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

Course Syllabus

1	**Course title**	Automation and Programmable Logic Controller
2	**Course number**	0938461
3	**Credit hours**	3
	Contact hours (theory, practical)	3 theoretical hours
4	**Prerequisites/corequisites**	Automatic Control Systems (0908353)
5	**Program title**	B.Sc. in Mechatronics Engineering
6	**Program code**	0908461
7	**Awarding institution**	The University of Jordan
8	**School**	School of Engineering
9	**Department**	Mechatronics Engineering Department
10	**Course level**	Fourth Year
11	**Year of study and semester (s)**	2023/2024 Second semester
12	**Other department (s) involved in teaching the course**	None
13	**Main teaching language**	English
14	**Delivery method**	■ Face to face learning ☐ Blended ☐Fully online
15	**Online platforms(s)**	■Moodle ☐Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	6/10/2023

17 Course Coordinator:

Name: Dr. Musa AlYaman Contact hours: Sunday 9:30-10:30, Monday 9:30-10:00

Office number: **202** Mechatronics Engineering Department Phone number: : 5355000 Ext. 23032

Email: m.alyaman@ju.edu.jo

18 Other instructors:

None

19 Course Description:

Introduction to Automation, Programmable Logic Controllers (PLC), PLC hardware, PLC software, SCADA Systems and Computer Numerical Control (CNC). CNC hardware, CNC software, Lab experiments concentrate on familiarizing the student with the concepts studied in class especially CNC and PLC programming and applications.

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)

Relationship of SO's to PEO's.

PEO's	Mechatronics SO's 1	2	3	4	5	6	7
1	☐	☐	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐

☐ Strongly correlated ☐ Somewhat correlated

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

Descriptors	ILO/ID	Program SOs / ILOs of the course	SO (4)
Knowledge	A1	Understand the underlying basic concepts of CNC and PLC Programming	

	A2	Understand the pivotal role of CNC andbPLC in industrial systems, showcasing knowledge of their subsystems of inputs and outputs.	
Skills	B1	Design and implement an effective industrial system solution, incorporating principles from software and hardware to meet specific system requirements.	
	B2	Evaluate and apply hardware/software for system analysis, showcasing proficiency in selecting appropriate component to address the industrial system challenges.	
	B3	Apply industrial system design principles to solve real-world problems, demonstrating practical skills and understanding their relevance in computing-based solutions.	
	B4	Apply HMI communication protocols for data analysis and transmission, and evaluate their suitability in addressing complex computing challenges.	
Competence	C1	Demonstrate competency in executing signal conditioning techniques, ensuring the quality and reliability of signals for subsequent computing-based analyses through proficient application of relevant methods and tools.	
	C2	Apply Ladder logic process with proficiency to implement SCADA assess comprehensive analogue control, justifying the selection based on specific computing requirements within the program's discipline.	

22 Course aims and outcomes:

A- Aims:

The course motivates the student to recognize the concept of automation, identify the benefits and requirements of automation, the knowledge in the Programmable Logic Controllers (PLC), and SCADA systems and the knowledge in the Computer Numerical Control

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

SLOs / SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)
1. Identify the benefits and requirements of automation				X			
2. Recognize the different types of PLCs by visiting different factories				X			
3. Identify the strategies of SCADA and HMI systems and CNC.				X			
4. Practice the oral communication skills in a form of presentation and the written communication skills in a form of report				X			

23. Topic Outline and Schedule:

Week	Lecture	Topic	ILO/s Linked to the Topic	Learning Types (Face to Face/ Blended/	Platform Used	Synchronous / Asynchronous	Evaluation Methods	Learning Resources
1	1.1	Course Overview	A1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal + Book
	1.2	Course Overview	A1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal +
	1.3	Chapter 1 (Introduction to Automation)	A1	Face to Face	Moodle Teams	Synchronous	Exams	Book
2	2.1	Chapter 2 PLC	B1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal +

	2.2	Chapter 2 PLC	B1	Face to Face	Moodle Teams	Synchronous	Exams	Book
	2.3	Chapter 2 PLC	B1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal +
3	3.1	Chapter 3 Basic Instructions 1	B1	Face to Face	Moodle Teams	Synchronous	Exams	Book
	3.2	Chapter 3 Basic Instructions 1	B1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal +
	3.3	Chapter 3 Basic Instructions 1	B1	Face to Face	Moodle Teams	Synchronous	Exams	Book
4	4.1	Chapter 3 Basic Instructions 1	C1	Face to Face	Moodle Teams	Synchronous	Homework, Exams	E-learning portal +
	4.2	Chapter 3 Basic Instructions 1	C1	Face to Face	Moodle Teams	Synchronous	Homework, Exams	Book
	4.3	Chapter 3 Basic Instructions 1	C1	Face to Face	Moodle Teams	Synchronous	Homework, Exams	E-learning portal +
5	5.1	Chapter 4 Basic Instructions 2	B1	Face to Face	Moodle Teams	Synchronous	Exams	Book
	5.2	Chapter 4 Basic Instructions 2	B1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal +
	5.3	Chapter 4 Basic Instructions 2	B1	Face to Face	Moodle Teams	Synchronous	Exams	Book
6	6.1	Chapter 4 Basic Instructions 2	B1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal +
	6.2	Chapter 4 Basic Instructions 2	B1	Face to Face	Moodle Teams	Synchronous	Exams	Book

	6.3	Chapter 5 Comparison Instructions	B1	Face to Face	Moodle Teams	Synchronous	Exams	E-learning portal +
7	7.1	Chapter 5 Comparison Instructions	B2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	7.2	Chapter 6 Control Instructions	B2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	7.3	Mid Review Chapters (1-5)	B2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
8	8.1	Mid Exam Chapters (1-5)	B2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	8.2	Mid Discussion	B2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	8.3	Chapter 6 Control Instructions	B2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
9	9.1	Chapter 6 Control Instructions	B3	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	9.2	Chapter 6 Control Instructions	B3	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	9.3	Chapter 6 Control Instructions	B3	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
10	10.1	Chapter 7 SCADA	B3	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	10.2	Chapter 7 SCADA	B3	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	10.3	Chapter 7 SCADA	B3	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +

11	11.1	Chapter 7 SCADA	B4	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	11.2	Chapter 8 CNC	B4	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	11.3	Chapter 8 CNC	B4	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
12	12.1	Chapter 8 CNC	B4	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	12.2	Chapter 8 CNC	B4	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	12.3	Chapter 9 HMI	B4	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
13	13.1	Chapter 9 HMI	A2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	13.2	Chapter 9 HMI	A2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	13.3	Project Discussion	A2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
14	14.1	Project Discussion	A2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	14.2	Project Discussion	A2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book
	14.3	Project Quiz	A2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
15	15.1	Marks Discussion	C2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book

	15.2	Course Discussion	C2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	E-learning portal +
	15.3		C2	Face to Face	Moodle Teams	Synchronous	Assignments, Exams	Book

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				Moodle
Project	15		4	11th week	Moodle
Midterm Exam	25	Chapters 1-5	4	8th week	Moodle
Final Exam	50	All topics	4		Moodle

25. Course Requirements:

Each student should have a computer (with MS Project, MS Excel, and MS Word installed) and internet connection.

26. Course Policies:

A- Attendance policies:

Students are expected to attend EVERY CLASS SESSION and they are responsible for all materials, announcements, schedule changes, etc., discussed in class

B- Absences from exams and submitting assignments on time:

There will be no make-up exams for any exam or missed assignment, which will be taken during the course. Exceptions to this rule is restricted only to the following cases:

- Death of only first order relatives (father, mother, sister, or brother).
- Hospital entry (inpatient) during the time of the examination.

Any other cases will be given the zero mark in the corresponding exam or assignment.

C- Health and safety procedures:

Students are responsible for:

- Keeping themselves informed of conditions affecting their health and safety;
- Participating in safety training programs;
- Following to health and safety practices in their workplace, classroom;
- Advising of or reporting unsafe practices or serious hazards in the classroom or laboratory.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

Follow the UoJ guidelines that providing definitions, procedures, and recommendations for promotion and violation of academic honesty and integrity.

E- Grading policy:

Follow the UoJ guidelines that providing definitions of undergraduate grading policy

F- Available university services that support achievement in the course:

Text book, class handouts, and an access to Personal Computer with office software

27. References:

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

Industrial Automation: Hands On, Frank Lamb, Publisher McGraw-Hill Professional; 1 edition 2013 ISBN-13: 978-0071816458

B- Recommended books, materials, and media:

- Automation, Production Systems, and Computer Integrated Manufacturing, Mikell P. Groover, Printice Hall, 2008, 3rd Edition. ISBN-13: 978- 0132393218
- Modern Control Engineering, Katsuhiko Ogata, 5th Edition n, Prentice Hall.

28. Additional information:

Name of the Instructor or the Course Coordinator: Dr. Musa Al Yaman	Signature: Musa	Date: 31/1/2024
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: ……
Name of the Dean or the Director ……	Signature: ……	Date: ……