

COURSE PLAN

FIRST: BASIC INFORMATION

College					
College	: Karak College				
Department	: Engineering Department				
Course					
Course Title	: Microcontroller I				
Course Code	: 020406241				
Credit Hours	: 3 (1 Theoretical, 2 Practical)				
Prerequisite	: 020406132 / 020406132				
Instructor					
Name	:				
Office No.	:				
Tel (Ext)	:				
E-mail	:				
Office Hours	:				
Class Times	Building	Day	Start Time	End Time	Room No.
Text Book					
1. Microcontroller I, Al-Balqa Applied University & KOICA, 2022					
References					
1. Michael Margolis, Brian Jepson, and Nicholas Robert Weldin, "Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects" 3 rd Edition, O'Reilly Media, Inc., 2020.					
2. Jeremy Blum, "Exploring Arduino, Tools and Techniques for Engineering Wizardry" 2 nd Edition, John Wiley & Sons, Inc.; 2020.					

SECOND: PROFESSIONAL INFORMATION

COURSE DESCRIPTION

This course explains the operating principle and basic usage of microcontrollers used in most electronic devices. Microcontrollers provide a versatile, configurable and efficient way to maintain traditional hardware-intensive systems with the help of software. Using the various data exchange methods including digital, analog, and serial ways, microcontrollers can be adopted to various fields of industry.

COURSE OBJECTIVES

The objectives of this course are to enable the student to do the following:

- Apply the acquired knowledge to understand Arduino platform
- Explain architecture and design of microcontrollers.
- Apply the acquired knowledge to interface different types of devices with microcontrollers.
- Apply the acquired knowledge to for microcontrollers to communicate with different kind of serial protocols.
- Design real life applications using microcontrollers.



COURSE LEARNING OUTCOMES

By the end of the course, the students will be able to:

- CLO1. Explain microcontrollers and Arduino
- CLO2. Work with Arduino software
- CLO3. Explain the code style for Arduino
- CLO4. Explain UART serial communication
- CLO5. Explain how to send and receive data using pins
- CLO6. Explain the characteristics of digital input/output pins
- CLO7. Explain the characteristics of analog input/output pins
- CLO8. Explain and use sound generating methods
- CLO9. Explain and use a text LCD
- CLO10. Apply I2C and SPI serial protocols to connect peripherals

COURSE SYLLABUS

Week	Topic	Topic Details	Reference (Chapter)	Proposed Assignments
1	Introduction Microcontrollers and Arduino	<ul style="list-style-type: none"> • What is Microcontroller? • What is Arduino? • Memories for Microcontrollers. • Arduino Uno. 	CLO1	
2	Arduino Engineering Basics Getting Started	<ul style="list-style-type: none"> • Installing the Integrated Development Environment (IDE). • Setting Up the Arduino Board. • Structures of an Arduino Sketch. 	CLO2	
3	Arduino Programming	<ul style="list-style-type: none"> • A Typical Arduino Sketch . • Using Serial Monitor • Using Arduino String Functionality. • Structuring Your Code into Functional Blocks. 	CLO3	
4	Arduino Programming	<ul style="list-style-type: none"> • Data types in Arduino. • Operators in Arduino. • Bitwise operators and Registers. 	CLO3	
5	Serial Communications (UART)	<ul style="list-style-type: none"> • UART Serial Communication • Sending, Receiving Formatted Information from Arduino to a Computer. • Sending, and receiving Binary Data from Arduino to a Computer. 	CLO4	
6	Serial Communications	<ul style="list-style-type: none"> • Logging Arduino Data to a File on a Computer. • Sending, and Receiving Data to More than One Serial Device. • Using Arduino with the 	CLO5	



Week	Topic	Topic Details	Reference (Chapter)	Proposed Assignments
		Raspberry Pi.		
7	Digital Output	<ul style="list-style-type: none"> • Light Emitting Diode • 'Blink' sketch • Traffic signal simulation 	CLO6	
8	Midterm Exam			
9	Digital Input	<ul style="list-style-type: none"> • Push Button. • Chattering or bouncing, vibrating. • Pull up and pull down resistors. • Debounce : Reliably Detection of press • Reading a Keypad. 	CLO6	
10	Analog Input	<ul style="list-style-type: none"> • Analog Digital Converter • Potentiometer. • LDR sensor. • LM35 sensor. • Ultrasonic sensor. 	CLO7	
11	Analog Output	<ul style="list-style-type: none"> • Pulse Width Modulation. • Change colors of a RGB LED. • Controlling DC motor speed using PWM. 	CLO7	
12	Audio Output.	<ul style="list-style-type: none"> • Sound and speakers • Playing simple tones • Generate more than one tone at a time • Audio play modules 	CLO8	
13	Text LCD	<ul style="list-style-type: none"> • Liquid Crystal Display • Connecting and Using a Text LCD Display. • Special Functions in Text LCD • Graphic LCD, TFT LCD and OLED 	CLO9	
14	I2C	<ul style="list-style-type: none"> • I2C Communication protocol. • Real Time Clock • Arduino-Arduino Communication using I2C 	CLO10	
15	SPI	<ul style="list-style-type: none"> • SPI Communication protocol. • LCD using SPI • Other Serial Communication Protocols : 1-Wire, CAN, I2S, etc. 	CLO10	
16	Final Exam			

COURSE LEARNING RESOURCES

This module will be taught using available resources including:



- Class lectures, lecture notes, assignments, quizzes, and exams designed to achieve the course objectives.
- Lectures and materials uploaded to the e-learning system.
- Student should read the material covered in class, complete assignments on time, participate in class discussions, and do whatever it takes to grasp the topics.

ONLINE RESOURCES

Any web site or tutorial that offers information about the basics and principles of power electronics analysis.

ASSESSMENT TOOLS

	ASSESSMENT TOOLS	%	
	Projects and Quizzes	20	
	Mid Exam	30	
	Final Exam	50	
	TOTAL MARKS	100	

THIRD: COURSE RULES

ATTENDANCE RULES

Attendance and participation are extremely important, and the usual University rules will apply. Attendance will be recorded for each class. Absence of 10% will result in a first written warning. Absence of 15% of the course will result in a second warning. Absence of 20% or more will result in forfeiting the course and the student will not be permitted to attend the final examination. Should a student encounter any special circumstances (i.e. medical or personal), he/she is encouraged to discuss this with the instructor and written proof will be required to delete any absences from his/her attendance records.

GRADING SYSTEM

The grading system for the Diploma Degrees in the Al-Balqa' Applied University is the total mark out of 100%

GRADE	POINTS
FAILED	0-49
PASSED	50-100

REMARKS



Copying assignments, quizzes, or exams from another student will not be tolerated.
Helping other students to cheat in any way or form will not be tolerated.
Excellent attendance is expected.
BAU policy requires the faculty member to assign 35 grades if a student misses 15% of the classes without a valid excuse.
If student miss a class, it is his responsibility to find out about any announcements or assignments he/she may have missed.
Participation in, and contribution to class discussions will affect the final grade positively.
Making any kind of disruption (side talks or mobile ringing) in the class is not allowed and it will affect student negatively.
Makeup exam should not be given unless there is a valid excuse according to BAU policies.

COURSE COORDINATOR**Course Coordinator:****Signature:****Date:****Department Head:****Signature:****Date:**