Philadelphia University

Faculty of Engineering
Mechanical Engineering Departments
Second Semester 2020/2021

Course Title:	**Reverse Engineering** (0620437)
Prerequisite:	Engineering Skills
Class Time	Section1: (9:45-11:15am)
Credit Hours:	Three credit hours (16 weeks per semester, approximately 45 contact hours)
Textbook:	Product Design: Techniques in Reverse Engineering and New Product Development by Otto and Wood. PE 2011
References	1. Reverse Engineering: Mechanisms, Structures, Systems & Materials by Robert Messler 2013 2. Reverse Engineering by R. Hinrichs 2015 3. Reverse Engineering: An Industrial Perspective by Raja and Fernandes. 2008 4. Reversing: Recent Advances and Applications Edited by A. Teila 2012
Description:	Dimensional analysis ,Customer Specifications, Design vs. Re-Design, Reverse Engineering Methodology ,Assembly vs. Disassembly, Data Collection ,Input-Output Measurements, System Identification ,Product Architecture ,System Modeling & Simulation , Rapid prototyping Functional Models, Design of Experiments, Creativity Techniques, Financial analysis, and Introduction to Fusion 360 software. ***Prerequisite: Engineering Measurements 620344***
Website:	http://www.philadelphia.edu.jo/academics/aateyat/page.php?id=36

Instructor:	**Ahmed Ateyat, MSc**
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ABET Student Outcomes (SOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Course Learning Outcomes with reference to ABET Student Outcomes

Upon successful completion of this course, student should be able to:

1.	Understand the Reverse Engineering (RE) Methodology	[1, 7]
2.	Compare forward design with re-engineering	[1, 7]
3.	Analyze product functions and Evaluate their performance	[2, 6]
4.	Disassemble products and specify interactions among subsystems and their functionality	[1, 6, 7]
5.	Understand Computer-Aided RE and Rapid Prototyping Technology	[1, 6, 7]
6.	Know the latest technologies used in RE for PCBs	[2,7]
7.	Understand RE applications in software engineering	[6, 7]
8.	Understand professional and ethical responsibilities regarding RE	[4]
9.	Apply RE methodologies in a multi-disciplinary within a team environment	[3, 5]
10.	Write technical report and present results to the class	[3, 5]

Course Academic Calendar		
Week	**Subject**	**Notes**
1	Introduction	
2	Forward Engineering Design: Design thought and process, designsteps	
3	Forward Engineering Design: examples	
4	System RE: RE methodology, RE steps	Prescreening
5	System RE: product development, product functions	
6	System RE: Product teardown, engineering specs, product architecture	Observation
7	Case Studies; Group Discussions	
Mid-Term Exam		
8	Mechanical RE: Computer aided RE	
9	Mechanical RE: rapid prototyping	Dissection
10	Mechanical RE: Mechanical Design Process , Product Discovery, Specifications.	
11	Electronic RE: Fundamentals	Analysis
12	Electronic RE: PCB RE	
13	Software RE Source code, re-drawing charts, applications	Report Due
14	Student Project Presentations	
15-16	Review	
Final Exam		

Teaching methodology: Online, Blended or both

Electronic platform: Microsoft-teams

Evaluation methods:

Evaluation of the student performance during the semester will be based on the following:

Mid Exam: The students will be subjected to a scheduled written exam, during the semester. The exam will cover materials given in lectures in about the previous 8 weeks.

Project: A project assignment will be handed to the students. The assignment will ask the students to reverse engineer a particular product. Students will be asked to write a technical report, show their work in the lab, and present it. A group of two students are expected to work on the project. Students will be asked to download the student version of Fusion 360 software and use it as part of the design /re-design application. A 3D printing techniques will be used as will.

Final Exam: The final exam will cover all the class material.

Quizzes: 10-minute quizzes will be given to the students throughout the semester.

Grading Policy:

Mid-Term Exam	30%
Project & Quizzes	30%
Final Exam	40%
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Total:	100%

Attendance Regulation:

The semester has in total 45 credit hours. Total absence hours from classes and tutorials must not exceed 15% of the total credit hours. Exceeding this limit without a medical or emergency excuse approved by the deanship will prohibit the student from attending the final exam and a zero mark will be recorded for the course. If the excuse is approved by the deanship the student will be considered withdrawn from the course.