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Title: Materials Engineering
Status: Definitive
Code: **6110MECH** (121324)
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering
Teaching School/Faculty: Engineering

Team	Leader
James Ren	Y
Lisa Li	

Academic Level: FHEQ6 **Credit Value:** 10 **Total Delivered Hours:** 41
Total Learning Hours: 100 **Private Study:** 59

Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	11
Online	11
Practical	6
Tutorial	11

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Portfolio	AS2	Portfolio	30	

Aims

To provide an in-depth understanding of advanced engineering materials together with techniques for material property and performance improvements.

Learning Outcomes

After completing the module the student should be able to:

- 1 Critically review the structure-properties relationships of advanced materials and techniques for performance improvements
- 2 Relate how the properties and behaviour of materials govern their design and manufacture through consideration of the basic mechanisms involved
- 3 Apply a range of techniques for improving the properties and performance of materials
- 4 Use of different materials data and analysis methods for design and product developments
- 5 Select materials to meet the performance requirements of a range of engineering applications
- 6 Use of life cycle analysis in design with respect to recycling and environmental issues

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	1	2	3	4	5	6
Portfolio	1	2	3	4	5	6

Outline Syllabus

Materials

High performance materials and applications

Advanced materials, composition design, processing and applications (high performance alloys, ceramics and composites)

High strength low weight materials, composites and high performance alloys

High performance alloys: alloying elements, structure improvements, processing methods, structural integrities, and applications

Structure and property design of different types of composites, failure mechanisms and performance enhancing methods.

New modern materials developments; Use of engineering principles in smart materials design and developments.

Performance oriented materials design and selection.

Performance of materials in service and structural considerations.

Material selection: computer-based techniques for material selection.

The selection of materials on the basis of performance requirements: strength, stiffness, toughness, fatigue resistance and energy absorption.

Use of modelling techniques in materials selection and product developments.

Material recycling and use of recycled materials: metals, plastics and composites.

Life cycle analysis of materials and structures.

Learning Activities

Lectures, tutorial and practicals

Notes

This module will provide an in-depth understanding of the structure and properties of advanced materials together with techniques available for improving properties and performances of materials. The selection of materials based on applications will also be developed.