

AU Course Outline

Electrical and Electronics Engineering Department

ELEC290 – Project 1 (PBL)

ELEC02

Diploma of Electrical and Electronics Engineering

- Prerequisites: ELEC220 & ELEC230
- Co-Requisites: NA
- Credit Hours: 3
- Contact Hours: 3
- Course Coordinator: Mr. Mohamad Zaki
- Instructor's Name: Mr. Mohamad Zaki
- Instructor's Office Hours: Monday from 5:30 PM to 6:30 PM & Thursday from 12:00 PM to 02:00 PM
- Instructor's Office Location: Building 2, Second Floor, Room S24
- Instructor's telephone extension: 4290
- Instructor's email address: m.zaki@au.edu.kw
- Classroom Location and timings¹: Refer to the schedule on EduGate

This course is part of the mentioned above 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

Upon completion of this course, students should be able to:

- ✓ **LO1:** Recall required engineering and sustainability principles to solve well-defined real-world engineering project.
- ✓ **LO2:** Analyze well-defined project specifications for efficient technical and financial breakdown of the project.
- ✓ **LO3:** Design and develop a solution that is compliant with the required standards and practices.

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

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- ✓ **LO4:** Iteratively evaluate and optimize solutions to improve efficiency and compliance through reflection.
- ✓ **LO5:** 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.

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	3.4 Professional use and management of information.
	3.5 Orderly management of self, and professional conduct.
	3.6 Effective team membership and team leadership.

Delivery Plan

Below are the topics that will be covered during this course². Please note that topics are tentative to change.

Week	Topic	Learning Outcome/ Performance Criteria
1-2	- Introducing the PBL concept. - Projects Brief. - Teams Formation. - MS Teams group creation. - Starting team collaboration. - Introducing the project planning concepts. - Transforming problem descriptions into design specifications. - Partitioning design specifications into design tasks. - Similar projects review.	LO1-3, 5
3-4	- Building a literature review - Identifying reliable resources - Developing individual and teamwork skills. - Developing the project plan. - Selecting project design and components compliant with the required standards and practices. - Introduce sustainability concepts. - Short, less formal presentations	LO1-5
5	- Developing individual and teamwork skills. - Starting the implementation of each design task and integration. - Final review of the project plan. - Prepare for first submission. - Finalize the technical search and the selection of components.	LO3-5

² For the Summer Sessions, number of lectures per week is doubled and number of weeks is halved.

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6	- Developing individual and teamwork skills. - Follow up on the implementation of each design task and integration. - Finalize the project plan. - Prepare for work submission. - Prepare for the first presentation. - Finalize the technical thorough search for your components.	LO4-5
7	- Developing individual and teamwork skills. - Introducing the financial aspect of engineering projects. - Start prototype implementation. - Review project progress.	LO1-5
8-9	- Developing individual and teamwork skills. - Prototype implementation progression. - Building a basic financial plan (TCO). - Evaluation of the project implementation and reflect on how to improve efficiency and match sustainability concepts in the project design. - Start prototype programming.	LO1-5
10	- Developing individual and teamwork skills. - Finalizing the financial documentation. (TCO) - Documentation of the work in the final project report. - Prototype/Simulation troubleshooting and testing. - Suggest areas of improvement for each group based on previous reflections.	LO1-5
11-12	- Developing individual and teamwork skills. - Finalizing the draft of the final project report. - Prototype/Simulation troubleshooting and testing. - Cross-group evaluation and feedback submission. - Providing professional comments about other groups' work. - Suggest areas of improvement for each group.	LO1-5
13	- Developing individual and teamwork skills. - Self and peers evaluation. -Final Submission.	LO4-5
14	Final presentation	LO1-5

Methods of Delivery

This course will be delivered through a face-to-face delivery method as a Project Based Learning (PBL) course which is briefly described as follows:

- ✓ A project is provided to the students at the early beginning of the semester.

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- ✓ Students will be divided into groups. Group members are supposed to work together during the semester to come up with a solution(s) for the project.
- ✓ Students are expected to carry out teamwork during the scheduled class sessions. During class sessions, students will receive feedback (formative assessment) on their project work and progress.
- ✓ Students are majorly and solely responsible of solving the problems that may arise during the preparation of their projects. They should be self-dependent and try to find out the cause of these problems as well as solutions.
- ✓ Students may consult people from the industry, software engineer experts, or any other party that might help to achieve their goal upon the approval of the facilitator. They may also use the web to find resources that can help in answering their questions. All meeting agendas and meeting minutes with experts must be documented as evidence. However, work carried out by practitioners will not be accepted and will lead to a zero mark on the assessment(s) in question.
- ✓ In all cases, the students must build the project with their own hands since their knowledge and understanding of all LOs covered by the project will be assessed (as per the detailed assessment plan provided later in this document).
- ✓ Students should not consult their facilitator before trying to personally solve any project related issue. The instructor of a PBL is a facilitator who guides all groups to achieve their goal and not as a direct expert consultant.
- ✓ Students are requested to record their meetings and are also requested to reflect on their learning continuously. Meeting details should be kept as a record of activity in every MS Teams group.
- ✓ Every student's work should be documented in the MS Teams group. No other communication platform will be considered in the grading process.
- ✓ The students are also required to submit deliverables online as specified by their facilitator and are required to stick to the corresponding defined deadlines. All deliverables are submitted via the course homepage on EduLearn unless announced otherwise by the facilitator.

