ENGG103 – Materials in Design

UNIVERSITY
OF WOLLONGONG
IN DUBAI

University of Wollongong in Dubai

ENGG103 – Materials in Design

Welcome Lecture: Autumn 2023

UNIVERSITY OF WOLLONGONG IN DUBAI

Dr Ciara O'Driscoll

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Consultation hours:

Tuesday 12:30-15:30

Please email first for appointment.

Overview

Materials in Design

Course Objective...

Introduce fundamental concepts in Materials Science

You will learn about:

- material structure
- how structure dictates properties
- how processing can change structure

This course will help you to:

- use materials properly
- realize new design opportunities with materials

ENGG103 – Materials in Design

Why study this course?

Only when materials failure occurs does the importance of materials selection become apparent.

- Understanding of ENGG103 material topics is fundamental to understanding "why" we choose (or deliberately do not choose) a certain material; or "why" we choose a certain process to treat or fabricate a material

- A knowledge of structure and bonding also leads to a better understanding of the properties of materials and how and why they can be changed by processing.

Welcome to ENGG103

Course Overview – Learning Objectives

And for many of you, welcome to the University of Wollongong Dubai

On successful completion of this subject, students should be able to:

1. Describe the structure, general properties and main applications of metals, polymers, ceramics and composites;
2. Evaluate the main mechanical properties of materials from experimental data;
3. Evaluate the main thermal and electrical properties of materials;
4. Describe the relationships that exist between structure, processing and properties of selected materials; and
5. Solve simple engineering problems related to materials selection, failure analysis and new materials development.

ENGG103 Contact Hours

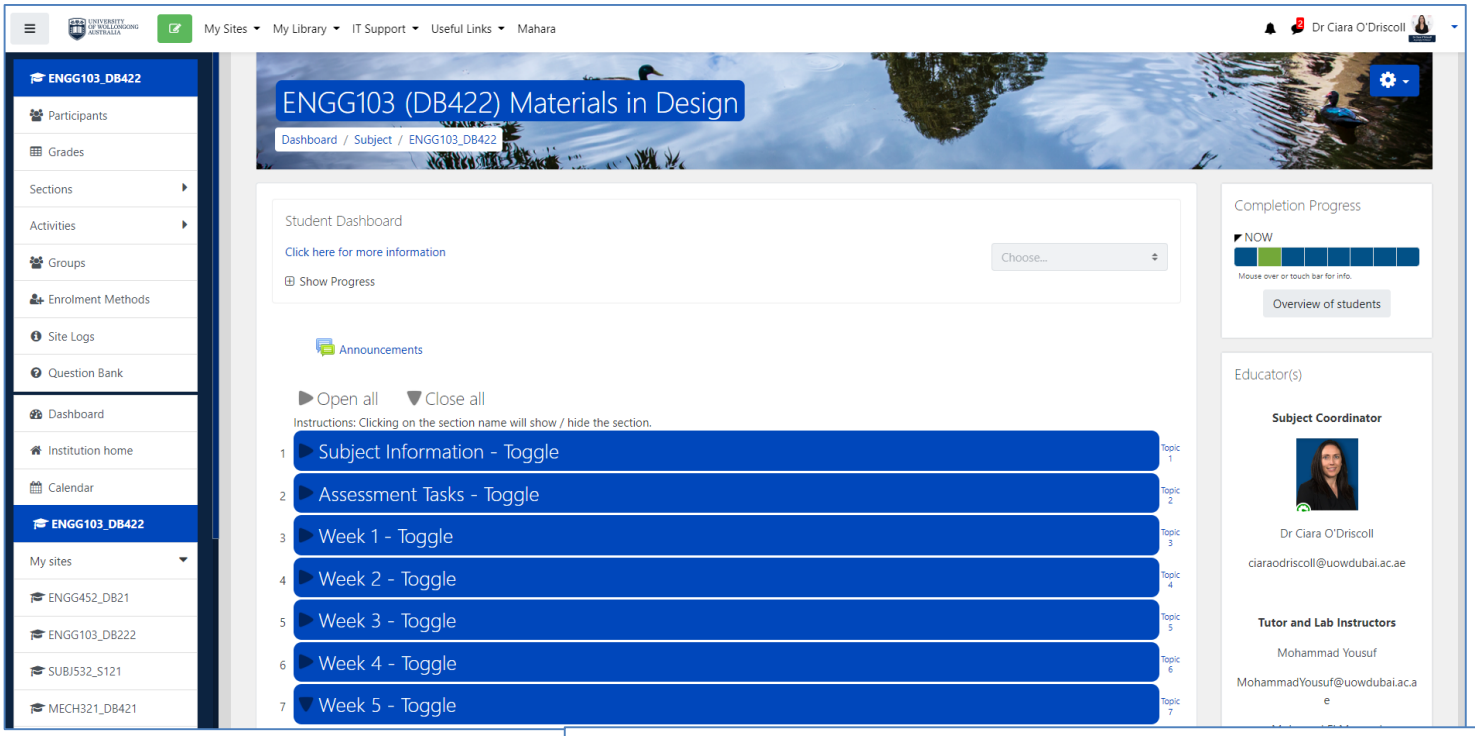
- ENGG103 has the following contact hours:
  - 1 x 3-hr **Lecture** per week, all weeks
  - **Monday or Tuesday 08:30 – 11:30**
  - **- problem solving examples will be covered during lectures**
  - 1 x 2-hr **Tutorial** starts Week 2 – Week 10
  - 1 x 2-hr **Lab every second week** 1.53-Chemistry & Materials Science Lab

