

Undergraduate Program Subject Outline

School of Engineering

SUBJECT NAME: FUNDAMENTALS OF ENGINEERING MECHANICS

Course code:	ENGG102	Section:	Dubai
Credit Points:	6	Year	2024
Session	Winter	Duration:	11 Weeks
Pre-requisite(s)	None	Co-requisite(s)	None
Mode of Delivery:	F2F (On campus)		
Final Exam Passing Requirement:	Weighted average of midterm and final exams $\geq 40\%$		

Timetabling Information can be found at MY|UOWD, <https://my.uowdubai.ac.ae/>

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Consultation:	See Moodle		

1 SUBJECT DESCRIPTION

In this subject, students will explore fundamental laws of motion, scalars and vectors, forces and moments, static equilibrium, energy, friction, and center of gravity and moment of inertia. Working in design teams, students will undertake a series of design and build projects to see the effects of concepts of mechanics on real structures.

2 CONTRIBUTION TO PROGRAM LEARNING OUTCOMES (PLO)

The activities in this course contribute to achieving the following program learning outcomes:

Program: Engineering	
PLO1	Demonstrate professional knowledge with a strong grounding in engineering and awareness of current local and international trends and challenges.
PLO2	Navigate disciplinary literature with particular skills in gathering & synthesising information independently to support an argument or strategy.

PLO3	Implement common research methods in the field of engineering, analyse data & evaluate the validity of findings and exercise critical judgement in determining new directions and strategies for carrying out further investigation.
PLO4	Draw from established engineering concepts, methods and industry standards to develop innovative solutions to complex engineering problems by completing a research project relating to the respective engineering major.
PLO5	Communicate clearly and coherently in writing to a range of audiences, with an ability to integrate knowledge, research, data, analysis and critical evaluation.
PLO6	Communicate verbally to a range of audiences using appropriate language in presentations, consultation and negotiation.
PLO7	Work productively as part of a team with the capacity for leadership, recognising the roles, responsibilities and accountabilities of team members.
PLO8	Show respect for the views, values and culture of others in settings involving colleagues, clients, communities and end users, and consider alternate perspectives in design and project management.
PLO9	Make complex considerations in regards to professional ethics and accountability, account for and mitigate risk, and operate with a commitment to professionalism in all work.
PLO10	Appreciate the importance of sustainable engineering design, and seek to maximise positive social and environmental outcomes in engineering design, practice and development.

ENGG102	Upon successful completion of this subject, a student should be able to:	PLOs
LO1	Describe the role of abstraction, simplification and the use of assumption and mathematical relationships in solving problems encountered by engineers	1,2
LO2	Construct free body diagrams to analyse the forces and moments acting on and within structural elements and structural systems	1
LO3	Apply logical engineering design practices to multi-faceted problems involving engineering mechanics	1,5
LO4	Solve engineering mechanics problems.	1,5
LO5	Undertake and present calculations and design in reports in a professional manner.	3
LO6	Work in a team to carry out design project work	4

3 SUBJECT SCHEDULE

3.1 LECTURE SCHEDULE

Week	Lecture Topic(s)	Learning Outcomes	Delivery format	Related supporting materials	Assessment Formative (F) Summative (S)
1	What engineers do. Newton's laws of motion. The concept of equilibrium. Application of Engineering mechanics and common examples.	1,3	F2F	Hagen Ch. 1, 4 Hibbeler Ch. 5	-

