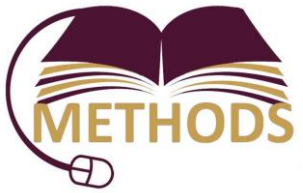

Co-funded by the Erasmus+ Programme of the European Union

Project Title: Modernization of Teaching Methodologies in Higher Education: EU Experience for Jordan and Palestinian Territory

Project acronym: METHODS

Project Number: 561940-EPP-1-2015-1-JO-EPPKA2-CBHE-JP

Funding scheme: Erasmus+ Programme (Capacity-Building projects in the field of Higher Education (E+CBHE))

Start date of the project: 15/10/2015 **Duration:** 42 months

Deliverable title	**Course Outline**
Author(s)	**Lutfi Al-Sharif**
Organisation name(s)	**The University of Jordan**
WP Number	**5**
WP Leader	**Birzeit University**

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The University of Jordan (UJ)

School of Engineering

Course title/code	Power Electronics & Drive Systems	0908421
Instructor /office	Lutfi Al-Sharif	
Semester- Year	Fall 2017/2018	
Compulsory/Elective	Compulsory	
Prerequisites	Electrical Actuators – 0908323. Electronics for Mechatronics - 0908222	

Course Description	The course aims to introduce the candidate to the concepts and principles of power electronics, the student is expected to know the different types of power electronic switching devices and their methods of operation, know how to carry out a Fourier series analysis on a periodic waveform, and know how to use Simulink and SimPowerSystems in simulating power electronic circuits.

Generic Competences*	To develop educational courses by utilising best practice of information communication technology (ICT)
Specific Competences (SCs)	1. Understand the operation and characteristics of power semiconductor devices. (a, j) 2. Understand the triggering and commutation techniques of the thyristor. (a, j) 3. Design uncontrolled and controlled rectifiers. (c, j) 4. Design chopping circuits. (c, j) 5. Design AC voltage controllers. (c, j) 6. Design single-phase and three-phase inverters. (c, j) 7. Understand the Pulse Width Modulation (PWM) techniques. (a, j) 8. Understand the power converter applications and impact on society. (a, j) 9. Use Simulink and SimPowerSystems in order to model and analyse power electronic systems. (k) 10. Work in teams, do presentations and communicate effectively. (d, e, g, i) N.B. The points a to l are the ABET learning outcomes.

	Course Contents	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC9	SC10
1	Introductory Basics and Revision	x	x	x	x	x	x	x	x	x	x
2	Components (Diodes and Transistors)	x	x								
3	Harmonics			x		x	x	x			
4	DC to DC Converters				x						
5	AC to DC Converters (Rectifiers)			x							
6	DC to AC Converters (Inverters)						x				
7	AC to AC Converters					x					
8	Class Discussions on Applications								x		
9	SimPowerSystems Exercises									x	
10	Project										x

Schedule				
Week	Subject	Activity Description *	Evaluation Criterion	
			Description	%
1	Introductory Basics and Revision	Discussion in class, presentation by students	-	
2 & 3	Components (Diodes and Transistors)	Discussion in class, presentation by students	10 minutes multiple choice quiz	3
4	Harmonics	Discussion in class, presentation by students	10 minutes multiple choice quiz	3
5 & 6	DC to DC Converters	Discussion in class, presentation by students	10 minutes multiple choice quiz	3
6 & 7	AC to DC Converters (Rectifiers)	Discussion in class, presentation by students	10 minutes multiple choice quiz	6
8 & 9	DC to AC Converters (Inverters)	Discussion in class, presentation by students	10 minutes multiple choice quiz	6
10 & 11	AC to AC Converters	Discussion in class, presentation by students	10 minutes multiple choice quiz	3
12	SimPowerSystems Exercises	Various problems solved in class using	10 minutes multiple choice quiz	3

		SimPowerSystems		
13	Class Discussions on Applications	Presentation by students on the latest technologies in this area	10 minutes multiple choice quiz	3
14	Project Presentations by students	Presentations in groups to the whole class with discussions and questions from other students	15 minutes for each group: 10 minutes for the presentation and 5 minutes for questions and discussion.	20
15	Project Presentations by students			
16	Final written exam			35

* Project Based Learning will be used as a form of Problem Based Learning.

* The Flipped Classroom approach will be used in teaching the material in this course.

Textbook and References	
Textbook:	• Videos on my You Tube playlist (Mechatronics System Design). • Notes and slides on the JU e-learning website.
References:	• Daniel W. Hart, "Power Electronics", 2011, McGraw Hill International Edition. • Power electronics", Cyril W. Lander, Third Edition, McGraw Hill, 1993. • Muhammad H. Rashid, ""Power Electronics: Circuits, Devices and Applications", Third Edition, Pearson.

	Method	**Weight** [%]
Overall Assessment Criteria	Mid Term Exam (10 quizzes) The exam will aim to gauge the level of understanding of the student as well as his/her skills in terms of analysing power electronic circuits and designing them.	30
	Project The project will be assessed by asking the students to prepare a report and make a power-Point presentation about the project.	20%
	Assignments and Presentations These are voluntary presentations that the students are encouraged to make during class time. They are followed by questions and discussions with the students in the class.	5% (bonus)
	Final Exam (written) The student is tested in the general knowledge he/she has acquired during the course and on design and analysis skils	35%
	Final Exam Computerised (converter design using Simulink)	15%

	Students bring their laptops and are given an assignment to design a power electronic converter and test is performance.	