

Undergraduate Program Subject Outline

Faculty of Engineering and Information Sciences

<http://my.uowdubai.ac.ae>

SUBJECT NAME: MATERIALS IN DESIGN

Course code:	ENGG103	Section:	Dubai
Credit Points:	6	Year	2023
Session	Autumn	Duration:	11 Weeks
Pre-requisite(s)	None	Co-requisite(s)	None
Mode of Delivery:	On-campus (F2F)		
Final Exam Passing Requirement:	Weighted average mark of midterm and final exams $\geq 40\%$		

LECTURE INFORMATION

Lecture 1 (Groups A, B, C)	
Day:	Monday
Time:	08:30 – 11:30
Location:	5.134-Classroom A 5.13 & 5.14

Lecture 2 (Groups D, E, F)	
Day:	Tuesday
Time:	08:30 – 11:30
Location:	4.467-Classroom A 4.46 & 4.47

TUTORIAL INFORMATION

Day:	Monday (Group A)	Monday (Group B)	Monday (Group C)	Tuesday (Group D)	Tuesday (Group E)	Tuesday (Group F)
Time:	12:30 – 14:30	12:30 – 14:30	12:30 – 14:30	12:30 – 14:30	12:30 – 14:30	12:30 – 14:30
Location:	6.33-Classroom B	4.51-Tutorial Room	6.38-Classroom B	4.45-Classroom B	4.48-Classroom B	3.45-Classroom B

COMPUTER LAB INFORMATION

	Computer Lab 1 (Groups A & B)	Computer Lab 2 (Groups C & D)	Computer Lab 3 (Groups E & F)
Day:	Monday	Tuesday	Wednesday
Time:	14:30 – 16:30	14:30 – 16:30	11:30 – 13:30
Location:	1.53-Chemistry & Materials Science Lab	1.53-Chemistry & Materials Science Lab	1.53-Chemistry & Materials Science Lab

Educator's Name:	Ciara ODriscoll	Abdulqader Hasan	Mohammad Yousuf
Building & Office No:	School of Engineering, Third Floor		
E-mail Address:	CIARAODRISCOLL@UOWDUBAI.AC.AE	ABDULQADERHASAN@UOWDUBAI.AC.AE	MOHAMMADYOUSUF@UOWDUBAI.AC.AE
Consultation:	See Moodle		

Educator's Name:	Thahsin Saidarakath	Ahmed Mohamed
Building & Office No:	School of Engineering, Third Floor	
E-mail Address:	THAHSINSAIDARAKATH@UOWDUBAI.AC.AE	AM320@UOWMAIL.EDU.AU
Consultation:	See Moodle	

1 SUBJECT DESCRIPTION

In this subject, students will explore the interrelationships between materials structure, properties, processing and application. Students will learn the principles underlying the selection of materials for design based upon material properties, processing techniques and the design of engineering components.

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.
--------------	---

Course ENGG103 Upon successful completion of this subject, a student should be able to:		PLOs
LO1	Describe the structure, general properties and main applications of metals, polymers, ceramics and composites.	1
LO2	Evaluate the main mechanical properties of materials from experimental data.	1
LO3	Evaluate the main thermal and electrical properties of materials.	1
LO4	Describe the relationships that exist between structure, processing and properties of selected materials.	1
LO5	Solve simple engineering problems related to materials selection, failure analysis and new materials development.	1

3. SUBJECT SCHEDULE

3.1 LECTURE SCHEDULE

Week	Lecture Topic(s)	Learning Outcomes	Session Type	Related supporting materials	Assessment Formative (F) Summative (S)
1	Atomic structure & Interatomic bonding, Imperfections in solids	1	Lecture	Chapters 1,3,4	
2	Mechanical properties of metals	1,2	Lecture	Chapter 6	
	Structure and imperfections in crystalline solids	1,2	Tutorial		
	Bend Test	1,2	Lab		
3	Dislocations and strengthening mechanisms	1,4	Lecture	Chapter 7	Assessment 2 Lab report 1 (S)
	Mechanical properties of metals	1,2	Tutorial		
4	Failure: Fracture & Fatigue	5	Lecture	Chapter 8	
	Dislocations and strengthening mechanisms	1,4	Tutorial		
	Tensile Test	1,2	Lab		
5	Phase Diagrams	4,5	Lecture	Chapter 8	Assessment 2 Lab report 2 (S)
	Failure: Fracture & Fatigue	5	Tutorial		
6	Polymers	1,3,4	Lecture	Chapter 19	Assessment 1 Midterm Quiz (S)
	Phase Diagrams	4,5	Tutorial		
	Torsion Test	1,2,4	Lab		
7	Composites	1,4,5	Lecture	Chapters 12,16	

	Polymers	1,3,4	Tutorial		Assessment 2 Lab report 3 (S)
8	Guest lecture: Ceramics	1,4	Lecture	Lecture notes provided	Assessment 3 Project (S)
	Composites & Ceramics	1,4	Tutorial		
	Charpy Impact Test	1,2,4	Lab		
9	Thermal properties of material	1,4,5	Lecture	Chapter 14,15,16	Assessment 2 Lab report 4 (S)
	Thermal properties	1,4,5	Tutorial		
10	Electrical properties of material	1,3,4	Lecture	Chapter 18	
	Electrical properties	1,3,4	Tutorial		
11	Revision				

3.2 LABORATORY SCHEDULE

Week	Computer Lab Activities	Learning Outcomes
2	Lab 1: Bend Test (Groups A, C, E)	1,2
3	Lab 1: Bend Test (Groups B, D, F)	
4	Lab 2: Tensile Test (Groups A, C, E)	1,2
5	Lab 2: Tensile Test (Groups B, D, F)	
6	Lab 3: Torsion Test (Groups A, C, E)	1,2,4
7	Lab 3: Torsion Test (Groups B, D, F)	
8	Lab 4: Charpy Impact Test (Groups A, C, E)	1,2,4
9	Lab 4: Charpy Impact Test (Groups B, D, F)	

4. SUPPORTING MATERIALS

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

4.1 REQUIRED TEXTBOOK

W.D. Callister Jr. and D.G. Rethwisch, "Materials Science and Engineering: An Introduction", 10th edition, Wiley, Hoboken NJ, 2018.