	The Engineering method, Analysis tools, presentation techniques, dimensions and units. Basic relationships. Introduction to Free Body Diagrams	1,2,5	F2F	Hagen Ch. 2, 3	-
2	Basic mechanics: Balanced Forces and moments on components and systems (static systems), Vectors, Applications	1,2,3	F2F	Hagen Ch. 4 Hibbeler Ch. 5	
	Free body diagram quiz	1,3	F2F	Hibbeler Ch. 10	Summative
3	Connecting stress with material strength Introduction to internal forces and FBD of sections of objects. Applications in engineering problems	1,2,3	F2F	Hagen Ch. 4 Hibbeler Ch. 7	-
4	Internal forces: Shear force and bending moment Drawing the shear force and bending moment diagrams - I	1,2,3	F2F	Hibbeler Ch. 7	-
5	Shear force and bending moment diagrams - II	1,2,3	F2F	Hibbeler Ch. 7	-
6	Internal Forces - Trusses	1,2,3	F2F	Hibbeler Ch. 6	
	Mid-Session Exam (outside of lecture session)			Until week 5	Summative
7	Internal forces – trusses	1,2,3	F2F	Hibbeler Ch. 6	-
8	Internal forces – trusses, Engineering applications Centroids of complex shapes	1,2,3	F2F	Hibbeler Ch. 6, 9	-
9	Centroids of complex shapes Second moment of area – parallel axes theorem Applications in engineering problems	1,3	F2F	Hibbeler Ch. 9 and 10	-
10	Work and energy Conservation of Energy	1,3	F2F	Notes will be provided	-
11	Revision				

3.2 SESSION TYPE: TUTORIAL

Week 1	Tutorial Topic(s)	Learning Outcomes	Delivery format	Related supporting materials	Assessment Formative (F) Summative (S)
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1	Dimensions and units, Introduction to free body diagrams, Review problems lecture 1	1,2	Distance	Hagen Ch. 1,2,3	-
2	Review problems lecture 2	1,2,3	F2F	Hagen Ch. 4 Hibbeler Ch. 5	-
3	Review problems lecture 3	1,2,3	F2F	Hagen Ch. 4 Hibbeler Ch. 5	-
4	Review problems lecture 4	1,2,3	F2F	Hibbeler Ch. 7	-
5	Review problems lecture 5	1,2,3	F2F	Hibbeler Ch. 7	-
6	Friction		F2F		
7	Review problems lecture 7	1,2,3	F2F	Hibbeler Ch. 6	-
8	Review problems lecture 8	1,2,3	F2F	Hibbeler Ch. 8	-
9	Review problems lecture 9	1,3	F2F	Hibbeler Ch. 9 and 10	-
10	Review problems lecture 10	1,3	F2F	Notes will be provided	-
11	Revision				

3.3 SESSION TYPE: LAB

Week	Lab Topic(s)	Learning Outcomes	Delivery format	Related supporting materials	Assessment Formative (F) Summative (S)
1	Team formation, work, organization. Project 1 Mechanics Attempt A: balsa beam design	5,6	F2F	Team work handouts Project 1A handouts	Homework: Balsa beam design
2	Project 1 (A) Task 5 – Beam testing Design of balsa beam discussion: Second moment of area of symmetrical compound rectangular shapes. Applications in engineering. Deflections, E modulus	5,6	F2F	Project 1A handouts Week 2 handout for theory	Homework: Project 1A: Work on report
3	Project 1 Mechanics Attempt B: E modulus experiment for balsa beam, Discuss preliminary redesign.	5,6	F2F	Project 1B handouts: E Modulus	Project 1A: Submit report via Moodle (S) Homework: Work on draft for project 1B, preliminary redesign
4	Project 1 Mechanics Attempt B: Preliminary redesign and testing	5,6	F2F	Project 1 B handouts: Design	Draft report Project 1B: Show to tutor (F)

	Optimizing the beam, Work on final redesign.				Homework: Finalize redesign
5	Project 1 Mechanics Attempt B: Final redesign Fabrication Testing of Beam – Project 1 B	5,6	F2F	Material will be provided	Show draft report, final redesign to tutor (F) Homework: Finalize report Project 1B
6	Project 2 Attempt A: Discussion, design. Suddenly applied loads, balanced and unbalanced systems	5,6	F2F	Material will be provided	Submit Final report Project 1B (S) Homework: Design Project 2A
7	Project 2 Attempt A: Build and Test Project 2 Attempt B: Discussion	5,6	F2F	Material will be provided	Homework: Finalize report Project 2A
8	Project 2 Attempt B: Build and test – Instructor's demonstration	5,6	F2F	Material will be provided	Project 2A: submit report via Moodle (S)
9	Project 3: Truss bridge design and discussion, building	5,6	F2F	Material will be provided	
10	Truss bridge competition: Display and testing	5,6	F2F	Material will be provided	Project 2B: submit report via Moodle (S)
11	Revision				

4 SUPPORTING MATERIALS

Books, Articles, Videos, Podcasts, etc. will be available on our Learning Management System (LMS).

