COURSE DESCRIPTIONS

Faculty	**College of Engineering**				
Department	**Department of Renewable Engineering**			**NQF level**	7
Course Title	**Senior Design Project 2**	**Code**	703593	**Prerequisite**	Pass 90 credit hours
Credit Hours	3	**Theory**	0	**Practical**	3
Course Leader	Dr. Amer Al-Canaan	**email**	a.alcanaan@jadara.edu.jo		
Lecturers	Dr. Amer Al-Canaan	**emails**	a.**alcanaan**@jadara.edu.jo		
Lecture time	[21:00_19:30] Wed, Sat	**Classroom**		**Attendance**	Fulltime
Semester	Summer (2023-2024)	**Production**	2019	**Updated**	2023
Type of Teaching	☐ Face to Face	■ Blended	☐ Online		

Short Description

This course is the complement to the senior design project 1 and aims at applying knowledge and skills grasped by the student to accomplish the proposed design project, which solves a specific problem in the field of renewable energy engineering. The project is implemented by a groups of students according to specific design rules, user requirements and other constraints such as budget and timeline limit.

The student may conducts teamwork under the supervision of a faculty member and learns how to cooperate within a team to accomplish the prototype of the senior design project.

The students may work in multidisciplinary teams to conduct research in a systematic way, gather relevant information to their project, carry out literature review, solve and analyse data for possible results and complete a sizable engineering design that is fully documented and prototyped.

At the end of this course, the students will be expected to defend their project findings in front of a panel of assessors including their supervisor.

Course Objectives

1- Learn how to prepare the team contract, exhibit professional responsibility, work in groups, conduct meetings, and complete group and individual tasks
2- Learn how to select and apply appropriate engineering theory to engineering design problems and their solutions
3- Understand the literature review process to collect, gather and assimilate relevant technical information
4- Learn how to prepare and submit a capstone design project proposal
5- Understand the theory and process of design concept development
6- Understand the Pugh methodology and learn about its application to design concept selection.
7- Learn how to prepare an interim project report following a required standard format.
8- Conduct and evaluate preliminary designs and analyse alternatives.
9- Write a project plan including a schedule with major milestones, a budget, a validation test plan, and a list of critical aspects.
10- Discuss the elements of good teaming, such as resolving conflict, conducting self-evaluation, providing leadership and professional responsibilities.
11- Discuss methods for learning a new technology and recognize social impacts of technology &

engineering and propose solutions based on some criteria and requirements.
12- Prepare a written report referencing external sources concerning global, societal, and environmental impact of a specific engineering implementation.
13- Communicate the findings through an effective oral presentation.

Course Intended Learning Outcomes (CILOs)
A. Knowledge - Theoretical Understanding
a1. Write an interim project report; implement any modifications to literature review or any other sections of the report based on advisor feedback for improvement. (**C3**) **a2. Develop** the mathematical model of the selected solution to fulfil design specifications. (**K2**)
B. Knowledge - Practical Application
a3.
C. Skills - Generic Problem Solving and Analytical Skills
b1. Develop, validate the simulation model and evaluate the manufacturability of the selected solution to fulfil the design specifications. (**S1**)
D. Skills - Communication, ICT, and Numeracy
b2. Collaborate actively in group work and **conduct** oral presentation, prepare poster, answer questions and discuss with audience. (**S3**) b3.
E. Competence: Autonomy, Responsibility, and Context
c1. Perform detailed analysis of the final design fulfilling environmental, sustainability and societal constraints. (**C1**)
Teaching and Learning Methods
☐ Face to Face Lectures ■ Brain Storming ■ Synchronous remote ☐ Asynchronous remote ☐ Using Video ■ Discussions ☐ Research Project ☐ Case Study ☐ Field visit ■ Problem solving
Assessment Methods
☐ Formative Assessment ☐ Quiz ☐ Lab Exam ☐ Homework ■ Project Assessment ■ Oral Presentation ■ Midterm ■ Final Exam

Course Contents

Week	Hours	CILOs	Topics	Teaching & Learning Methods	Assessment Methods
1.	3	a1	Submit modified interim project report	Discussions	
2.	3	a1	Evaluation and approval of project report based on feedback from project 1	Project assessment	Project assessment
3.	3	a1, a2, b1	Develop mathematical model • Apply appropriate theory • Select appropriate engineering parameters. • Calculate required engineering parameters	Discussions, brain storming, problem solving	
4.	3	a1, a2, b1, b2	Evaluation of mathematical model (advisor)	Project assessment, discussions	Project assessment

5.	3	a1	Develop simulation model • Assembly and connection • Circuit/Component level analysis • System level analysis. • Input/output data	Discussions, brain storming, synchronous remote	
6.	3	a1, a2, b1, b2	Evaluation of simulation model (advisor)	Project assessment, discussions	Project assessment
7.	3	a1, a2, b1, b2	Project manufacturability • Evaluate Project manufacturability • Ensure all raw materials are procurable • Confirm the availability of facilities/equipment/labour • Confirm availability of technical information and supervision personnel. • Budget allocation	Discussions, brain storming, problem solving	
8.	3	b1, b2, c1	Evaluation of project manufacturability (advisor)	Project assessment, discussions	Project assessment, oral presentation
9.	3	a1, b1, b2, c1	Final Design/Prototype development and manufacturing • Assembly of Prototype • Routing and Placement Optimization • Thermal and Electrical Factors • Use of Manufacturing Equipment. • Inspection of Prototype	Discussions, brain storming, problem solving	
10.	3	b1, b2, c1	Evaluation of prototyping	Project assessment, discussions	Project assessment
11.	3	a1, b1, b2, c1	Detailed analysis I • Functionality Analysis • Failure Analysis • Health and Safety Analysis. • Economic Constraints	Discussions, brain storming, problem solving	
12.	3	a1, b1, b2, c1	Evaluation of detailed analysis I (advisor)	Project assessment, discussions	Project assessment, oral

					presentation
13.	3	a1, b1, b2, c1	Detailed analysis II • Environmental Constraints • Societal Constraints. • Sustainability Constraints	Discussions, brain storming, synchronous remote	
14.	3	a1, b1, b2, c1	Evaluation of detailed analysis II (advisor)	Project assessment, discussions, oral presentation	Project assessment
15.	3	a1, b1, b2, c1	Final report submission and evaluation (advisor + examiner)	Project assessment, discussions, oral presentation	
16.	3	a1, a2, b1, b2, c1	Evaluation of Poster and Oral presentations +Viva (advisor examiner)	Discussions, brain storming, synchronous remote	Project assessment, oral presentation

Infrastructure	
Textbook	1. Senior Design Projects in Mechanical Engineering, A Guide Book for Teaching and Learning, MA YONGSHENG; RONG YIMING, ISBN: 9783030853891
References	1. S. Pokras, *Systematic problem-solving and decision making,* Kogan page ltd, London, UK, 1990
Required reading	
Electronic materials	**PDF, Word templates**
Other	

Course Assessment Plan							
Assessment Method		**Grade**	**CILOs**				
			a1	**a2**	**b1**	**b2**	**c1**
First (Midterm)		**30**	12	6	7	15	
Final Exam		**50**	6	3	3	25	3
Coursework		**20**					
Coursework assessment methods	Assignments						
	Case study						
	Discussion and interaction						
	Group work activities		18		2		
	Lab tests and assignments						
	Presentations						
	Quizzes						

Total	**100**	36	9	12	40	3

Plagiarism

Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).

Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.