London South Bank University

EST 1892

Module Guide

Introduction to Mechanical Engineering

ENG_4_441

School of Engineering

Level 4

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1. MODULE DETAILS

Module Title:	Introduction to Mechanical Engineering
Module Level:	4
Module Reference Number:	ENG_4_441
Credit Value:	20
Contact Hours:	65
Private Study Hours:	135
Pre-requisite Learning:	None
Co-requisite Modules:	None
Courses:	MEng/BEng Mechanical Engineering and Advanced Vehicle Engineering
Year and Semester:	2019, Semester 1
Module Coordinator:	Dr Ben Lishman
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Teaching Team & Contact Details:	Dr Naveed Hussain: n.hussain@lsbu.ac.uk
Subject Area:	Mechanical Engineering
Summary of Assessment Method:	50% Exam, 50% Coursework
External Examiner appointed for module:	Professor Ibrahim Esat, Brunel University

2. SHORT DESCRIPTION

This module will give students a broad introduction to the properties and limitations of engineering materials and an understanding of the fundamental structural characteristics governing these properties. Students will learn Newtonian mechanics, with a focus on statics (i.e. how to analyse the engineering of things which aren't moving, like bridges or rail tracks.)
The module emphasises the relationship between theory and real engineering systems. This involves a set of appropriate practical laboratory experiments and workshops.

3. AIMS OF THE MODULE

- To introduce students to the fundamental concepts and principles of solid mechanics.
- To provide an appreciation of the relationship between conceptual models and real engineering systems.
- To develop an analytical and practical approach to the solution of basic engineering problems based on the use of the fundamental principles of mechanics.
- To provide an appreciation of the rapidly advancing field of materials and how it relates to engineering applications and the wider community.
- To provide students with a knowledge of the properties and limitations of the main classes of engineering materials.
- To develop students' understanding of the fundamental structural characteristics governing the properties of engineering materials.

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

• demonstrate knowledge of the underlying concepts and principles of mechanical science
• demonstrate knowledge of materials technologies available for design and application

4.2 Intellectual Skills

• use numerical and analytical methods to solve problems in a mechanical engineering context
• apply knowledge of mechanics and materials to solve engineering problems

4.3 Practical Skills

• take practical measurements, analyse and critically appraise experimental data, and present the results in an accessible format.

4.4 Transferable Skills

• work in teams, coordinate information, and manage defined projects.

5. ASSESSMENT OF THE MODULE

You will be assessed in three ways in this module.

- you will be asked to produce a manufactured part in the workshops, and to produce a poster explaining your workshop procedures. This component is worth 30% of the module.
- you will be asked to perform some experiments in the Strength of Materials Laboratory, and then to write a report explaining the experiments and your results. This component is worth 20% of the module.
- In January you'll sit an exam. This is worth 50% of the module.

For each of the coursework assignments (the workshop and the lab) you'll be given a brief via the VLE, and this brief will be explained in a lecture. The date, time and format of the exam will also be explained in lectures.

In order to pass this unit you must achieve an overall minimum pass mark of 30% in each component, and an average mark of 40% overall.

6. FEEDBACK

Feedback will normally be given to students 15 working days after the final submission of an assignment or as advised by their module leader.

General feedback, applying to all students, will also be placed on the module VLE site within 15 working days.

7. INTRODUCTION TO STUDYING THE MODULE

7.1 Overview of the Main Content

- Units and dimensions, dimension analysis.
- Equilibrium
- Statics of rigid bodies
- Plane linkage mechanisms
- Shearing force and bending moment

- Risk Assessment, Health and Safety
- Machining Processes.
- An Introduction to Rapid Prototyping Technologies
- Inspection & Measurement - Tools, Methods and Approaches to Quality

- Bonding in solids
- Atomic packing and crystal structure.
- Materials under stress and the deformation of solids
- Metals, alloys, defects and dislocations.
- Plasticity and strengthening mechanisms.
- Polymers (structures, processing, properties and applications)
- Composite materials (structures, processing, properties and applications)
- Ceramics (structures, processing, properties and applications)

7.2 Overview of Types of Classes

Lectures for this module are generally on Monday afternoons. In your lectures you'll be introduced to new material, and your lecturer will go through examples of how this new understanding can be applied in your career as an engineer.

You'll also have **Tutorials**, where the tutor and students work through question sets which you've had time to study. Tutorials are a good place to ask questions, and to ask for a specific focus on areas you find more difficult. You must try all tutorial work before the tutorial.