4.1 REQUIRED TEXTBOOK

McCarthy T (Compiled) Yap KB, Hibbeler, RC and Hagen KD (2015) Fundamentals of Engineering Mechanics for ENGG102 and ENGG100, Published Pearson, Sydney ISBN 9781488610431. [Ebook.](#)

4.2 RECOMMENDED READINGS

None.

4.3 ACCESS TO SUPPORTING MATERIALS

The University uses MOODLE as a Learning Management System (LMS) to support all coursework subjects. The subject site and supporting materials can be accessed via: <https://moodle.uowplatform.edu.au> And via UOWD Library.

5 ASSESSMENT

5.1 ASSESSMENT OF LEARNING OUTCOMES

	Learning Outcome	Measures (Elements of Assessment)
1	Describe the role of abstraction, simplification and the use of assumption and mathematical relationships in solving problems encountered by engineers	Mid-session Exam, Final Exam
2	Construct free body diagrams to analyse the forces and moments acting on and within structural elements and structural systems	Free Body Diagram Quiz, Mid-session Exam, Final Exam
3	Apply logical engineering design practices to multi-faceted problems involving engineering mechanics	Mid-session Exam, Final Exam
4	Solve engineering mechanics problems.	Tutorials
5	Undertake and present calculations and design in reports in a professional manner.	Lab reports (group project 1B and 2B)
6	Work in a team to carry out design project work	Lab experiments and reports (group project 1, 2 and 3)

5.2 ASSESSMENT TASKS

Assessment Task	Due date	Marks	LO	Group (G)/ Individual (I)	Weighting
Laboratory experiments and laboratory reports: 1. Project 1A and 1B 2. Project 2A and 2B 3. Project 3: Truss Bridge Design and Competition	For tentative schedule, see section 3.3	100 for each project	5,6	G	40% (15+15+10)
Free Body Diagram Quiz (must pass this quiz – retakes allowed)	Week 2	50	2	I	5%
Tutorials	Weekly	10 each	4	I	10%
Mid-session Exam	Week 6	100	1,2,3	I	20%
Final Exam	Final exam week	100	1,2,3	I	25%

Assessment Task:	1A - Reflection on project 1
Type:	Group
Description:	Reflection report on beam design and deflection measuring
Marking criteria:	Based on preliminary beam design and report

Learning Outcome Measured:	5,6
Total Marks:	100
Weighting:	5%
Due Date:	Week 3
Word Length (if applicable):	-
Hand in to:	Tutor

Assessment Task:	1B- Final analysis report on project 1
Type:	Group
Description:	Analysis reports on beam design and performance
Marking criteria:	Based on the final beam design, calculations and report.
Learning Outcome Measured:	5,6
Total Marks:	100
Weighting:	10%
Due Date:	Week 6
Word Length (if applicable):	-
Hand in to:	Tutor

Assessment Task:	2A- Reflection on project 2
Type:	Group
Description:	Reflection report on beam design and deflection measuring
Marking criteria:	Based on preliminary beam design and report
Learning Outcome Measured:	5,6
Total Marks:	100
Weighting:	5%
Due Date:	Week 8
Word Length (if applicable):	-
Hand in to:	Tutor

Assessment Task:	2B - Final analysis report on project 2
Type:	Group
Description:	Analysis reports on beam design and performance
Marking criteria:	Based on the final beam design, calculations and report.

