Course Code: 1502ENG
Course Name: Engineering Materials
Semester: Semester 1, 2015
Program: Diploma of Engineering
Credit Points: 10
Course Coordinator: Dr Lucija Boskovic
Document modified: 18 Feb 2015 15:30:31

Teaching Team

Your lecturer/tutor can be contacted via the email system on the portal.

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
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</thead>
<tbody>
<tr>
<td>Dr Lucija Boskovic</td>
<td><a href="mailto:Lucija.Boskovic@staff.qibt.qld.edu.au">Lucija.Boskovic@staff.qibt.qld.edu.au</a></td>
</tr>
<tr>
<td>Ehsan Effshari</td>
<td><a href="mailto:ehef@portal.qibt.qld.edu.au">ehef@portal.qibt.qld.edu.au</a></td>
</tr>
</tbody>
</table>

Staff Consultation

Your lecturer/tutor is available each week for consultation outside of normal class times. Times that your lecturer/tutor will be available for consultation will be given in the first week of lectures. A list of times and rooms will be published on the QIBT Portal under the "myTimetable" link.

Prerequisites
There are no prerequisites for this course

Brief Course Description

The course is designed for first year students enrolled on engineering programs. It considers the fundamental properties of metals and non-metallic materials. Students are introduced to the atomic and microstructure of materials and their relationship to mechanical and electrical properties. The course explores the mechanical concepts of stress, strain, elongation and material failure (including testing) and the phenomenon of electrical conduction.

Engineering Materials is a 10 credit point course within the Diploma of Engineering. The course is situated within the first semester of the program. The Diploma of Engineering is designed to provide students with a pathway to:
- further university studies in Engineering and related degrees; or
- direct employment.

Rationale

"Historically, the development and advancement of societies have been intimately tied to the members' ability to produce and manipulate materials to fill their needs" (Callister and Rethwisch, 8e). An understanding of the characteristics and properties of materials is essential for the design and development of new technologies and structures.

This course introduces the fundamental of materials science and engineering. It introduces students to a range of engineering materials including metals, ceramics, polymers and composites. The course investigates the relationships that exist between the structure and properties of materials. It also considers the need to 'engineer' the structure of materials to produce predetermined characteristics. An appreciation of the physical, mechanical and electrical properties of materials is fundamental to studies of material behaviour. These studies are a cornerstone of engineering design and practice. Thus, the behaviour of materials under a mechanical load and an applied electric field are considered. The course explores the mechanical concepts of stress, strain, elongation and material failure and the phenomenon of electrical conduction.

Aims

Engineering Materials aims to give students an understanding of the fundamental properties of both metals and non-metallic materials, and their applications in the 'real' world of engineering. The course is supported by lectures, tutorial and laboratory-practicals. Problem solving exercises elaborating the lecture material are introduced during the lecture and tutorial time. Laboratory activities are set-up to provide students with the opportunity to clarify their own ideas on the content material, to develop teamwork and necessary problem solving skills, and to develop written communication skills. In addition the laboratory sessions aim to develop students' competency in
laboratory skills and the interpretation of the results of system measurements.

Learning Outcomes

After successfully completing this course you should be able to:

1. Describe the atomic and interatomic bonding of metals, ceramics, polymers and composites;
2. Relate the atomic and microstructure of materials to their mechanical and electrical properties;
3. Describe and/or perform standard material tests - tensile, hardness, and non-destructive testing;
4. Calculate mechanical and elastic properties including Young's modulus, stress, strain, elongation (and relate these to experimental values);
5. Describe the effects of stress, temperature, and degradation in engineering materials; and
6. Calculate electrical conductivities of metals (i.e. conductors), semiconductors and insulators.

Texts and Supporting Materials

Required Resources


Organisation and Teaching Strategies

The weekly class contact consists of 4 contact hours per week and 2 x 2 hours laboratory sessions. The 4 hours will be made up of 2 hour lecture, 2 hour tutorial/workshop.

The lectures will enable the students to understand the theoretical and practical aspects of the course matter. The tutorial/workshops will provide students with the opportunity to discuss and clarify their own ideas on the course material, as well as to ascertain their numerical and analytical skills. Laboratory activities will reinforce the theoretical content.

Attendance at lectures, tutorials and workshops is a requirement. In independent study time you are expected to read the prescribed text, complete weekly exercises in your workbook and prepare for summative assessment.

Class Contact Summary

Your attendance in class will be marked twice during a four hour class. To receive full attendance, you must be present in the classroom on both occasions. Therefore, you are encouraged to attend and participate in all classes throughout the semester.

