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| Module Code | MEU33B04 |
| Module Name | Mechanical Engineering Materials |
| ECTS Weighting | 5 ECTS |
| Semester taught | Semester 1 |
| Module Coordinator(s) | Prof. Kevin O'Kelly |
| Module Learning Outcomes (LOs) with reference to the Graduate Attributes and how they are developed in the discipline | <p>LO1. Understand different mechanism of material deformation and failure and perform calculations relating deformation under load to the atomic structure and microstructure of materials. LO2. Calculate the failure loads and times for simple structures and apply these predictions for complex engineering components to ensure safe life.</p> <p>LO3. Predict how material microstructure will be affected by alloy compositions and thermo-mechanical treatment. LO4. Describe the structure and mechanical properties of different engineering materials including metals, polymers, ceramics and composites.</p> <p>LO5. Apply knowledge to select suitable materials for specific engineering applications.</p> <p>LO6. Appreciate the importance of preventing failure in engineering components, especially its social and ethical consequences.</p> <p>Graduate Attributes: levels of attainment</p> <ul style="list-style-type: none"> • To act responsibly - Enhanced • To think independently - Enhanced • To develop continuously - Enhanced • To communicate effectively - Enhanced |
| Module Content | This module develops essential concepts in the selection and use of engineering materials for mechanical and biomedical applications. Various modes of failure including yield, fracture, fatigue, creep, corrosion and wear will be examined. Different types of materials (including metal alloys, polymers, ceramics and composites) and their mechanical behaviour will be |

| | explored. Material processes and environmental conditions that alter the mechanical characteristics of the materials shall be considered. This information will then be used to select suitable materials for specific applications and determine why some materials fail under certain conditions. | | | | | | | | | | | | |
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| Teaching and Learning Methods | This module is taught using a combination of lectures and tutorial sessions. The tutorial sessions are overseen by a Teaching Assistant where students work in groups to develop their technical, communication and teamwork skills. | | | | | | | | | | | | |
| Assessment Details | <table border="1"> <thead> <tr> <th><i>Assessment Component</i></th> <th><i>Assessment Description</i></th> <th><i>% of total</i></th> <th><i>Week due</i></th> </tr> </thead> <tbody> <tr> <td>A. Written examination</td> <td>2 in-class exams</td> <td>50% (25% each)</td> <td>Week 6, Week 12</td> </tr> <tr> <td>B. Continuous assessment</td> <td>Long technical report</td> <td>50%</td> <td>Week 10</td> </tr> </tbody> </table> <p>IMPORTANT: Students must pass both the A and B assessment components to pass the module (i.e. students must attain $\geq 40\%$ in both the CA and Exam components).</p> | <i>Assessment Component</i> | <i>Assessment Description</i> | <i>% of total</i> | <i>Week due</i> | A. Written examination | 2 in-class exams | 50% (25% each) | Week 6, Week 12 | B. Continuous assessment | Long technical report | 50% | Week 10 |
| <i>Assessment Component</i> | <i>Assessment Description</i> | <i>% of total</i> | <i>Week due</i> | | | | | | | | | | |
| A. Written examination | 2 in-class exams | 50% (25% each) | Week 6, Week 12 | | | | | | | | | | |
| B. Continuous assessment | Long technical report | 50% | Week 10 | | | | | | | | | | |
| Reassessment | Written Examination (100%) | | | | | | | | | | | | |
| Contact Hours and Indicative Student Workload | Contact hours: 44 (33 lectures + 11 tutorials) Independent Study (preparation for and review of lecture materials): 22 Independent Study (preparation for and completion of assessments): 54 | | | | | | | | | | | | |
| Recommended Reading List | Engineering Materials 1 & 2, MF Ashby & DRH Jones (Butterworth- Heinemann) | | | | | | | | | | | | |
| Module Pre-requisites | MEU11E12 Materials or equivalent module | | | | | | | | | | | | |
| Module Co-requisite | None | | | | | | | | | | | | |