ENGG103 Moodle Site

ENGG103

- The ENGG103 Moodle Site will be the main way you interact with the various parts of this subject
- It includes a repository for all lecture slides, practical and laboratory assignments, and assessment information
- You can also interact with the Moodle site for online Quizzes, accessing the subject forum.

https://moodle.uowplatform.edu.au/course/view.php?id=33986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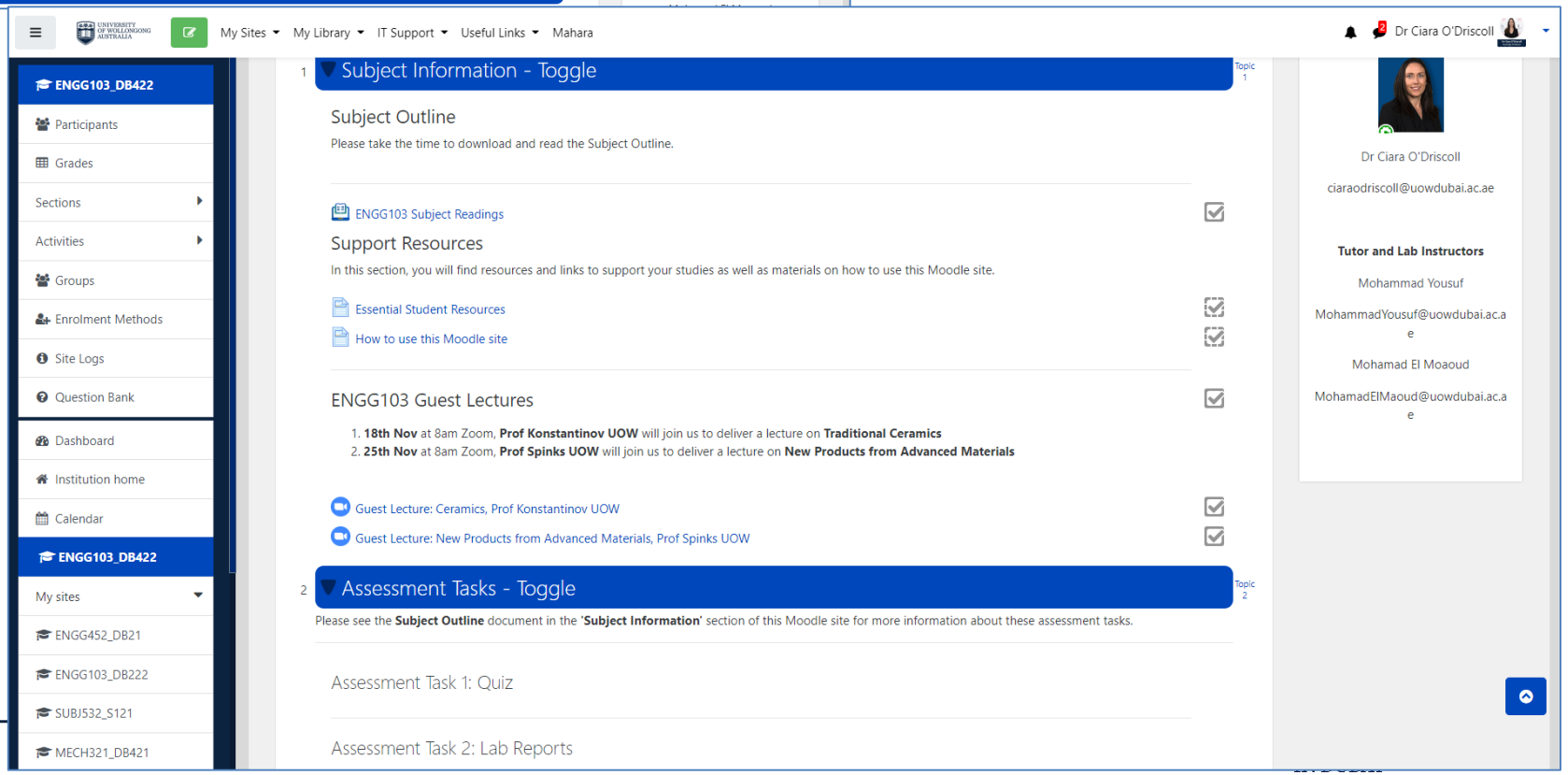
MECH321_DB421
ENGG103 (DB422) Materials in Design
Dashboard / Subject / ENGG103_DB422
Student Dashboard
Click here for more information
Choose...
Show Progress
Announcements
Open all
Close all
Instructions: Clicking on the section name will show / hide the section.
1 Subject Information - Toggle
2 Assessment Tasks - Toggle
3 Week 1 - Toggle
4 Week 2 - Toggle
5 Week 3 - Toggle
6 Week 4 - Toggle
7 Week 5 - Toggle
Completion Progress
NOW
Mouse over or touch bar for info.
Overview of students
Educator(s)
Subject Coordinator
Dr Ciara O'Driscoll
ciaraodriscoll@uowdubai.ac.ae
Tutor and Lab Instructors
Mohammad Yousuf
MohammadYousuf@uowdubai.ac.ae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SUBJ532_S121