In weeks 4-7 you'll have scheduled **Workshops**. Here you'll be working in BR-B05, making a whistle from aluminium. You'll be allocated to a specific workshop group at a specific time. It's important you go to your allocated session. You'll get more information about the workshops in lecture and also in your first week of workshops.

In weeks 8-10 you'll have scheduled **Labs**. You'll work in E-123 to run experiments which tell you about materials properties and about the behaviour of objects under load. Again, you'll be allocated to a specific group. More information will be given in lectures.

7.3 Importance of Student Self-Managed Learning Time

Students are required to undertake directed self-study and prepare solutions/discussions to questions relative to various topic areas. Students will be encouraged to identify for themselves particular problems of difficulty and to use tutorials to resolve these. Students must regularly access the VLE for this module.

Students are also expected to download the relevant tutorial questions and study them in advance of each tutorial, in order to derive maximum benefit from tutorial time. The "learning resources" section of this module guide gives a series of textbooks, available from the library to encourage further reading both on and around the topic.

7.4 Employability

This module delivers the fundamental building blocks of the theory of materials and mechanics. The theories and practices learned in this module will be central to any career in the engineering industry.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Start Date	CMIS	Week Number	Lecture Content	Tutorial Content	Workshop Content	Coursework
23/09/2019	9	1	Introduction to Engineering	Maths and equations		
30/09/2019	10	2	Forces and equilibrium	Introduction to the workshops		*CW1 launched*
07/10/2019	11	3	Structural Analysis			
14/10/2019	12	4	Trusses and Beams		Manufacturing week 1 (BR-B05)	
21/10/2019	13	5	Workshop standards		Manufacturing week 2 (BR-B05)	
28/10/2019	14	6	Safety and operations		Manufacturing week 3 (BR-B05)	
04/11/2019	15	7	Manufacturing processes		Manufacturing week 4 (BR-B05)	*CW2 launched*
11/11/2019	16	8	Materials classification and properties	Structural Analysis	Materials labs week 1 (E123)	
18/11/2019	17	9	Materials structures	Trusses and Beams	Materials labs week 1 (E123)	
25/11/2019	18	10	Imperfection and metal strengthening	Materials classification and properties	Materials labs week 1 (E123)	*CW1 submission*
02/12/2019	19	11	Polymers, ceramics, composite and their applications	Materials structures		
09/12/2019	20	12		Metals, polymers, ceramics, composites		
16/12/2019	21			Christmas holiday		
23/12/2019	22					
30/12/2019	23					
06/01/2020	24	13	Revision and exam preparation			*CW2 submission*
13/01/2020	25	14		Exam Period		
20/01/2020	26	15				

Your exam will be scheduled in either week 14 or 15 – i.e. between the 15th and the 26th of January. Exam timetables will be published at https://my.lsbu.ac.uk/my/portal/My-Course/Exams-Assessments.

Please check your timetable to find out exactly when you should attend lectures, labs, workshops and tutorials.

9. STUDENT EVALUATION

Previous students have valued the combination of classroom work alongside workshops and laboratories. Students last year asked for examples of good practice in, for example, producing workshop posters, and so this year we will provide a corpus of excellent work which you can learn from.

You can provide feedback on the module at any time by contacting any member of the teaching team: we like hearing from students and we're always interested in ways we can make things work better for you. At the end of the module there will be a Module Evaluation Questionnaire which you must complete. This helps us keep improving year on year.

10. LEARNING RESOURCES

Lecture materials are all supported through the VLE, and you should use this as the first place to look for information about the module. You should also support your learning by investigating textbooks available in the library, and recommended below.

Core material

1. Hibbleler, R (2017). Engineering mechanics: statics. 14th Ed, Pearson. ISBN 978-1292089232. (Earlier editions are similar and will be equally helpful).

2. Jones, D and Ashby, M (2011). Engineering materials 1: an introduction to properties, applications and design. 4th Ed. Butterworth-Heinemann. ISBN: 978-0080966656. (Earlier editions are similar and will be equally helpful)

Other recommendations

3. Matthews, C. (2012). IMechE engineers' data book. Wiley-Blackwell. ISBN: 978-1119976226

4. Meriam J.L. and Kraige. L.G. (2013). Engineering mechanics, volume 1: statics. 7th Ed, Wiley. ISBN: 978-1118164990. (Earlier editions are similar and will be equally helpful)

5. Callister, W.D. and Rethwisch, D.G. (2014). Materials science & engineering. 9th Ed. Wiley & Sons. ISBN: 978-1118319222. (Earlier editions are similar and will be equally helpful)

6. Gordon, J (1991). The new science of strong materials: or why you don't fall through the floor. ISBN: 978-0140135978