



University of Jordan

King Abdullah II School of  
Information Technology

Department of Artificial Intelligence



Course Syllabus

First Semester 2022/2023

Embedded Systems (1905330)

Dr. Musa Al-Yaman

1	Course title	Embedded Systems	
2	Course number	1905330	
3	Credit hours	3	
	Contact hours (theory, practical)	3 theoretical hours	
4	Prerequisites/corequisites	Data structures (1901242) and AI Programming (1905320)	
5	Program title	B.Sc. in Artificial Intelligence	
6	Program code	1905330	
7	Awarding institution	The University of Jordan	
8	School	King Abdullah II School for Information Technology	
9	Department	Artificial Intelligence Department	
10	Course level	Third Year	
11	Year of study and semester (s)	2022/2023 First semester	
12	Other department (s) involved in teaching the course	None	
13	Main teaching language	English	
14	Delivery method	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online	
15	Online platforms(s)	<input checked="" type="checkbox"/> Moodle <input type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....	
16	Issuing/Revision Date	6/10/2022	



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**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](mailto:m.alyaman@ju.edu.jo)**18 Other instructors:**

None

**Course Description:**

The course aims to introduce students to basic logic design system, logic gates, combinational and sequential logic circuits. Then basic input and output devices, after that microcontroller-based embedded systems design, development and implementation with focus on real-time applications.

Topics to be covered include, basic logic design, basic input and output systems. Embedded system types, microcontroller architecture, programming (Embedded C), interrupt management and other related topics. This course will use a combination of lectures, class discussions, reading and writing assignments, case studies analysis, and hands-on work. Practical hands-on computer vision best practices will be given in Lab weekly.

## 20 Course aims and outcomes:

### A- Aims:

The course motivates the student to recognize the concept of Embedded Systems, identify the benefits and requirements of microcontrollers, the knowledge in the application of embedded systems.

### B- Students Learning Outcomes (SLOs):

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

SLOs	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)
SLOs of the course							
1. Identify the benefits and requirements of embedded system.				X			
2. Recognize the different types of microcontrollers.				X			
3. Practice the oral communication skills in a form of presentation and the written communication skills in a form of report				X			

## 21. Topic Outline and Schedule:

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Day/Date
1	1.1	Course Overview	4	Face to Face		Synchronous		Sunday 9/10/2022
	1.2	Numbering Systems 1	4	Face to Face		Synchronous		Tuesday 11/10/2022
	1.3	Numbering Systems 2	4	Face to Face		Synchronous		Thursday 13/10/2022

2	2.1	Basic Logic Gates	4	Face to Face		Synchronous		Sunday 16/10/2022
	2.2	K-maps (2 var.)	4	Face to Face		Synchronous		Tuesday 18/10/2022
	2.3	Lab 1 (mm_logic Introduction)	4	Face to Face		Synchronous		Thursday 20/10/2022
Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Day/Date
3	3.1	K-maps (3 var.)	4	Face to Face		Synchronous		Sunday 23/10/2022
	3.2	K-maps (4 var.)	4	Face to Face		Synchronous		Tuesday 25/10/2022
	3.3	Lab 2 (Simplification)	4	Face to Face		Synchronous		Thursday 27/10/2022
4	4.1	Combinational Circuits 1	4	Face to Face		Synchronous		Sunday 30/10/2022
	4.2	Combinational Circuits 2	4	Face to Face		Synchronous		Tuesday 1/11/2022
	4.3	Lab 3 (Combinational Circuits )	4	Face to Face		Synchronous		Thursday 3/11/2022
5	5.1	Multiplexers	4	Face to Face		Synchronous		Sunday 6/11/2022
	5.2	Decoders	4	Face to Face		Synchronous		Tuesday 8/11/2022

	5.3	Lab 4 (Mux's & Decoders )	4	Face to Face		Synchronous		Thursday 10/11/2022
6	6.1	Sequential Circuits 1	4	Face to Face		Synchronous		Sunday 13/11/2022