MECH321_DB421
1 Subject Information - Toggle
Topic 1
Subject Outline
Please take the time to download and read the Subject Outline.
ENGG103 Subject Readings
Support Resources
In this section, you will find resources and links to support your studies as well as materials on how to use this Moodle site.
Essential Student Resources
How to use this Moodle site
ENGG103 Guest Lectures
1. 18th Nov at 8am Zoom, Prof Konstantinov UOW will join us to deliver a lecture on Traditional Ceramics
2. 25th Nov at 8am Zoom, Prof Spinks UOW will join us to deliver a lecture on New Products from Advanced Materials
Guest Lecture: Ceramics, Prof Konstantinov UOW
Guest Lecture: New Products from Advanced Materials, Prof Spinks UOW
2 Assessment Tasks - Toggle
Topic 2
Please see the Subject Outline document in the 'Subject Information' section of this Moodle site for more information about these assessment tasks.
Assessment Task 1: Quiz
Assessment Task 2: Lab Reports
Dr Ciara O'Driscoll
ciaraodriscoll@uowdubai.ac.ae
Tutor and Lab Instructors
Mohammad Yousuf
MohammadYousuf@uowdubai.ac.ae
Mohamad El Moaoud
MohamadElMaoud@uowdubai.ac.ae

ENGG103: How will I be assessed?