Extent and Nature of Use of Technology

The students would be required to use computer and communication systems in order to facilitate the achievement of their projects such as search engines, databases, e-libraries, word processors, presentation software, etc.

The students are recommended to use MS Project for their project plan. Internet resources such as AI tools, search engines, expert chat rooms, Arduino, and Raspberry Pi help resources in order to fulfill all course requirements if necessary.

Course-related announcements are also sent by email to the students or announced on EduLearn. The students are required to check the course home page and their email daily throughout the week.

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Textbook/s

For this course, some handouts will be uploaded to the students on the course's page on EduLearn. However, as a PBL course, the students are required to go beyond this material. For instance, the following textbook would be very useful:

“Designing the Internet of Things”, 1st Edition, by Adrian McEwen and Hakim Cassimally, ISBN 978-1118430620.

“Arduino for Beginners: Essential Skills Every Maker Needs”, by John Baichtal, ISBN 978-0134785173.

“Project-Based Learning: Differentiating Instruction for the 21st Century”, 2nd Edition, by William N. Bender, ISBN 978-1412997904.

“The Project Management Toolkit: Tools and Techniques for the Practicing Project Manager”, 3rd Edition, by Trish Melton, ISBN 978-1856178131.

Attendance

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

As per the AU Student Code of Conduct Policy, students should not engage in conduct that disrupts class. Late students are required to enter class quietly. The use of cell phones or other electronic devices for voice or text communication is not allowed. Failing to do so is considered as a violation of the AU student code of conduct and may lead to disciplinary actions.

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

Submission of Work

All students' submissions must be free of plagiarism. AU has zero tolerance for Academic Dishonesty and is committed to dealing with all incidents promptly, effectively and with the principles of procedural fairness. Please refer to the AU Code of Academic Integrity on the [AU Portal](#).

Group work submissions must be performed individually by a selected member. Individual work submission must be done by every student unless otherwise mentioned by the facilitator. Late penalties detailed in the following paragraphs apply on an individual basis for individual reports and on a group basis for group submission.

Assessment 1 & 2 Submission:

This submission is performed online on EduLearn unless mentioned otherwise (softcopy) and requires the submission of the following:

1. Project plan. (Assessment 1)
2. Progress reports (Assessment 1) (On Teams)

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3. Self and peers' assessment. (Assessment 1) (Filled by computer)

The submission deadline is **Thursday 20th of February 2025 at 12:00 pm (noon)**.

2.5% out of the first evaluation will be deducted for every day of late submission as detailed below:

- Thursday afternoon (i.e. 12:01 PM) till Friday noon (12:00 PM): -2.5 out of 15%.
- Thursday afternoon (i.e. 12:01 PM) till Saturday noon (12:00 PM): -5 out of 15%.
- Thursday afternoon (i.e. 12:01 PM) till Sunday noon (12:00 PM): -7.5 out of 15%

Assessment 3 & 4 Submission:

Includes:

1. Prototype/Simulation. (Assessment 4)
2. TCO. (Assessment 4)
3. Self and Peer assessment. (Assessment 3)
4. Progress Reports. (Assessment 3)
5. Final Report. (Assessment 4)

The submission deadline is **Thursday, 24th of April 2025 at 12 pm (noon)**.

This submission is performed **online** via the appropriate links on the course home page on EduLearn and requires the submission of the following:

- ✓ The Final Report in a Word document format.
- ✓ TCO in a Word document format and the table in Excel sheet format.
- ✓ Self and Peer assessment in Excel sheet format.
- ✓ Presentation in a PowerPoint format. (On the Viva-Voce day)
- ✓ Prototype/Simulation. (On the Viva-Voce day)

4% out of 30% dedicated to the final Portfolio evaluation will be deducted for every day of late submission as detailed below:

- Thursday afternoon (i.e. 12:01 PM) till Friday noon (12:00 PM): -4 out of 30%.
- Thursday afternoon (i.e. 12:01 PM) till Saturday noon (12:00 PM): -8 out of 30%.
- Thursday afternoon (i.e. 12:01 PM) till Sunday noon (12:00 PM): -12 out of 30%

In case the student was partially late in submission the 4% will be deducted only from the missing activity until it becomes 0 then the student will have no right to submit it.

Assessment Plan

The evaluation of the student's work and defining the student's final grade depends on the level of achievement of each of the summative assessments listed in the table below that will together cover all the course's learning outcomes (LO1-9).

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In addition to the summative assessments, the student's work is evaluated during the semester through formative assessments (i.e. feedback), based on the student's project work documented in the submitted deliverables.

