

Course Outline – Spring 2025

Department of Mechanical Engineering

MECH290 Project 1 (PBL)

MECH02

Diploma of Engineering Technical- (Mechanical)

- Prerequisites: MECH250, CIVL210
- Co-Requisites: NA
- Credit Hours: 3
- Course Coordinator: Eng. Omar Al Rifai
- Instructors' Names: Eng. Omar Al Rifai
- Instructors' Office Hours:

Name	Eng. Omar Al Rifai
Office hours	Sun& Thu: 11:00am – 12:30pm
Location	B4/SF/10
Email	o.alrifai@au.edu.kw

- Classroom Location and timings¹: As per Edugate (On-Campus)

This course is part of the abovementioned program, which is accredited by Engineers Australia.

Catalog Description:

This is a project-based learning (PBL) course during which the students work in groups under the supervision of one or more academic staff to Conceive, Design, Implement and Operate (CDIO) a solution to an engineering problem. This course allows students to exercise daily engineering ethics and work practices such as professional documentation, meetings, communication styles, etc. The students are required to present their final solution in the form of technical report, presentation and a functional prototype.

Course Objectives and Student Learning Outcomes

On successful completion of this course, students will be able to be:

1. Recall required engineering and sustainability principles to solve well-defined real-world engineering project
2. Analyze well-defined project specifications for efficient technical and financial breakdown of the project (analysis)
3. Design and develop a solution that is compliant with the required standards and practices
4. Iteratively evaluate and optimize solutions to improve efficiency and compliance through reflection.

¹ Classroom timings and location are tentative, please refer to ATS for the up to date information.

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5. Practice project management, oral and written communication and teamwork skills effectively.

Engineers Australia Stage 1 Competencies

Achieving the student learning outcomes of this course partially fulfills the following EA Stage 1 Competencies for engineering associate.

Knowledge and Skills	1.1 Descriptive, formula-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the practice area.
	1.2 Procedural-level understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the practice area.
	1.3 In-depth practical knowledge and skills within specialist sub-disciplines of the practice area.
	1.4 Discernment of engineering developments within the practice area.
	1.5 Knowledge of engineering design practice and contextual factors impacting the practice area.
	1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the area of practice.
Engineering Application Ability	2.1 Application of established technical and practical methods to the solution of well-defined engineering problems.
	2.2 Application of technical and practical techniques, tools and resources to well-defined engineering problems.
	2.3 Application of systematic synthesis and design processes to well-defined engineering problems.
	2.4 Application of systematic project management processes.
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.
	3.2 Effective oral and written communication in professional and lay domains.
	3.3 Creative, innovative and pro-active demeanour.
	3.4 Professional use and management of information.

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	3.5 Orderly management of self, and professional conduct.
	3.6 Effective team membership and team leadership.

Course Content

Below are the topics that will be covered during this course²². Please note that topics are tentative to change.

Week	Topic	Resource required	Student Learning Outcome/ Performance Criteria
1	Introduction to the course outline, Creating groups and Introduction to project definition	Course outline Project Description Lecture 1	1 2, 3, 4, 5
2	Decision Matrix, Project Planning, and Gantt Chart	Lecture 2	1, 2, 3
3	Risk assessment	Lecture 4	1, 2, 5
4	WBS, Meeting Minutes		1, 2, 5
5	Assessment-1 (20 Feb.) project design		1, 2, 3, 4
6,7&8	Working on the project implementation		2, 3, 4, 5
Midterm (Week9)			
10	Assessment-2 (23 Mar.) Project Implementation & Testing		2, 3, 4, 5
11	Project Implementation		1, 2, 3, 4, 5
12	Meeting with teams, Presentation skills		1, 2, 3, 4, 5
13	Project final testing Assessment-3 (17 Apr.) Submission of final report/portfolio		
14,15 &16	Presentation practice and techniques Assessment-5 (24 Apr.) Viva-Voca		1, 2, 3, 4, 5

Methods of Delivery

Students are expected to attend designated live lectures on campus according to the attendance policy

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Any updates about the method of delivery will be communicated with the students via the official communication platforms.

All communications between the instructors and the students are done through emails and the instructors reserve the right to setup a meeting through MS Team if deemed necessary.

Extent and Nature of Use of Technology

All the lectures' slides, lab manual and other learning material for this course are available online on the COURSE CODE webpage on EduLearn. Students are required to visit this page regularly to check for any update.

Course related announcements are sent by email. Students are required to check their email daily.

Textbook/s

For this course, No textbook is required.

Additional Supplemental Materials

Since this unit is based on a PBL approach, it is the responsibility of the students to identify, source and access additional supplemental materials as necessitated by the given projects.

In addition, there will be direct entries from the unit coordinator into EduLearn specifying the required tasks to be done on each week. These will be checked and evaluated by the instructor during the next class.