Participation in Class

You are expected to read the relevant chapter/s and complete all work stated in the content schedule before the required class. This weekly preparation both in-class and independently will help in preparing you for the Mid-Semester and Final Examination. Peer study groups can be useful in assisting with your weekly preparation.

Consultation Times

Attendance during consultation times is optional but you are encouraged to use this extra help to improve your learning outcomes.

Course Materials

Lecture notes will be made available to you on the Learning@QIBT site on the student portal and you are advised to print these out and bring them to each class so that extra notes can be added.

Independent Learning

You are expected to reinforce your learning from class time by undertaking sufficient independent study (approximately 6 hours per week outside of class time) so that you can achieve the learning outcomes of the course.

Program Progression

You are reminded that satisfactory Program Progression requires that attendance in classes is maintained at equal to or greater than 80%, and that GPA is maintained at equal to or greater than 3.5 [please see QIBT Policy Library - Program Progression Policy - for more information].

Content Schedule

1502ENG Labs will be held in room G39_2.18. (Gold Coast campus students) and N55_3.04 Nathan Campus (Mt Gravatt campus students).

Please note that you must attend the labs as per your timetable. Failure to do this will result in losing the mark for this assessment item. Please note that no second chance to do the lab/s will be given.

* Laboratory 1: Atomic Structure and Materials
* Laboratory 2: Young's Modulus, Stress, Strain and Elongation - 1

Weekly Teaching Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Activity</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Materials Readings</td>
<td>Lecture</td>
<td>Ch 1</td>
</tr>
<tr>
<td>1</td>
<td>Introduction to Materials Readings</td>
<td>Workshop</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Atomic Structure and Interatomic Bonding; Learning Outcomes: 1</td>
<td>Lecture</td>
<td>Ch 2</td>
</tr>
<tr>
<td>2</td>
<td>Atomic structure and Interatomic Bonding</td>
<td>Tutorial</td>
<td>Ch2</td>
</tr>
<tr>
<td>3</td>
<td>The Structure of Crystalline Solids and Imperfections in Solids; Learning Outcomes: 2</td>
<td>Lecture</td>
<td>Ch 3, 4</td>
</tr>
<tr>
<td>3</td>
<td>The Structure of Crystalline Solids and Imperfections in Solids</td>
<td>Tutorial</td>
<td>Ch 3, 4</td>
</tr>
<tr>
<td>4</td>
<td>Mechanical Properties of Metals; Learning Outcomes: 2, 3, 4, 5</td>
<td>Lecture</td>
<td>Ch 6, 7</td>
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</tbody>
</table>
### Assessment Details

Any unavoidable laboratory absence must be discussed with the Course Co-ordinator and suitable arrangements made to complete any missed laboratory sessions. You cannot submit a laboratory report if you do not attend and participate in the practical session. Failure to attend a laboratory session will result in 0 mark for that individual laboratory component.

### Laboratory Reports

The laboratory reports assess the ability of the student to analyse and interpret actual experimental data for Atomic Structures and Young's Modulus, stress, strain, elongation-METALS. The students understanding of experimental uncertainty and the ability to present their results clearly and concisely will be assessed.

### In-class Test

The in-class tests are closed book. The in-class tests encourage the students to keep up to date with their work. It also provides feedback to both the students and the teaching team regarding progress and conduct of the course. Marks will be awarded according to correctness of the procedure, accuracy of the solution and clarity of the presentation.

### Group Work: Written Report

Student will work in small groups on a project. This assessment builds students ability to work in small teams and apply the theories and concepts learnt in the course through peer-learning. Marks will be awarded according to the correctness of the procedure, the accuracy of the solution and the clarity of the report.

### Final Exam

Students must pass this assessment with a mark of at least 24 out of 60 to pass the course.
The final examination will be 120 minutes in duration, plus 10 minutes perusal, and closed book. The final examination will assess the student's knowledge and understanding of the topics covered in the course and the ability to apply that understanding to the solution of practical problems. The examination paper is devised also to test the student's computational skills, as well as the ability to apply that knowledge to engineering design problems. Marks will be awarded according to correctness of the procedure, accuracy of the solution and clarity of the presentation.

To be eligible to pass the course, students are required to complete all items of assessment and to achieve an aggregate mark of at least 50% overall. In addition, students must obtain at least 40% in the final examination in order to achieve a grade of "Pass" or above.

**Submission and Return of Assessment Items**

Normally you will be able to collect your assignments in class within fourteen [14] days of the due date for submission of the assignment.

**Retention of Originals**

You must be able to produce a copy of all work submitted if so requested. Copies should be retained until after the release of final results for the course.

