Course Outline (Higher Education)

Institute / School:	Institute of Innovation, Science & Sustainability
Course Title:	MATERIALS IN ENGINEERING
Course ID:	ENGIN1003
Credit Points:	15.00
Prerequisite(s):	Nil
Co-requisite(s):	Nil
Exclusion(s):	(ENCOR1110 and GPENG1003)
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 you to the basic properties of the most commonly used materials in engineering. To develop your understanding both the micro-structural and macroscopic behaviour of materials and fundamental chemistry will be studied, so that an understanding of how a material can be used safely is developed. In addition you will be introduced to the common processing methods, life cycle assessment and material selection techniques.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Does Recognition of Prior Learning apply to this course? No

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 explain how material properties and behavior are dependent on the crystallinity, microstructure, and phase composition and how these can be controlled by processing.

K2. Outline 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 relating to material properties in a clear, logical and concise way.

S3. Demonstrate problem-solving and teamwork techniques for laboratory experiments.

Application of knowledge and skills:

A1. Interpret information of engineering significance to material selection and present them in a professional manner

A2. Demonstrate knowledge and practical problem-solving skills in materials engineering by preparing a technical report based on laboratory exercises.

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

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	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 - S2, A1	An examination covering all or some of the material covered in the course.	Test/Exam	40 - 50%
K1 - K3, S1- S3, A1 - A2	A range of laboratory and other exercises will be undertaken to support the theoretical development during lectures.	Report/Presentation	30-40%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a program level. Although courses must undertake MiCS mapping, there is NO expectation that courses will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS program level reporting highlights how each program embraces the principals and practices associated with the Co-Operative Model. Evidence of program alignment with the MiCS, can be captured in the Program Modification Form.

MICS Mapping has been undertaken for this course No

Date:

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