

Course Outline (Higher Education)

Institute / School:	Global Professional School
Course Title:	MATERIALS IN ENGINEERING
Course ID:	GPENG1003
Credit Points:	15.00
Prerequisite(s):	Nil
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	039999

Description of the Course:

For all engineering disciplines a fundamental understanding of how materials behave is core to being able to effectively select and design solutions to the challenges that are faced by the world. This course will introduce students to the basic properties of the most commonly used materials in engineering. The micro-structural and macroscopic behaviour of materials and fundamental chemistry will be studied to develop an understanding of how a material can be used safely. In addition the common processing methods, life cycle assessment and material selection techniques will be introduced.

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	■	■	■	■	■	■
Advanced	■	■	■	■	■	■

Learning Outcomes:

On successful completion of the course the students are expected to be able to:

Knowledge:

- K1.** Identify and understand how material properties and behaviour are dependent on the crystallinity, microstructure and phase composition and how these can be controlled by processing.
- K2.** Recognise the interface between the design process, materials selection and manufacturing.
- K3.** Review the common manufacturing processes available for engineering materials and the role of life cycle analysis.

Skills:

- S1.** Apply the processes of materials and manufacturing process selection to practical problems in design.
- S2.** Solve problems in a clear, logical and concise way.
- S3.** Exercise problem solving and team work techniques for laboratory experiments.
- S4.** Develop the appropriate English language and academic skills to successfully study at an undergraduate level.

Application of knowledge and skills:

- A1.** Interpret information of engineering significance to material selection and present them in a professional manner
- A2.** Use a technical report as a means to demonstrate knowledge and skills in materials engineering.

Course Content:

Topics may include:

- Material Properties, including atomic number, atomic mass, stoichiometry, crystal structure, mass and density.
- Introduction to stress and strain and their measurement, modulus of elasticity, ductility, brittleness and hardness, electrical and magnetic properties, fracture, fatigue and creep, corrosion mechanisms.
- Introduction to materials commonly used in engineering applications; steel and other major metals, concrete, ceramics, polymers, composites
- For each material, the following issues will normally be covered - manufacture; introduction to their microstructure; material properties; main tests conducted; most common engineering applications

Values:

V1. Recognise the connection between physics, chemistry, materials science and engineering.

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, 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.	A2, S4	2
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.	S3	2

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1 - K3, S1 - S4, A1 - A2	Tests or examination covering all or some of the material covered in the course.	Examination/Test	40 - 60%
K1 - K3, S1- S4, A1 - A2	A range of exercises will be undertaken to support the theoretical development during lectures.	Report/Presentation/Quiz/Test	40 - 60%

Adopted Reference Style:

Other (Refer to the library website for more information: IEEE)

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

Fed Cite - [referencing tool](#)