

## MODULE DESCRIPTION FORM

### DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

## ME960 APPLIED METALLURGY

Module Registrar: Dr A I Toumpis <a href="mailto:athanasios.toumpis@strath.ac.uk">athanasios.toumpis@strath.ac.uk</a>	Taught To (Course): MSc Advanced Mechanical Engineering (Distance Learning)		
Other Lecturers Involved:	Credit Weighting: 10	Semester: 1 (Distance Learning)	
Assumed Prerequisites: n/a	Optional class for AME DL only	Academic Level: 5	Suitable for Exchange: N

#### Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	Total
	9				35		6	50	100

#### Educational Aim

This module aims to develop an understanding of the applied metallurgy of principal engineering alloys, to include structure & properties of metals and alloys, metal extraction, diffusion theory, heat treatments, welding engineering and typical degradation mechanisms.

#### Learning Outcomes

On completion of the module the student is expected to:

- LO1 Gain knowledge and understanding of applied metallurgy (structure, properties, application, etc.)
- LO2 Develop skills in material selection and processes used for physical property manipulation
- LO3 Be able to apply the knowledge gained across several industrial sectors

#### Syllabus

The module will teach the following:

- Introduction to the structure of metals, reviewing aspects such as crystal structure, mechanical properties, crystal defects and their effects on alloy properties
- Application of metallurgical principles in the extraction and processing of steel and aluminium
- Theory of diffusion and the phenomenon of mass transport for heat treatments
- Phase diagrams (equilibrium and non-equilibrium conditions), focusing on steel phase transformations
- Heat treatments primarily for steel alloys: hardening, softening and conditioning
- Welding engineering
- Corrosion science, including theory and practice, corrosion protection, etc.

#### Assessment of Learning Outcomes

##### Criteria

For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

##### LO1 Gain knowledge and understanding of applied metallurgy

- C1 Exhibit knowledge of fundamental materials science over a range of common engineering alloys
- C2 Demonstrate understanding of heat treatments, corrosion science and welding engineering

##### LO2 Develop skills in material selection and processes used for physical property manipulation

- C1 Demonstrate understanding and application of material selection principles
- C2 Evidence competence in applying advanced strategies for material and process selection

##### LO3 Be able to apply knowledge across several industrial sectors

- C1 Present understanding of diverse heat treatment processes within an industrial context  
 C2 Exhibit knowledge of the degradation phenomena influencing a variety of engineering materials

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

### Principles of Assessment and Feedback

(within Assessment and Feedback Policy at: <https://www.strath.ac.uk/staff/policies/academic/> )

#### Deliver high quality feedback information that helps learners self-correct.

Students are invited and encouraged to contact staff using the Myplace forum or by email with any module-related questions upon which specific formative feedback will be provided, including advice on style and expectations.

#### Ensure that summative assessment has a positive impact on learning.

The open book nature of the exam encourages students to read and research widely in preparation of their written answers.

#### Give choice in the topic, method, criteria, weighting or timing of assessments.

The assignments and the online exam offer a 3-week submission window, allowing students to schedule their coursework around employment-related commitments.

### Assessment Method(s) Including Percentage Breakdown and Duration of Exams

Examination				Coursework		Practical		Project	
Number	Month(s)	Duration	Weighting	Number	Weighting	Number	Weighting	Number	Weighting
1 (DL)	Nov/Dec	3 weeks	70%	2 (DL)	20%	1 (DL)	10%		
* LO1-LO3				* LO1-LO3		* LO1, LO3			

\* **L/Os:** Indicate which Learning Outcomes (L01, L02, etc) are to be assessed by exam/coursework/project/practical as required.

### Coursework / Submissions deadlines (*academic weeks*):

Mandatory participation in all weekly forum activities and recapping multiple choice quizzes (10% of total mark)  
 Coursework 1 will be released in wk 4 & coursework 2 in wk 7, with submission deadlines in wks 6 & 9 respectively.  
 Online exam released in wk 9 (November) with a submission date in wk 11 (prior to the December exam diet)

### Resit Assessment Procedures:

An alternate online extended coursework to be submitted after the Examination Board decisions and **prior to commencement** of the August exam diet (the date for which is confirmed in the University Calendar).

**As soon as a student knows that they require a resit assessment for this class, they should contact the class registrar to confirm these resit requirements and deadlines for this class.**

### PLEASE NOTE:

**Students must gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-assessed by courseworks as above. No marks from any previous attempts will be transferred to a new resit attempt.**

### Recommended Reading

\*\*\* Purchase essential      \*\*Purchase recommended      \*Highly recommended reading

\*\*\* Callister W.D. & Rethwisch D.G., *Materials Science and Engineering: An Introduction*, any edition, Wiley

\* Any textbook on Applied Metallurgy

### Additional Student Feedback

(Please specify details of when additional feedback will be provided)

Date	Time	Room No
Email to arrange		

Session: 2019/20

### Approved:

Course Director Signature: *E Henderson*

Date of Last Modifications: 05/09/2019