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- Your final mark in ENGG103 will be weighted as follows:
  - Assessment 1: 25% Midterm
    - Refer to Subject Outline for MT schedule
    - Midterm: Topics examined during weeks 1-4 – Closed book on campus exam
  - Assessment 2: 20% Laboratory Experiments
    - Starting from Week2 (every second week)
    - 4 experimental labs
  - Assessment 3: 20% Group Project (Week 4 – Week 8)
    - Case study on material selection based on UN SDGs
  - Assessment 4: 35% Final Exam
    - Topics examined from weeks 5 -10
    - Exam time: During end of semester exam weeks

Subject Outline Uploaded on Moodle

ENGG103

- The **subject outline** describes all the processes and procedures you need to know.
- It lists all assessments in detail.
- It lists the online textbook
  - You do not need to purchase this book unless you want to (Ebook available)
  - Other reference books will be advertised during the subject

https://moodle.uowplatform.edu.au/mod/lti/view.php?id=2801619

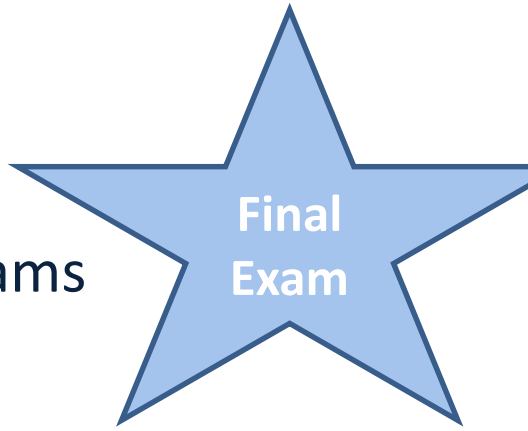
Lecture Topics

ENGG103

- Opening Lecture: Introduction to ENGG103

- **Week 1:**
  - Introduction to Materials in Design
  - Atomic Structure, Chemical Bonds
  - Crystallinity in Solids
  - Imperfections in Solids
- **Week 2:**
  - Mechanical properties of materials
- **Week 3:**
  - Dislocations & Strengthening Mechanisms
- **Week 4:**
  - Failure: Fatigue/Fracture
  - Creep

- **Week 5:**
  - Phase Diagrams
- **Week 6:**
  - Polymers
- **Week 7:**
  - Composites
- **Week 8:**
  - **Guest Lecture**: Ceramics
- **Week 9:**
  - Thermal properties
- **Week 10:**
  - Electrical properties



Assessment 2

Group Project – Material Case Study

20%

Tutorials and Laboratory Experiments

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- **Tutorials** are WEEKLY and start from WEEK 2
  - You will be mostly following the online textbook available through the library.
  - Tutorial problem sheets will be uploaded to moodle at beginning of the week.

Assessment 3

20%

- **Laboratories** are bi-weekly and start from week 2
  - Each Workshop Assignment (WSA) is based on material properties
  - In these, you need to apply what you have learnt to solve a number of problems and write and submit an experimental report on your findings

