MODULE DESCRIPTION FORM

ME212  MATERIALS ENGINEERING AND DESIGN

Module Registrar: Dr A M Galloway  
alex.galloway@strath.ac.uk

Taught To (Course): Cohorts for whom class is compulsory

Other Lecturers Involved: Dr P Muñoz-Escalona

Credit Weighting: 10 (ECTS 10)  
Semester: 1

Assumed Prerequisites: none  
Compulsory class  
Academic Level: 2

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

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Laboratory</th>
<th>Groupwork</th>
<th>External</th>
<th>Online</th>
<th>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>20</td>
<td>5</td>
<td></td>
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<td>3</td>
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Educational Aim

The class aims to provide a grounding in concepts of material science and engineering with reference to mechanical design and material selection.

Learning Outcomes

On completion of the module the student is expected to be able to

LO1 Understand crystal structure, deformation mechanisms and strengthening mechanisms in metals
LO2 Understand the use of phase diagrams. Difference between steels and cast iron
LO3 Develop a basic knowledge of heat treatment of metals
LO4 Understand the behaviour of linear and non-linear elastic materials, brittle fracture and fatigue
LO5 Appreciate the importance of stress concentration in fracture

Syllabus

The module will teach the following:


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
C1 demonstrates knowledge in strengthening and deformation processes with respect to metals and alloys
C2 demonstrates understanding of atomic structure, packing density and slip planes in crystals
C3 demonstrate understanding of the influence of crystal structure in terms of physical and mechanical properties

LO2
C1 demonstrates knowledge using different types of phase diagram
C2 understand the difference between phases and weight composition
C3 demonstrate knowledge in recognizing steels and cast iron microstructure

LO3
C1 demonstrates knowledge of heat treatment methods and applications
C2 demonstrate understanding of the role of phase diagrams in determining heat treatment procedure
C3 demonstrate knowledge in hardening and tempering, annealing, stress relieving and normalising

LO4
C1 demonstrates knowledge of material mechanical properties, including Young’s modulus, shear modulus, Poisson’s ratio, yield strength, ultimate tensile strength and thermal expansion coefficient
C2 demonstrate understanding of the ductile and brittle failure and ductile-brittle transition temperature
C3 demonstrates knowledge of material behaviour under alternating stress.
The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

12 Principles of Assessment and Feedback
(on Learning & Teaching web pages: www.strath.ac.uk/learnteach/informationforstaff/staff/assessfeedback/12principles/)

Formal, summative feedback will be provided by the return of examination marks to students after assessment (note:- exam scripts will not be returned to students and no individual or collective discussion of exam performance will be facilitated).

Informal feedback will be provided at regular tutorial sessions primarily through verbal discussion with individuals or groups on tutorial exercises attempted in advance by students (note:- to receive this feedback students should participate in these tutorials but attendance is not mandatory).

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

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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<tbody>
<tr>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
</tr>
<tr>
<td>4</td>
<td>Wk 4 (online)</td>
<td>30 min</td>
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<tr>
<td></td>
<td>Wk 8 (online)</td>
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<tr>
<td></td>
<td>Wk 12 (online)</td>
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<td>January diet</td>
<td>2 hrs</td>
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LO1 – LO5 will be assessed in both examinations.

Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines:

Resit Assessment Procedures:
2hr examination in August diet.

PLEASE NOTE:
Students need to gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of exam.

Recommended Reading

****Purchase essential; ***Purchase recommended; **Highly recommended reading; *Simply for reference (do NOT purchase)


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

Individual feedback will be provided immediately after the online quiz has been submitted

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<th>Room No</th>
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Session: 2014/15

Approved:

Course Director Signature: 

Date of Last Modifications: 27 August 2014
**MODULE TIMETABLE**

宗节开： ME212  | 宗节活： Materials Engineering and Design

**Brief Description of Assessment:**
Formal, summative feedback will be provided by the return of examination marks to students after assessment.
Informal feedback will be provided at regular tutorial sessions primarily through verbal discussion with individuals or groups on tutorial exercises attempted in advance by students.

**Assessment Timing:**
Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment(s).

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<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
<th>WK5</th>
<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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