Philadelphia University

Faculty of Engineering and Technology
Mechatronics Engineering Department
First Semester 2019/2020

Course Details:

Title:	Power Electronics and Drives (0640312), Third Year.
Prerequisite:	Electronics for Mech. And Elec.Mach.
Credit Hours:	3-credit hours (16 weeks per semester, approximately 45 contact hours).
Class Time:	9:10 – 10.00 Sun, Tues, Thur.
Text Book:	Power Electronics, Circuits, Devices, and applications. M. H. Rashid, Prentice Hall, 4th Edition, 2014.
References:	1- Power Electronics, By: Mohan, John wiley, Last Version. 2- Power Electronics, By: B.K.Bose, Prentice Hal, Last Version.
Description:	The course produces the important part of hardware circuit fundamentals that are required for mechatronics engineering applications. The course will offer knowledge on power semiconductors that are used as electronic switches in power electronic system. Converters, protection and drive circuits are also discussed.
Website:	http://www.philadelphia.edu.jo/academics/jghaeb/
Instructor:	Dr. Jasim Ghaeb, Associate Professor. Email: jghaeb@philadelphia.edu.jo Office: Mechatronic building, Room 6407, ext: 2590. Office hours: Sun, Tues, Thurs: 10:10-11:00, Mon, Wed: 10:00 -11:00.

Course Outlines:

Week	Basic and support material to be covered	Assignments
(1)	Introduction, Power electronic system, applications, power processors, power converter classification.	
(3)	Power semiconductor devices.	
(2)	Thyristor, thyristor characteristics and operation, Turn-on and Turn off.	
(4)	Thyristor trigger angle. Thyristor firing circuit applications.	
(5)	Commutation circuits, Forced commutation circuit, Line Commutation circuit.	
(6)	Gate-turn-on thyristor, GTO on and off, Power MOSFETS, Snubber circuits.	Assignment No.1

(7)	Single-phase rectifiers, Uncontrolled diode half-wave rectifiers, Application circuits.	
(8)	Single-phase full-wave rectifiers, Diode full-wave rectifiers, Application circuits.	
(9)	Controlled rectifier. Full-wave controlled rectifier.	Assignment No.2
(10)	Resistive loads of rectifiers, Inductive loads of rectifiers.	
(11)	Three-phase rectifiers, Three-phase half-wave diode rectifiers, Three-phase half-wave controlled rectifiers.	
(12)	Three-phase full-wave diode rectifiers, Three-phase full-wave controlled rectifiers.	
(13)	DC-AC conversion, Inverters, Half- bridge inverter, Inductive load.	Assignment No.3
(14)	Voltage control, Pulse-width modulated inverter, Harmonics.	
(15)	DC-DC converters, Operation of step-down converter and step-up converter, converter classification.	
(16)	Simulating of power electronic circuits with Simulink-MATLAB.	Assignment No.4

Course Learning Outcomes with reference to ABET Student Outcomes:

Upon successful completion of this course, student should:

1.	Understand the fundamentals of semiconductor switches and power electronic system.	[1]
2.	Study the applications of electric power convertor and drives.	[1]
3.	Cary out different circuit design for converters, drives and protection.	[2, 6]
4.	Practice design and response of different converters applying Matrix Laboratory (MATLAB).	[5, 6]

Assessment Guidance:

Evaluation of the student performance during the semester (total final mark) will be conducted according to the following activities:

Sub-Exams: The students will be subjected to two scheduled written exams, first exam and second exam during the semester.

Quizzes: will be conducted during the semester. The materials of the quizzes are set by the lecturer.

Homework and projects: Homework and MATLAB simulation should be solved individually and submitted before or on a set agreed date. Student may be assigned to present project(s).

Final Exam: The students will undergo a scheduled final exam at the end of the semester covering the whole materials taught in the course.

Grading policy:

First Exam	20%
Second Exam	20%
Quizzes, projects and homework	20%
Final Exam	40%
Total:	100%

Attendance policy:

The semester has in total 45 credit hours. Total absence hours from classes 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 sitting the final exam and a zero mark will be recorded for the course.