Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Unit Title:	Space, Shape & Design (Intermediate Level)
Unit ID:	MATHS2009
Credit Points:	15.00
Prerequisite(s):	(Two mathematics units or equivalent)
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	010101

Description of the Unit:

This unit is aimed at a broad audience with experience in the use of symbols and mathematical language, who are interested in studying the patterns and order evident in nature and the spatial design of art, architecture and industry. It will provide students with some experience of the thinking and techniques necessary to establish evidence of general patterns and calculations related to spatial measurement and design. This unit will also include further experience of the formal use of mathematics to solve spatial problems. This unit will be particularly valuable to prospective teachers of mathematics at both primary and secondary level and to other students interested in developing a broad understanding of 2-D and 3-D shapes.

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. investigate geometric properties of various 2D and 3D shapes;

K2. identify and analyse symmetries in geometric patterns and structures;

K3. compare and contrast Euclidean geometry with non-Euclidean geometries, including spherical and hyperbolic;

K4. investigate and describe planar tessellations and topological ideas;

K5. determine features of conic sections through their equations;

Skills:

S1. investigate packing arrangements for circles, spheres, and other shapes in 2D and 3D;

S2. explore the basic principles of projective geometry and how it relates to perspective and infinity;

S3. construct simple mathematical proofs;

S4. use the proper language and symbols associated with the geometric concepts covered;

S5. use and appreciate current technology to investigate and explore geometrical patterns and associated properties;

Application of knowledge and skills:

A1. provide practical examples of the use of geometry in 2D and 3D constructions;

A2. solve real world problems through geometric modelling;

A3. illustrate the mathematical properties associated with aspects of space, shape and design;

Unit Content:

Topics in this unit may include an introduction to the concepts of Euclidean and elementary non-Euclidean geometry. Throughout the unit, the ideas will be developed using practical applications and examples from nature, art, architecture and industry. Topics to be covered in this unit will be taken from the following: 2-D and 3-D shapes, geometric properties, tessellations, scale, perspective, symmetry, topology, graph theory, fractals, kaleidoscopes, Golden Mean, and principles of trigonometry.

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, K4, K5, S1, S2, S3, S4	A range of tasks and problems are explored to support the understanding of the content and the development of skills and knowledge throughout the unit	Portfolio of completed work	10 - 30%
K1, S4, S5, A1, A2, A3	Self-directed or group exploration of geometric concepts and ideas	Project/Presentation/Assignment	20 - 40%
K1, S4, S5	Software based investigation and analysis of geometric concepts and ideas	Software based investigation	10 - 20%
K1, K2, K3, K4, K5, S1, S2, S3, S4, S5	A test on any part of or all the material covered in the unit	Test(s) / Examination(s)	30 - 50%

Adopted Reference Style:

APA ()

Refer to the library website for more information

Fed Cite - referencing tool