**Extensions**

To apply for an extension of time for an assessment item you must submit a written request to your lecturer via the Student Website at least 48 hours before the date the assessment item is due. Grounds for extensions are usually serious illness, accident, bereavement or other compassionate circumstances and must be able to be substantiated with relevant documentation [e.g. medical certificate]. Please refer to the QIBT website - Policy Library - for guidelines regarding extensions and deferred assessment.

**Penalties for late submission without an approved extension**

Penalties apply to assignments that are submitted after the due date without an approved extension. Assessment submitted after the due date will be penalised 10% of the TOTAL marks available for assessment (not the mark awarded) for each day the assessment is late. Assessment submitted more than five days late will be awarded a mark of zero (0) For example:

- > 5 minutes and <= 24 hours: 10%
- > 24 hours and <= 48 hours: 20%
- > 48 hours and <= 72 hours: 30%
- > 72 hours and <= 96 hours: 40%
- > 96 hours and <= 120 hours: 50%
- > 120 hours: 100%

Note:

- Two day weekends will count as one day in the calculation of a penalty for late submission.
- When a public holiday falls immediately before or after a weekend, the three days will count as one day in the calculation of a penalty for late submission.
- When two public holidays (e.g. Easter), fall immediately before or after, or one day either side of a weekend, the four days will count as two days in calculating the penalty for late submission.
- When a single public holiday falls mid-week, the day will not be counted towards the calculation of a penalty.

Please refer to the QIBT website - Policy Library - Assessment Policy for guidelines and penalties for late submission.

**Assessment Feedback**

Marks awarded for assessment items will also be available on the on-line grades system on the Student Website within fourteen [14] days of the due date.

**Generic Skills**

QIBT aims to develop graduates who have an open and critical approach to learning and a capacity for lifelong learning. Through engagement in their studies, students are provided with opportunities to begin the development of these and other generic skills.

Studies in this course will give you opportunities to begin to develop the following skills:

<table>
<thead>
<tr>
<th>Generic Skills</th>
<th>Taught</th>
<th>Practised</th>
<th>Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Communication</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Oral Communication</td>
<td></td>
<td></td>
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<tr>
<td>Information Literacy</td>
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<tr>
<td>Secondary Research</td>
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<tr>
<td>Critical and Innovative Thinking</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Academic Integrity</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Self Directed Learning</td>
<td></td>
<td></td>
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<tr>
<td>Team Work</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Cultural Intelligence</td>
<td></td>
<td></td>
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<tr>
<td>English Language Proficiency</td>
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**Additional Course Generic Skills**
Overall, there is a high level of satisfaction among students for this course. The qualitative feedback suggests that students feel that the knowledge of the teacher, classroom engagement and the time taken to explain concepts are all positive aspects of the course.

Your feedback is respected and valued by your lecturers and tutors. You are encouraged to provide your thoughts on the course and teaching, both positive and critical, directly to your lecturer and tutor or by completing course and lecturer evaluations via QIBT’s online evaluation tool whenever these are available.

Academic Integrity

QIBT is committed to maintaining high academic standards to protect the value of its qualifications. Academic integrity means acting with the values of honesty, trust, fairness, respect and responsibility in learning, teaching and research. It is important for students, teachers, researchers and all staff to act in an honest way, be responsible for their actions, and show fairness in every part of their work. Academic integrity is important for an individual’s and the College’s reputation.

All staff and students of the College are responsible for academic integrity. As a student, you are expected to conduct your studies honestly, ethically and in accordance with accepted standards of academic conduct. Any form of academic conduct that is contrary to these standards is considered a breach of academic integrity and is unacceptable.

Some students deliberately breach academic integrity standards with intent to deceive. This conscious, pre-meditated form of cheating is considered to be one of the most serious forms of fraudulent academic behaviour, for which the College has zero tolerance and for which penalties, including exclusion from the College, will be applied.

However, QIBT also recognises many students breach academic integrity standards without intent to deceive. In these cases, students may be required to undertake additional educational activities to remediate their behaviour and may also be provided appropriate advice by academic staff.

As you undertake your studies at QIBT, your lecturers, tutors and academic advisors will provide you with guidance to understand and maintain academic integrity; however, it is also your responsibility to seek out guidance if and when you are unsure about appropriate academic conduct.

Please ensure that you are familiar with the QIBT Academic Integrity Policy; this policy provides an overview of some of the behaviours that are considered breaches of academic integrity, as well as the penalties and processes involved when a breach is identified.

For further information please refer to the Academic Integrity Policy on the QIBT website – Policy Library.

Risk Assessment Statement

Note: For all Diploma level programs, QIBT acknowledges content derived from Griffith University.