4 Experiments
1. Bend Test
2. Tensile Test
3. Charpy Impact Test
4. Torsion Test

Submission: Report based on experiments conducted in lab class

Tutorials and Laboratory Experiments

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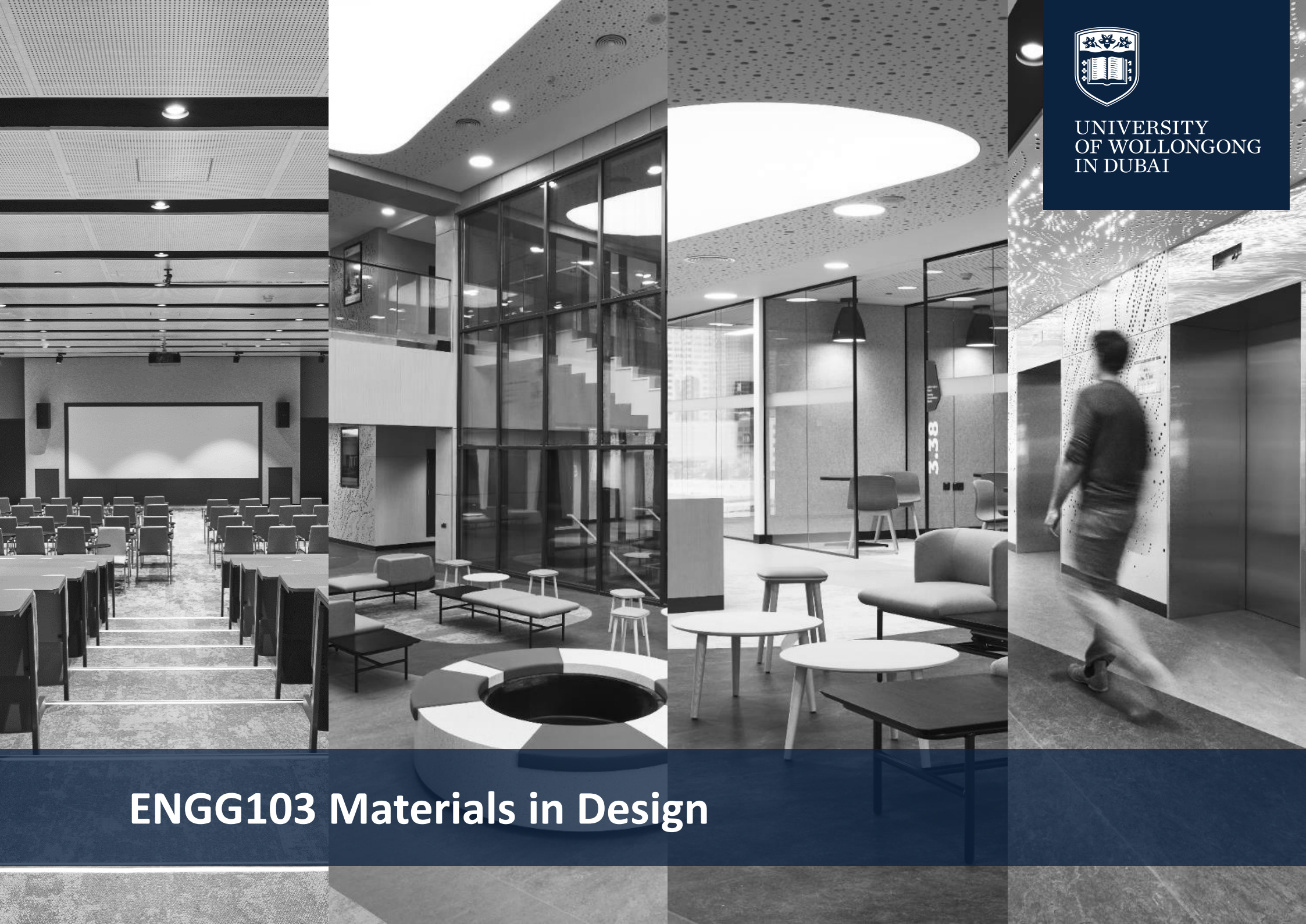
- All tutorial sheets and lab handouts will be uploaded to Moodle prior to the class.
- Ideally, you would have attempted a significant portion of the exercises before entering tutorials.
- **Be prepared** for tutorials/workshops/practicals.
- Make sure you make use of your time by asking questions!
- Be very careful when reading instructions.



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