Learning Outcome Measured:	5,6
Total Marks:	100
Weighting:	10%
Due Date:	Week 10
Word Length (if applicable):	-
Hand in to:	Tutor

Assessment Task:	Project 3
Type:	Group
Description:	Design and construction of truss bridge and performance test.
Marking criteria:	Bridge must conform to the guidelines given on moodle. Lightest bridge with the maximum load carrying capacity will be considered the best design.
Learning Outcome Measured:	5,6
Total Marks:	100
Weighting:	10%
Due Date:	Week 10
Word Length (if applicable):	-
Hand in to:	Tutor

Assessment Task:	Free Body Diagram Quiz
Type:	Individual
Marking criteria	Based on accuracy and completion level of the solution
Learning Outcome Measured:	2
Total Marks:	50
Weighting:	5%
Date, Time and Location:	Week 2

Assessment Task:	Tutorials
Type:	Individual
Description:	Problems given in tutorial class must be solved and submitted on Moodle.
Marking criteria:	Submission of all questions is compulsory and will carry 1% for each week's tutorial.

Learning Outcome Measured:	4
Total Marks:	100
Weighting:	10% (10 tutorials at 1% each)
Due Date:	Weekly. By the end of the day of tutorial.
Word Length (if applicable):	-
Hand in to:	Tutor

Assessment Task:	Mid-Session test
Type:	Individual
Marking criteria	Based on accuracy and completion level of the solution
Learning Outcome Measured:	1,2,3
Total Marks:	100
Weighting:	20%
Date, Time and Location:	Week 6

Assessment Task:	Final Exam
Learning Outcome Measured:	1,2,3
Marking criteria	Based on accuracy and completion level of the solution
Total Marks:	100
Weighting:	25%
Date:	To be held during the official examination period. Please refer to the Exam Timetable available on the Student Online Resources website (http://my.uowdubai.ac.ae) closer to the exam period.

LATE SUBMISSIONS:

Please note that late submissions for projects will incur a penalty of 20% per day, including weekends.

5.3 GRADES AWARDED

The approved grades of performance and associated ranges of marks for undergraduate subjects are:

High Distinction (HD)	85 – 100%
Distinction (D)	75 – 84%
Credit (C)	65 – 74%
Pass (P)	50 – 64%
Pass Supplementary (PS)	50%
Fail (F)	0 – 49% (and not meeting the attendance requirements)
Technical Fail (TF)	Not meeting the final exam passing requirements – see the Assessment Policy PP-REG-DB-2.1

5.4 SATISFACTORY COMPLETION REQUIREMENTS

In order to be considered for a grade of Pass (P) or better in this subject, students must achieve the minimum required mark in the Final Examination (see page 1 for required score); students who obtain a composite mark greater than or equal to 50% but do not satisfy the Final Examination minimum pass requirements in the final examination will be awarded a “Technical Fail” grade.

Students must ‘reasonably’ complete all assessment tasks (including the required score for the Final Examination,) and submit these as specified in the subject outline. ‘Reasonable’ completion of an assessment task will be determined based on the instructions given to the student including: word length, demonstration of research and analysis where required, adherence to the Plagiarism Policy guidelines, and completion of each section/component of the assessment. Failure to submit all assessment tasks may result in a Fail grade awarded for the subject.

6 RELEVANT POLICIES AND DOCUMENTS

All students must read and be familiar with the following UOWD policies and documents, which are available on the Student Online Resources (my.uowdubai.ac.ae) website by following the Policies link:

- Academic Grievance Policy
- Academic Integrity Policy
- Campus Access and Order Rules
- Code of Conduct – Library Users
- Code of Practice – Students
- Copyright Policy
- Intellectual Property Policy
- Library Regulations
- Minimum Rate of Progress
- Music, Video and Software Piracy
- Non-Discriminatory Language and Practice & Presentation Policy and Guidelines
- Special Consideration Policy & Procedure
- Student Attendance Policy
- Student Conduct Rules
- Rules for use of UOWD ITTS Facilities
- Teaching and Assessment: Code of Practice – Teaching
- Teaching and Assessment: Assessment and Feedback Policy
- Teaching and Assessment: Subject Delivery Policy

7 SSP & STUDIOSTY

SSP (Student Support Program) is a program committed to assisting students in developing their academic skills and getting the most out of their studies. As part of their services, SSP provides Peer Tutoring Program and Academic Workshops (<https://my.uowdubai.ac.ae/ssd/index.php>).

