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**	Engineering Measurements and Signal Processing
2.	**Course Number**	0908371
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	3
4.	**Prerequisites/ Corequisites**	0908381+0908320
5.	**Program Title**	Mechatronics Engineering
6.	**Program Code**	0908
7.	**School/ Center**	Engineering
8.	**Department**	Mechatronics Engineering
9.	**Course Level**	3rd
10.	**Year of Study and Semester (s)**	3rd /2nd
11.	**Other Department(s) Involved in Teaching the Course**	-
12.	**Main Learning Language**	English
13.	**Learning Types**	☐Face to face learning ☑Blended ☐Fully online
14.	**Online Platforms(s)**	☑Moodle ☐Microsoft Teams
15.	**Issuing Date**	16/3/2023
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:

Introduction to process-control concepts and the elements of a process-control system. Block diagram of a simple process-control loop and identify each element. Define analog and digital control systems. Overview of metrology and measurement. Errors & error analysis; Uncertainty analysis; Statistical methods. Mechanical and Electrical Engineering units. Instrumentation: Characteristics (statics and dynamics); Operational modes; Measurement accuracy; Measurement standards. Analog signal conditioning methods are used in process-control systems, passive and active methods, operational amplifiers, and filters. Basic principles of digital signal processing: Digital-to-analog converters (DAC); Analog-to-digital converters (ADC); Characteristics of digital data.

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.

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

1. **Describe the process control and draw the block diagram.**
2. **Distinguish between the analog and digital systems.**
3. **Understand and determine a sensor's and system's accuracy, uncertainty, and sensitivity.**
4. **Understand the dynamic response of the sensors and signal conditioning system.**

5. **Deal with SI units and unit conversion.**
6. **Design analog signal conditioning circuits, including passive, op-amp, and filters.**
7. **Specify the analog-to-digital converter and digital-to-analog converter specifications needed for a measurement system.**
8. **Recognize the sampling rate and its effect on the data acquisition system.**
9. **Conduct a project in which an entire measurement system is designed.**

Course ILOs	The learning levels to be achieved					
	Remembering	**Understanding**	**Applying**	**Analysing**	**evaluating**	**Creating**
1		✓				
2		✓				
3			✓	✓		
4			✓	✓		
5			✓			
6				✓	✓	✓
7		✓		✓		
8	✓	✓				
9	✓	✓	✓	✓	✓	✓

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							
9			✓				

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	Process Control Principles						
	1.2	Process Control Diagram						
	1.3							
2	2.1	Control System Evaluation						
	2.2	Transient Regulation						
	2.3							
3	3.1	Analog and Digital Processing		online				
	3.2	ON/OFF Control						
	3.3							
4	4.1	Accuracy						
	4.2	Sensor Time Response		online				
	4.3							
5	5.1	Units						
	5.2	Significance and Statistics		online				
	5.3							
6	6.1	Signal Conditioning						
	6.2	Signal Conditioning		online				
	6.3							
7	7.1	Passive Circuit						
	7.2	Elementary Operations on Signals		online				

	7.3							
8	8.1	Operational Amplifier (Op-Amp)						
	8.2	Operational Amplifier (Op-Amp)						
	8.3							
9	9.1	Operational Amplifier (Op-Amp)						
	9.2	The Unit Impulse Function		online				
	9.3							
10	10.1	Analog Signal Conditioning Design Guidelines						
	10.2	Signal Processing Operations		online				
	10.3							
11	11.1	Converters (A/D and D/A)						
	11.2	Fourier Series Representation		online				
	11.3							
12	12.1	Digital-to-analog Converter (DACs)						
	12.2	Fourier Transform		online				
	12.3							
13	13.1	Digital-to-analog Converter (DACs)						
	13.2	Filters		online				
	13.3							
14	14.1	Analog-to-digital Converters (ADCs)						
	14.2	Filters		online				
	14.3							
15	15.1	Analog-to-digital Converters (ADCs)						
	15.2	Sample-and-Hold						
	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
Quizzes	10%				
Midterm Exam	30%				
Project	20%		SO (3)		Teams
Final Exam	40%				

25. Course Requirements:

Students should have a computer, internet connection, scientific calculator, and Simulation Software.

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:

- Process Control Instrumentation Technology, Curtis D. Johnson 8th Edition

B- Recommended books, materials, and media:

- Mechanical Measurements, Thomas G. Beckwith, 6th Ed., SAE.
- Experimental Methods for Engineers, J. P. Holman,7th Ed., McGraw-Hill
- Theory and Design for Mechanical Measurements, Richard Figliola and Donald Beasley, 5th Ed. John Wiley & Sons, Inc.
- Measurement and Instrumentation Principles, Alan Morris, 3rd Ed., Butterworth-Heinemann.

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:
…….	……...……	……..……
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:
…….	……...……	……..……