Assessment No. and title	Individual (I) / Group Work (G)	Learning Outcomes Covered	Week	Weight
Assessment 1: Deliverables	I / G	LO1-5	1-6	15%
Assessment 2: Presentation	I / G	LO1-5	6-8	15%
Assessment 3: Comprehensive Evaluation	I / G	LO1-5	7-14	30%
Assessment 4: Portfolio	I / G	LO1-5	12	30%
Assessment 5: Attendance & Participation	I	LO1-5	1-14	10%

The grades of the deliverables will be divided as follows:

Assessment 1 – Deliverables:	Project Plan 10% Progress Performance 5%
Assessment 2 – Presentation:	First Presentation 10% Progress Performance 5%
Assessment 3 – Comprehensive Evaluation:	Technical Evaluation 9% Second Presentation 15% Progress Performance 6%
Assessment 4 – Portfolio:	Prototype/Simulation 14% TCO 8% Final Report 8%
Assessment 5 – Attendance:	Attendance and Participation 10%

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Assessment Components Definition

1. **Progress Performance (Assessment 1, 2 & 3):** Weekly progress captured during group Teams meetings which assess the leadership skills and group communication skills:
 - a. A summary of the week's activities.
 - b. Accomplished tasks during the week.
 - c. Leader reflections on the week's performance (What went wrong? and what can be enhanced during his/her next leadership period?)
 - d. The contribution of group members.
 - e. Strength and weak points of the group and its members.
 - f. A difficulty you are facing and suggestions to overcome it.
 - g. The forecast for next week's tasks.

You need to support your reflections with strong referred evidences. This evidence must be present in your meetings and could be part of other portfolio items (e.g. a photo, program, table in your project report, etc.).

- a. **Self and Peers Assessment:** The peer assessment should consist of the contributions made by each team member the student has worked with on the projects during the term. This, along with observations made by the academic supervisor will be used to substantiate individual students' claims made in the portfolio and used in the determination of individual student grades. The assessment is to be based on a scoring model the group has to develop and agree on.
2. **Project Final Report (Assessment 4):** It is your project's final report (thesis). Each group is responsible for generating a unified final report. However, all team members need to participate in the formation of this report and all the team members are responsible for all the content of the report. The final report reflects your own achievements within the project. The more your final report is organized, the better the impression taken by the reader about your work. The final report is limited to 6,000 words and not less than 4,000 words (using Times New roman as font type and 12 points as font size). The Final Report must contain (but not be limited to) the following:
 - a. A cover page including a title for the report, name and student ID of all group members of the team, department's name, AU logo, facilitator name, supervisor name, date of preparation, etc.
 - b. A table of contents.
 - c. A table of figures.
 - d. Introduction: explaining the aim of the project, what was expected to be done, and what was really done by the end of the project.
 - e. A state-of-the-art chapter from your literature review.
 - f. Your own work and outcomes.
 - g. An introductory reflection on sustainability concepts.

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- h. A conclusion of no more than one page.
- i. A reference list that follows Harvard referencing style.

The report is word processed and is to be submitted through EduLearn as part of **Final Portfolio Submission** in order to allow “Turn-it-in” plagiarism check. A similarity index of **20% or above** will lead to penalties according to the AU Code of Academic Integrity on the [AU Portal](#).

3. **Project Plan (Assessment 1):** It’s the complete plan for the project including the timeline. Students are requested to search and learn how to create and build a project plan and they must implement it for their project’s phases.
The report is word processed and is to be submitted through EduLearn as part of **Project Plan Submission** in order to allow “Turn-it-in” plagiarism check. A similarity index of **20% or above** will lead to penalties according to the AU Code of Academic Integrity on the [AU Portal](#).
4. **Total Cost of Ownership (TCO) calculations (Assessment 4):** It’s the financial calculations that is done over a certain time span for the projects. Students must read and search for how to create the TCO and then they have to use the template given to finalize the TCO calculations over 5 years.
5. **Prototype/Simulation (Assessment 4):** The prototype is the programmed hardware (components) that represents the solution provided by each group to tackle all project requirements mentioned in the project proposal. While the Simulation is the software representation for the project design provided by each group to tackle all project requirements mentioned in the project proposal.
6. **Technical Evaluation (Assessment 3): Is split into two parts;**
 - a) **Technical evaluation for components:** Student must know all the technical information related to each component used in the project which can be but is not limited to Frequency, Modulation, Encryption, Speed ...etc
 - b) **Technical evaluation for the project:** Students must verify the selection of components for this prototype/simulation, the design, and documentation.
7. **Presentation (Assessment 2 & 3):** Each group is required to present and showcase all the work completed in the project so far. This may include, but is not limited to, the project idea, components, design, planning, financial study, and more. The presentation is an opportunity for every student to highlight their individual contributions and efforts throughout the course. Groups will present their project work and defend it during a scheduled session. The

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presentation schedule will be shared with students via the course homepage on EduLearn or through email.

The presentation will take place on campus, and students are expected to adhere to a formal dress code.

Students must refer to the AU Student Assessment Policy on the [AU Portal](#) with regards to assessments and re-assessment.

Grading Scale

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