Form: Course Syllabus		
	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	06

1.	**Course Title**	Power Electronics and Drive
2.	**Course Number**	0908425
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	3
4.	**Prerequisites/ Corequisites**	0908323
5.	**Program Title**	Mechatronics Engineering
6.	**Program Code**	0908
7.	**School/ Center**	Engineering
8.	**Department**	Mechatronics Engineering
9.	**Course Level**	4^{th}
10.	**Year of Study and Semester (s)**	4^{th} / 1^{st}
11.	**Other Department(s) Involved in Teaching the Course**	-
12.	**Main Learning Language**	
13.	**Learning Types**	☑Face to face learning ☐Blended ☐Fully online
14.	**Online Platforms(s)**	☑Moodle ☑Microsoft Teams
15.	**Issuing Date**	16/3/2024
16.	**Revision Date**	

17. Course Coordinator:

Name: Ahmad M. A. Malkawi	Contact hours: 11:30-12:30
Office number:	Phone number:
Email: ah.malkawi@ju.edu.jo	

18. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

19. Course Description:

Principle of operation of power semiconductor devices; single-phase and three-phase uncontrolled and controlled rectifiers feeding resistive and inductive loads; step-down (buck) and step-up (boost) DC-DC converters; AC voltage controllers; Applications: half-bridge and full-bridge single-phase and three-phase inverters feeding inductive loads; Applications: Power supplies, DC motor drives; AC motor drives.

20. Program Intended Learning Outcomes: (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

1.

2.

3.

4.

21. Course Intended Learning Outcomes: (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. **Understand the operation and characteristics of power semiconductor devices.**
2. **Understand the triggering and commutation techniques of the thyristor.**
3. **Design uncontrolled and controlled rectifiers.**
4. **Design chopping circuits.**
5. **Design single-phase and three-phase inverters.**

6. **Understand the Pulse Width Modulation (PWM) techniques.**
7. **Understand the power converter applications and impact on society.**
8. **Conduct a project in which a full power electronic system is designed to study the impact of engineering solutions in global, economic, environmental, and societal contexts.**

Course ILOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
1	✓	✓				
2		✓	✓			
3			✓	✓	✓	
4		✓	✓	✓	✓	
5		✓	✓	✓	✓	
6		✓	✓	✓	✓	✓
7	✓	✓				
8	✓	✓	✓	✓	✓	✓

22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Program ILOs / Course ILOs	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)
1							
2							
3							
4							

5							
6							
7				✓			
8				✓			

23. Topic Outline and Schedule:

Week	Lecture	Topic	ILO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	1.1	Review of Electrical Circuit						
	1.2	Review of Electrical Circuit						
	1.3							
2	2.1	Nonsinusoidal Waveforms in Steady State						
	2.2	Line-Current Distortion						
	2.3							
3	3.1	Power Electronics Versus Linear Electronics						
	3.2	Power Semiconductor Devices						
	3.3							
4	4.1	HW Diode Rectifier						
	4.2	HW Diode Rectifier						
	4.3							
5	5.1	HW Controlled Rectifier (SCR)						
	5.2	HW Controlled Rectifier (SCR)						
	5.3							
6	6.1	FW Diode Rectifier						
	6.2	FW Controlled Rectifier (SCR)						
	6.3							
7	7.1	Three-Phase Diode						
	7.2	Three-Phase Controlled (SCR)						
	7.3							
8	8.1	Step-Down (Buck) Converter						
	8.2	Step-Down (Buck) Converter						

	8.3							
9	9.1	Step-up (Boost) DC-DC Converter						
	9.2	Step-up (Boost) DC-DC Converter						
	9.3							
10	10.1	Full Bridge DC-DC Converter						
	10.2	Switch-Mode DC-AC Inverters.						
	10.3							
11	11.1	Basic Concepts of Switched-Mode Inverters						
	11.2	Half-Bridge Inverters (Single-Phase)						
	11.3							
12	12.1	Full-Bridge Inverters						
	12.2	Full-Bridge Inverters						
	12.3							
13	13.1	Full-Bridge Inverters						
	13.2	Full-Bridge Inverters						
	13.3							
14	14.1	Three-Phase Inverters						
	14.2	Three-Phase Inverters						
	14.3							
15	15.1	Three-Phase Inverters						
	15.2	Blanking Time or Dead-Band						
	15.3							

24. Evaluation Methods:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	ILO/s Linked to the Evaluation activity	Period (Week)	Platform
Midterm Exam	30%				
Project	20%				
Final Exam	50%				

25. Course Requirements:

Students should have a computer, internet connection, scientific calculator, MATLAB/Simulink.

26. Course Policies:

A- Attendance policies: The University regulations. B- Absences from exams and submitting assignments on time: The University regulations. C- Health and safety procedures: D- Honesty policy regarding cheating, plagiarism, misbehavior: E- Grading policy: F- Available university services that support achievement in the course:

27. References:

A- Required book(s), assigned reading and audio-visuals:

- Power Electronics Converters, Applications, and Design By Mohan, Undeland and Robbins, 3rd edition.

B- Recommended books, materials, and media:

- 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.

28. Additional information:

Name of the Instructor or the Course Coordinator:	Signature:	Date:
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Name of the Head of Quality Assurance Committee/ Department	Signature:	Date:
…….	……..……	……..……
Name of the Head of Department	Signature:	Date:
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Name of the Head of Quality Assurance Committee/ School or Center	Signature:	Date:
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Name of the Dean or the Director	Signature:	Date:
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