Course Code:	**1502ENG**
Course Name:	**Engineering Materials**
Semester:	**Semester 1, 2016**
Program:	Diploma of Engineering
Credit Points:	10
Course Coordinator:	Dr Lucija Boskovic
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Teaching Team

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

Callister,WD and Rethwisch, DG. (2014) Materials Science and Engineering:An Introduction 9e, Wiley.

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 EXPECTED. 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 MYSTUDY/Course Notes & Results 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 Griffith College Policy Library - Program Progression Policy - for more information].

Content Schedule

1502ENG Labs will be held in the room G39_2.18 (Gold Coast campus students only) and in the room N55-3.04 Nathan Campus (Mt Gravatt campus students only).

Please note that you must attend the labs as per your timetable. Failure to attend a laboratory session will result in losing the mark for that assessment item. Please note that only in exceptional circumstances the second chance to do the lab/s will be given Any unavoidable laboratory absence must be discussed with the Course Coordinator 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.

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

Weekly Teaching Schedule

Week	Topic	Activity	Readings
1	Introduction to Materials Readings	Lecture	Ch 1
	Introduction to Materials Readings	Workshop	
2	Atomic Structure and Interatomic Bonding; Learning Outcomes: 1	Lecture	Ch 2
	Atomic structure and Interatomic Bonding	Tutorial	Ch2
3	The Structure of Crystalline Solids and Imperfections in Solids; Learning Outcomes: 2	Lecture	Ch 3, 4
	The Structure of Crystalline Solids and Imperfections in Solids	Tutorial	Ch 3, 4
4	Mechanical Properties of Metals; Learning Outcomes: 2, 3, 4, 5	Lecture	Ch 6, 7
	Mechanical Properties of Metals	Tutorial	Ch, 6, 7
5	Failure of Engineering Materials; Learning Outcomes: 1, 2, 4, 5	Lecture	Ch 8
	Failure of Engineering Materials	Tutorial	Ch 8
6	Phase Diagrams; Learning Outcomes: 2, 4	Lecture	Ch 9
	Phase Diagrams	Tutorial	Ch 9
7	IN-CLASS TEST	Assessment	Ch 1-4, 6- 9
	IN-CLASS TEST	Assessment	Ch 1-4, 6- 9
8	Ceramics; Learning Outcomes: 2, 4, 5	Lecture	Ch 12, 13
	Ceramics	Tutorial	Ch 12, 13
9	Polymers; Learning Outcomes: 2, 4, 5	Lecture	Ch 14, 15
	Polymers	Tutorial	Ch 14,15
10	Composites; Learning Outcomes: 2, 4, 5	Lecture	Ch 16
	Composites	Tutorial	Ch 16
11	Degradation and Corrosion of Materials; Learning Outcomes: 5	Lecture	Ch 17
	Degradation and Corrosion of Materials	Tutorial	Ch 17
12	Electrical Properties; Learning Outcomes: 6	Lecture	Ch 18
	Electrical Properties	Tutorial	Ch 18
13	Revision	Lecture	All Materials
	Revision	Tutorial	All Materials

Assessment

This section sets out the assessment requirements for this course.

Summary of Assessment

Item	Assessment Task	Weighting	Relevant Learning Outcomes	Due Date
1	Assessment 1 Laboratory Atomic Structure and Materials Class	5%	1,2	Dependent on class scheduled to attend
2	Assessment 2 Laboratory Young's modulus, stress, straing, elongation-METALS Laboratory Report	10%	3,4,5	Two weeks after each lab attendance (NOTE: break week will count as 1 week)
3	Online Assignments	10%	1,2,4,5	5, 8 and 12
4	Assessment 3 In-Class Test	15%	1,2,4	Week 7
5	Assessment 4 Group Work: Written Report	10%	1,2,5	Week 12
6	Assessment 5 Final Exam *- Students must pass this assessment with a mark of at least 20 out of 50 to pass the course*	50%	1,2,4,5,6	Week 14

Assessment Details

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.

Online Assignments
You will be required to complete three online assignments. These assignments will help you to prepare better for summative final assessment and to practice more through the self-study time.

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 student's 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
The final examination will be 120 minutes in duration, plus 10 minute 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.

Students are required to complete all items of assessment and to achieve an aggregate mark of at least 50% overall. 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 if required to submit a hard copy of your work in conjunction with the electronic submission through TurnItIn

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 assignment, you must submit an Application for Extension of Assignment form to your teacher at least 24 hours before the date the assignment is due. Grounds for extensions are usually: serious illness, accident, disability, bereavement or other compassionate circumstances and must be able to be substantiated with relevant documentation [e.g. Griffith College Medical Certificate]. Please refer to the Griffith College website - Policy Library - for guidelines regarding extensions and deferred assessment.

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

Griffith College 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:

Generic Skills	Taught	Practised	Assessed
Written Communication		Yes	Yes
Oral Communication		Yes	
Information Literacy			
Secondary Research			
Critical and Innovative Thinking	Yes	Yes	Yes
Academic Integrity		Yes	Yes
Self Directed Learning			
Team Work	Yes	Yes	Yes
Cultural Intelligence			
English Language Proficiency			

Additional Course Generic Skills

Additional Course Information

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 Griffith College"™s online evaluation tool whenever these are available.

Academic Integrity

Griffith College 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, Griffith College 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 Griffith College, 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 **Griffith College 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 Griffith College website – Policy Library.

Risk Assessment Statement

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