Studiosity is an online study tool that students can access 24 hours, 7 days a week! Students can receive feedback on submitted writing in less than 24 hours and receive one-to-one, personal help in real time with a subject specialist. The service can be accessed through the subject’s Moodle site.

For further information, please contact:

SSP Coordinator

ssp@uowdubai.ac.ae

Phone Number: +971 4 278 1756

8 ACADEMIC INTEGRITY

Plagiarism and cheating are serious offences that can lead to expulsion from the university. Students must be familiar with the *Academic Integrity* policy which outlines the procedure that will be followed in case of academic misconduct including cheating and plagiarism. Please refer to *How to Avoid Plagiarism* available on the Student Online Resources website (<http://my.uowdubai.ac.ae>).

8.1 TURNITIN

Students are required to submit all written assignments in soft copy through the TurnItIn system which is available online at www.turnitin.com. Every student must have a TurnItIn account. Failure to submit an assignment through TurnItIn will result in marks for that assignment being withheld. **Students do NOT need to hand in a printed copy of the TurnItIn Originality Report.** More information about TurnItIn (including how to create an account and add a class) will be provided in the first lecture. Students can download Frequently Asked Questions (FAQs) about TurnItIn from the SSP section of UOWD website (<https://www.uowdubai.ac.ae/academic-resources/student-support-programs>).

TurnItIn information required to add this subject:

Class ID:	Moodle Link
Password:	Moodle Link

8.2 REFERENCE & IN-TEXT CITATION

For information about referencing and in-text citation please review the *Academic Writing Presentation* available on the Student Online Resources website (<http://my.uowdubai.ac.ae>).

8.3 UOWD RULES & POLICIES

For information about UOWD Rules and Policies, please go to the Student Online Resources website (<http://my.uowdubai.ac.ae>) and click on the POLICIES link.

9 ATTENDANCE REQUIREMENTS

Attendance in this subject is compulsory. Failure to attend all tutorials and computer labs as per the Student Attendance Policy may result in a FAIL grade. Students are strongly encouraged to become familiar with this policy (which can be found on the Online Resources website at my.uowdubai.ac.ae).

10 TUTORIAL/COMPUTER LAB ENROLMENTS

All students must sign up for one tutorial and/or computer lab in Week 1. Admission to a tutorial/computer lab will not be possible unless the student's name is on the Attendance List for that class. No changes will be allowed once a student has enrolled in a tutorial/computer lab.

11 SUPPLEMENTARY ASSESSMENTS

A supplementary assessment may be offered to students whose performance in this subject is close (45-49 in the final examination and 48-49 in the composite score) to that required to pass the subject, and are otherwise identified as meriting an offer of a supplementary assessment. The precise form of a supplementary assessment will be determined at the time the offer of a supplementary is made.

12 LECTURE CAPTURE

UOWD supports the recording of lectures as a supplemental study tool, to provide students with equity of access, and as a technology-enriched learning strategy to enhance the student experience.

To make your own recording of a lecture you **must** receive the explicit permission of the Educator and those people who are also being recorded.

You may only use recorded lectures, whether they are your own or recorded by the university, for your own educational purposes. Recordings cannot be altered, shared or published on another platform, without permission of the University. UOWD's Lecture Capture policy is underdevelopment.

13 SUSTAINABILITY

UOWD encourages all students to act in a sustainable manner when planning and submitting assessments. If possible, students should not use plastic items, such as folders, covers, and bindings, and other synthetic materials, for presentations, workshops, and other activities. Students are also encouraged to avoid unnecessary printing; and if printing is required, please consider printing double-sided and only printing essential illustrations avoiding blocks of any colour as the use of ink is harmful to the environment. Always behave in a sustainable way.