Attendance

The student is required to attend designated session on campus. A student who fails to do so will be marked as absent from that class.

The student who misses more than 2 lab sessions will be awarded a ZERO mark on the overall lab grade (i.e. 0 out of 20%).

Please refer to the AU Student Attendance Policy and Procedure on the [EduGate](#).

Submission of Work

All assigned lab reports are to be presented and submitted in a professional manner on the nominated due dates. No late submission will be accepted.

Please refer to the AU Code of Academic Integrity on the [EduGate Portal](#).

Formal assessment in this course is done by submission of a midterm portfolio and a final portfolio which contains all of the individual student's work and teamwork. A portfolio is used to allow

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individuals to choose the method that best suits them to demonstrate how the learning outcomes have been met and to what level.

The compulsory items (pieces of work) to be included in the Midterm Portfolio (weight: 20%) should be covering the first three learning outcomes only (each task will be marked out of 10) are:

1. Decision matrix and group management tools Risk Assessment (for design, implementation, and operation) with Work Breakdown Structure (WBS) and Gantt Chart, word- processed document hard copy. The last two items are only for production phase (L.O. 1)
2. Individual design idea with explanation of parameters/criteria used in decision matrix, word- processed document, along with individual drawing folder (CAD drawings with dimensions in mm and minimum size of A3) with assembly instructions which must also include a rough 3-D CAD view of the individual design. (L.O. 2 and L.O.3)

A signed hardcopy of the Assessment Tool and Marking Guide must be also submitted.

For the midterm submission, risk assessment is related to the product regarding design, production and operation (a minimum of 3 hazards is needed for each phase).

The compulsory items (pieces of work) to be included in the Final Portfolio (**weight: 80%**) are:

1. Individual portfolio that include: Reflective Report (word processed), and Individual Self and peer assessment (L.O. 4, 9)
2. Group Technical Report (word processed) + Group project evaluation (project implementation) (L.O. 5, 6, 7)
3. Group and individual Presentation, viva voce (L.O. 8)

A signed hardcopy of the Assessment Tool and Marking Guide must be also submitted.

- The **Individual Reflective Report (IRR)** is a word- processed document that should include reflections on issues arising from the course content, project work, as well as reflection on what the student has set out to learn, how he/she approached their learning, what they have achieved and what they do differently in future to improve their learning.
- The **Self and Peer Assessment (SPA)** is a review of contributions made by each team member that the student has worked with during the term. This, along with observations made by the learning facilitators, during the course and during the viva voce, will be used to substantiate individual students' claims made in the portfolio and used in the determination of students' grades. SPA is required for final portfolio submission only. The student should provide a mark out of 100 for her/him, as well as for each team member.
- The **Assessment Tool and Marking Guide Form** will be available on the system. It just needs to be printed out, filled and submitted by the student as a part of the portfolio.
- The **Project Evaluation** will be based on the implementation phase and the final project testing.

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- The **Group Technical Report (TR)** is a learning tool and is required to be submitted by the group as a part of the portfolio. It contains all details about the individual designs with relevant calculations and the supporting analysis to validate the design.

The TR should include: (This is just an example):

- Cover sheet followed by “Code of Ethics” signed by all team members
- Abstract followed by “Table of Contents” and “List of Figures/Tables”.
- Project definition and theory
- Decision matrix to choose the final design with a minimum of 5 items.
- Final group design with 2D and 3D details about all components and assembling instructions.
- Design calculation
- Project management items (WBS, MS Project, and Responsibility Matrix)
- Risk Assessment, Stakeholder Analysis, Cost Analysis
- Conclusion
- References according to Harvard Referencing Style
- Appendix with possible supplementary material (Standards and codes, meeting agendas and meeting minutes etc...)

The final portfolio & prototype project evaluation will be followed up with a compulsory Group Presentation (15-20 minutes), and a Group Viva Voce (oral interview) that will be used to confirm and enhance the material presented in the portfolio.

The portfolio must be the student’s own work and the performance in the group VivaVoce will have an impact on the grade. In addition, students must follow instructions that will be imposed by the unit coordinator on EduLearn during the semester.

Assessment Plan

#	Assessment Title	Method of Assessment	Learning Outcomes Covered	Week	Weight
1	Midterm Portfolio	Report	1-3	5	20%
2	Project Evaluation	Project Implementation/Testing	1-8	11	20%
3	Final Portfolio	Reports	1-8	12	25%
4	Attendance: Team meeting minutes and agenda	Class Attendance & Participation	1-8	12	10%

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5	Presentation	On Campus	1-8	13	25%
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Students must refer to the AU Student Assessment Policy on the [EduGate Portal](#) with regard to assessments and re-assessment.

Grading Scale

Please refer to the AU Grading Policy on the [EduGate Portal](#).

General Guidelines.

- During the implantation phase, make sure you have all required PPE.
- Return all material provided to you to their proper places and keep the workshop area clean and tidy.