	6.2	Sequential Circuits 2	4	Face to Face		Synchronous		Tuesday 15/11/2022
	6.3	Lab 5 (Sequential Circuits)	4	Face to Face		Synchronous		Thursday 17/11/2022
7	7.1	Registers	4	Face to Face		Synchronous		Sunday 20/11/2022
	7.2	Counters	4	Face to Face		Synchronous		Tuesday 22/11/2022
	7.3	Lab 6 (Registers and Counters)	4	Face to Face		Synchronous		Thursday 24/11/2022
8	8.1	Embedded System 1	4	Face to Face		Synchronous		Sunday 27/11/2022
	8.2	Embedded Systems 2	4	Face to Face		Synchronous		Tuesday 29/11/2022
	8.3	Mid Exam (Logic Design)	4	Face to Face		Synchronous	Project Available: 13:30	Thursday 1/12/2022
9	9.1	Microcontroller Hardware 1	4	Face to Face		Synchronous		Sunday 4/12/2022
	9.2	Microcontroller Software 1	4	Face to Face		Synchronous		Tuesday 6/12/2022
	9.3	Lab 7 (Mplab Introduction)	4	Face to Face		Synchronous		Thursday 8/12/2022
Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Day/Date

10	10.1	Microcontroller Hardware 2	4	Face to Face		Synchronous		Sunday 11/12/2022
	10.2	Microcontroller Software 2	4	Face to Face		Synchronous		Tuesday 13/12/2022

	10.3	Lab 8 (Instructions)	4	Face to Face		Synchronous		Thursday 15/12/2022
11	11.1	Interrupts 1	4	Face to Face		Synchronous		Sunday 18/12/2022
	11.2	Interrupts 2	4	Face to Face		Synchronous		Tuesday 20/12/2022
	11.3	Lab 9 (Interrupts)	4	Face to Face		Synchronous		Thursday 22/12/2022
12	12.1	Holiday						Sunday 25/12/2022
	12.2	Timers	4	Face to Face		Synchronous		Tuesday 27/12/2022
	12.3	Project Discussion	4	Face to Face		Synchronous	G1+G2	Thursday 29/12/2022
13	13.1	Holiday						Sunday 1/1/2023
	13.2	ADC	4	Face to Face		Synchronous		Tuesday 3/1/2023
	13.3	Project Discussion	4	Face to Face		Synchronous	G3+G4	Thursday 5/1/2023
14	14.1	Communication	4	Face to Face		Synchronous		Sunday 8/1/2023
	14.2	USART	4	Face to Face		Synchronous		Tuesday 10/1/2023
	14.3	Project Discussion	4	Face to Face		Synchronous	G5+G6	Thursday 12/1/2023
15	15.1	Marks Discussion	4	Face to Face		Synchronous		Sunday 15/1/2023
	15.2	Course Discussion	4	Face to Face		Synchronous		Tuesday 17/1/2023
	15.3							Thursday 19/1/2023

## 22 Evaluation Methods:

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



Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Labs	10	9 labs			Moodle
Project	15		4		Moodle
Midterm Exam	25	Digital Logic	4	8 <sup>th</sup> week	Moodle
Final Exam	50	All topics	4		Moodle

### 23 Course Requirements

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

### 24 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

**25 References:**

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

Designing Embedded Systems with PIC Microcontrollers: Principles and Applications, Tim Wilmshurst, Newnes, 2007

**B- Recommended books, materials, and media:**

1. Digital Design, M.Mano 3 Ed., Prentice Hall 2002
2. Tim Wilmshurst, An Introduction to the Design of Small-Scale Embedded Systems.
3. Barry B. Brey, The Intel Microprocessors, Architecture, Programming and Interfacing, Prentice Hall

**26 Additional information:**

Name of Course Coordinator: Dr. Musa AlYaman-----Signature: ----- Date: 6/10/2022
Head of Curriculum Committee/Department: ----- Signature: ----- - ---
Head of Department: ----- Signature: ----- -
Head of Curriculum Committee/Faculty: ----- Signature: ----- -
Dean: ----- Signature: -----