of ordinary differential equations and systems of ordinary differential equations.
- S2.** Calculate approximate solutions of differential equations using numerical methods.
- S3.** Apply advanced mathematics concepts drawn from a number of disciplines such as linear algebra to solve ordinary differential equations.
- S4.** Use basic statistical concepts and hypothesis testing to solve problems in science and technology.
- S5.** Utilise appropriate technology to assist in the solution and investigation of problems.

Application of knowledge and skills:

- A1.** Formulate basic and advanced problems in science and technology as mathematical problems involving advanced concepts such as ordinary differential equations and systems of ordinary differential equations.
- A2.** Interpret results produced by a mathematical model.

Course Content:

Topics may include:

- Ordinary differential equations.
- Systems of differential equations.
- Mathematical modelling of problems in science and technology.
- Introduction of advanced concepts and techniques from mathematics or statistics to solve mathematical models.

Values:

- V1.** Appreciate the use of mathematical concepts to solve problems in science and technology.
- V2.** Critically appraise both their own models and those of others.
- V3.** Appreciate that theory can only approximate the real world.
- V4.** Appreciate the need for continuous learning.

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-K4, S1-S5, 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.	Not applicable	Not applicable
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-K4, S1-S5, 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-K4, S1-S5, 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-K4, S1-S4	A test and/or examination on any part of or all the material covered in the course.	Tests/examination(s)	50%-60%

Adopted Reference Style:

APA

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)