



Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: MATHEMATICS FOR DATA SCIENCE

Unit ID: MATHS5000

Credit Points: 15.00

Prerequisite(s): Nil

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 010101

Description of the Unit:

This unit covers key mathematical concepts relevant to Data Science and related fields such as Software Engineering. Students are provided with a foundation of mathematics required for further study, including vectors, systems of linear equations, linear programming, set theory, calculus, and probability theory. Students explore the utility of these tools through application to real-world problems.

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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes:**Knowledge:**

- K1.** Describe the nature of vectors, lines, and planes in nD-space.
- K2.** Analyze and solve systems of linear equations relevant to data science and software engineering problems.
- K3.** Explain the principles of probability theory, including random variables, probability distributions, conditional probability, Markov chains, and stochastic processes.
- K4.** Describe the relationships between functions, derivatives, gradients, maxima, and minima

Skills:

- S1.** Evaluate and apply matrix arithmetic, including the calculation of determinants, inverses, eigenvalues, and eigenvectors.
- S2.** Create and interpret graphical representations of linear programming problems in two dimensions.
- S3.** Apply appropriate algorithms to solve complex problems in linear programming, and probabilistic modelling.
- S4.** Express mathematical structures using set theory

Application of knowledge and skills:

- A1.** Synthesize knowledge of linear equations, matrices, vectors, linear programming, and probability to solve real-world problems in data science and software engineering.

Unit Content:

Topics may include:

- Gradients, Derivatives, and Global and Local Minima/Maxima
- Introduction to Vectors, Lines, and Planes in nD space
- Systems of Linear Equations
- Matrix Arithmetic
- Determinants, Inverses, Eigenvalues, and Eigenvectors
- Graphical Representations of Linear Programming Problems
- Foundational set theory
- Random Variables and Probability Distributions
- Markov chains and conditional probability
- Stochastic processes and probabilistic modelling

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**tttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are 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	<p>Students will demonstrate high-level skills to effectively communicate, interact and work with others both individually and in groups.</p> <p>Students will be required to display (in person and/or online) high-level skills in-person and/or online in:</p> <ul style="list-style-type: none"> • Effective verbal and non-verbal communication via a range of synchronous and asynchronous methods • Active listening for meaning and influencing • High-level empathy for others • Negotiating and demonstrating extended conflict resolution skills • Working respectfully in cross-cultural and diverse teams 	Not applicable	Not applicable
FEDTASK 2 Leadership	<p>Students will demonstrate the ability to apply leadership skills and behaviours.</p> <p>Students will be required to display skills in:</p> <ul style="list-style-type: none"> • Creating, contributing to, and enabling collegial environments • Showing self-awareness and the ability to self-reflect for personal growth • Inspiring and enabling others • Making informed and evidence-based decisions through consultation with others • Displaying initiative and ability to solve problems 	Not applicable	Not applicable
FEDTASK 3 Critical Thinking and Creativity	<p>Students will demonstrate an ability to work in complex and ambiguous environments, using their imagination to create new ideas.</p> <p>Students will be required to display skills in:</p> <ul style="list-style-type: none"> • Reflecting critically on complex problems • Synthesising, evaluating ideas, concepts and information • Proposing alternative perspectives to refine ideas • Challenging conventional thinking to clarify concepts through deep inquiry • Proposing creative solutions in problem solving 	A1	AT3
FEDTASK 4 Digital Literacy	<p>Students will demonstrate the ability to work proficiently across a range of tools, platforms and applications to achieve a range of tasks.</p> <p>Students will be required to display high-level skills in:</p> <ul style="list-style-type: none"> • Finding, accessing, collating, evaluating, managing, curating, organising and appropriately and securely sharing complex digital information at a high-level • Receiving and responding to messages in a range of digital media • Using digital tools appropriately to conduct research • Contributing proficiently to digital teams and working groups • Participating in and utilising digital learning opportunities 	S3, A1	AT2, AT3

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 5 Sustainable and Ethical Mindset	Students will demonstrate the ability to think ethically and sustainably. Students will be required to display skills in: <ul style="list-style-type: none"> • The responsible conduct of research • Making informed judgments that consider the impact of devising solutions in multiple global economic environmental and societal contexts • Demonstrating commitment to social responsibility as a professional and a citizen • Generating research solutions which are sustainable, ethical, socially responsible and/or sustainable • Extending lifelong, life-wide and life-deep learning to be open to diverse others • Demonstrate extended 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, S2	Analyze and solve a system of linear equations relevant to a given data science problem. Create and interpret a graphical representation of a two-dimensional linear programming problem.	Report and/or Presentation	20% - 30%
K1, K2, K3, K4, S1, S2, S3, S4, A1	Present solutions to a set of problems related to unit contents. Explain the meaning of findings for both specialist and mainstream audiences.	Tutorial tasks	30% - 50%
K1, K2, K3, K4, S3, S4	Complete an exam or test	Exam/test	30% - 50%

Adopted Reference Style:

IEEE

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

Fed Cite - [referencing tool](#)