4.2 RECOMMENDED READINGS

- M. Ashby and D. Jones, "Engineering Materials 1: An Introduction to Properties, Applications and Design", 4th edition, Elsevier, 2012
- M. Ashby and D. Jones, "Engineering Materials 2: An Introduction to Microstructure and Processing", 4th edition, Elsevier, 2012.

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)
LO1: Describe the structure, general properties and main applications of metals, polymers, ceramics and composites;	<ul style="list-style-type: none"> • Midterm exam • Practical labs • Project • Final Exam
LO2: Evaluate the main mechanical properties of materials from experimental data	<ul style="list-style-type: none"> • Midterm exam • Practical labs
LO3: Evaluate the main thermal and electrical properties of materials;	<ul style="list-style-type: none"> • Final Exam
LO4: Describe the relationships that exist between structure, processing and properties of selected materials; and	<ul style="list-style-type: none"> • Midterm exam • Practical labs • Final Exam
LO5: Solve simple engineering problems related to materials selection, failure analysis and new materials development.	<ul style="list-style-type: none"> • Midterm exam • Practical labs • Project • Final Exam

5.2 ASSESSMENT TASKS

Learning Outcome	Assessment 1 Midterm Exam 25%	Assessment 2 Practical Labs 20%	Assessment 3 Projects 20%	Assessment 4 Final Exam 35%
LO 1	x	x	x	x
LO 2	x	x		
LO 3				x
LO 4	x	x		x
LO 5	x	x	x	x
Group (G)/ Individual (I)	I	G	G	I
Total Marks	25	20	20	35
Due Date	Week 6	As per lab schedule	Week 8	Final Examination Period

Assessment Task:	Assessment 1: Midterm
Type:	Individual
Description:	Exam
Learning Outcome Measured:	LO1, LO2, LO4, LO5

Total Marks:	25
Weighting:	25%
Due Date:	Week 6
Word Length (if applicable):	NA
Hand in to:	Lecturer
TurnItIn submission required by:	NA

OUTLINE AND REQUIREMENTS

Midterm exam is on campus. Based on topics covered in week 1 – 4.

- Atomic structure & Interatomic bonding
- Crystallinity in solids
- Imperfections in solids
- Mechanical properties of materials
- Dislocations and strengthening mechanisms
- Failure: Fracture & Fatigue

MARKING CRITERIA

Demonstrated understanding through answering related questions. Late submission will not be marked (zero mark).

Assessment Task:	Assessment 2: Practical Labs
Type:	Group
Learning Outcome Measured:	LO1, LO2, LO4, LO5
Description:	Four lab sessions
Total Marks:	20
Weighting:	20%
Due Date:	As per lab schedule
Word Length (if applicable):	NA
Hand in to:	Lab Instructor
TurnItIn submission required by:	NA

OUTLINE AND REQUIREMENTS

4 experimental lab sessions relating to material properties to be completed as per lab schedule. Labs will be conducted every second week starting in week 2 as per student lab group.

Group reports to be uploaded to ENGG103 Moodle site. Report deadlines will be posted on ENGG103 Moodle site.

MARKING CRITERIA

Marking scheme is available on ENGG103 Moodle site. Marks for report are awarded out of 100.

Assessment Task:	Assessment 3: Group Project
Type:	Group
Learning Outcome Measured:	LO1, LO5
Description:	Material selection case study
Total Marks:	20
Weighting:	20%
Due Date:	Week 8, on campus presentations will be held in either Week 8 & 9 as per schedule.
Word Length (if applicable):	NA
Hand in to:	Moodle
TurnItIn submission required by:	NA

OUTLINE AND REQUIREMENTS

Your engineering materials team has been tasked with identifying and discussing sustainable materials for real world problems identified through the United Nations 17 Sustainable Development Goals. The goal is for students to use their new and existing materials knowledge to make sustainable material selection decisions as a group and rationalize those choices using facts, not necessarily to find the “best” choice but the most suitable sustainable choice based on your identified criteria.

Your task as a group is to present your findings based on your material knowledge in a professional manner. Example projects and further details are provided on ENGG103 Moodle site.

MARKING CRITERIA

Marking scheme/rubric is available on ENGG103 Moodle site.

Assessment Task:	Final Exam
Learning Outcome Measured:	LO1, LO3, LO4 & LO5
Total Marks:	35
Weighting:	35%
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.

OUTLINE AND REQUIREMENTS

Topics covered in the final assessment:

- Phase Diagrams
- Polymers
- Composites
- Ceramics
- Thermal properties of material
- Electrical properties of material

MARKING CRITERIA

The exam will be marked based on the correctness of the answers.

LATE SUBMISSIONS:

Please note that late submissions 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.