GMR Institute of Technology
An Autonomous Institute Affiliated to JNTU-GV

GMRIT Training Tomorrow's Engineers Today

1.3.2(B) Brochure and Course content or syllabus along with course outcome of Value-added courses offered

Department of Electronics & Communication Engineering

Index

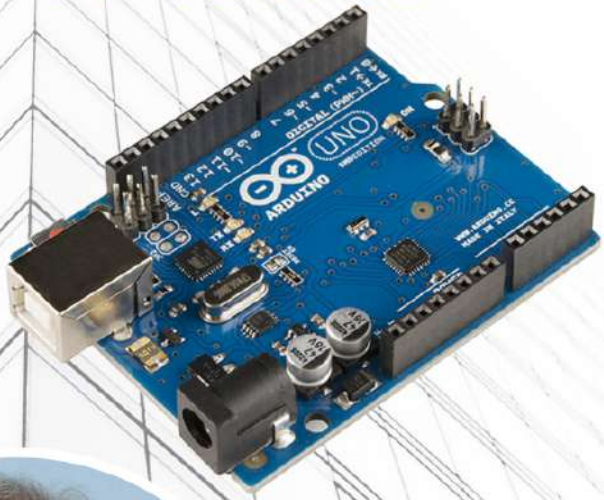
GARIT
Training Tomorrow's Engineers Today

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SENSORS, ACTUATORS AND IoT UNLEASED: EMBEDDED BOARD ESSENTIALS

30 HOURS ADD-ON COURSE

SCAN TO REGISTER



HANDS-ON WITH CERTIFICATION

DR. YOGESH MISRA
Professor (ECE)
(M) 9950511025

Eligibility	B.Tech (All Branches)
Number of Seats	Limited
Criteria for Enrolment	First-Come-First-Served
Course Start Date	7th October 2024
Course Fee	Rs. 500/-

- **Introduction to Embedded C for Arduino / Node MCU development board**
- **Interfacing and programming of IO Devices & actuators with Arduino / Node MCU**
- **Interfacing and programming for sensing the real world**
- **ThingSpeak and Blynk cloud platform for IoT Applications**

DR. B ANIL KUMAR
Senior Asst Prof. (ECE)
(M) 9963268763

Date: 23-9-2024

To,
The Principal,
GMR Institute of Technology,
Rajam

Sub: Approval for conducting an add-on course on "Sensors, Actuators & IoT Unleased – Embedded Board Essentials" - Reg.

Dear Sir,

An add on course on "Sensors, Actuators & IoT Unleased - Arduino & ESP 8266 Essentials" is proposed for the B.Tech (All Branch) Students. The main aim of the course is to expose the students to the comprehensive understanding of the architecture and programming of Arduino UNO and NodeMCU embedded design target board along with real world data capturing using sensors and interfacing of input devices, output devices & actuators. This course gives hands-on exposure of Thingspeak and Blynk IoT cloud platforms to students. This course aims to equip students with the knowledge and skills necessary to develop IoT based embedded applications.

The course is of 30 hours duration and conducted on 4th Saturday and weekdays without prejudice to regular classwork.

The detail of the proposal is attached.

With Regards,

Signature of Coordinator
(Dr. Yogesh Misra)
Date: 23-9-2024

Signature of Coordinator
(Dr. B Anil Kumar)
Date: 23-9-2024

Yours
HOD-ECE
(Dr.V.Jagan Naveen)

ADD-ON Course

Duration – 30 Hours

on

Sensors, Actuators & IoT Unleased – Embedded Board Essentials

By:

Dr. Yogesh Misra – Professor
Dr. B. Anil Kumar – Sr. Assistant Professor

Department of Electronics & Communication Engineering
GMR Institute of Technology
Rajam, Srikakulam (Andhra Pradesh) - 532127

1.	Name of host Institution	GMR Institute of Technology, Rajam
2.	Name of host Department	Electronics & Communication Engineering
3.	Title of course	**SENSORS, ACTUATORS & IOT UNLEASED – EMBEDDED BOARD ESSENTIALS**
4	Introduction	The course on SENSORS, ACTUATORS & IOT UNLEASED - ARDUINO & ESP8266 ESSENTIALS for Electrical Engineering/Electronics Engineering offers students a comprehensive understanding of the architecture and programming of Arduino UNO and NodeMCU embedded design target boards along with real world data capturing using sensors and interfacing of input devices, output devices & actuators. This course gives hands-on exposure of Thingspeak and Blynk IoT cloud platforms to students. This course aims to equip students with the knowledge and skills necessary to develop embedded-IoT applications.
5	Course Overview	This course includes study of the architecture of Arduino UNO and NodeMCU embedded design target board, Integrated Development Environment (IDE), in-depth understanding on various constructs required for the programming of Arduino board and NodeMCU, construction and working of various sensors, input devices, output devices & actuators, programming examples and IoT based designs.
6	Significance & Objectives of the Course	The objectives of the course are: **1. *Introduction to the hardware and software of Arduino and NodeMCU development board:*** Learners will gain a comprehensive understanding of the architecture of Arduino UNO and NodeMCU board along with on-board components, Integrated Development Environment (IDE) required for the development of software which actually guides the hardware to perform the desired task and programming constructs. **2. *Interfacing and programming of IO Devices & actuators with Arduino and NodeMCU:*** Learners will demonstrate the interfacing and programming of Arduino and NodeMCU with IO devices and actuators viz. LED, Seven-segment display, LCD, push button, keypad, relay for high voltage devices interfacing, PWM technique, dc motor/stepper motor, motor

		driver. **3. *Sensing the real world:*** Learners will gain the insight of various sensors and demonstrate the interfacing and programming of Arduino and NodeMCU with various sensors viz. temperature sensor, humidity and temperature sensor, light sensor, touch sensor, smoke sensor, gas sensor, rain detector sensor, ultrasonic sensor, soil moisture sensor, etc. **4. *Introduction to IoT:*** Learners will understand Characteristics of IoT, Building Blocks of IoT, the architecture of Node MCU/ESP8266, and development of IoT based applications on Thingspeak and Blynk cloud.
7.	Outcome of the course	After completion of this course the learners will be able to: i. Understand the architecture of Arduino and NodeMCU Development Board ii. Summarize the constructs of Embedded C iii. Demonstrate the programming and interfacing skills of sensors and IO devices with Arduino and NodeMCU Development Board iv. Demonstrate the skills of sending captured data from sensor on cloud
8.	Course Content	i. Architecture of Arduino Development Board ii. IDE for programming Arduino board iii. Embedded programming constructs iv. Sensors parameters v. Hands-on to program, interface and process data on Arduino development board vi. Architecture of Node MCU and cloud
9.	Course Delivery	The course will employ a combination of lectures, practical demonstrations, and hands-on exercises. Students will have access to embedded target board, sensors, I/O devices and actuators and software tools, enabling them to gain practical experience in designing and developing embedded & IoT based applications.
10.	Schedule	**From** 7th Octobet 2024 **to** 2nd November 2024 **Weekend** 4th Saturday: 8 Hours (9:00 AM to 5:00 PM) Weekdays: 1 Hour (4:00 PM to 5:00 PM)
11.	Duration of the Program	30 Hours
12..	Venue	ECAD Lab of ECE Department
13.	Details of special equipment or Laboratory facilities available for course	i. Arduino Development Boards ii. NodeMCU Development Boards ii. Sensors
14	Eligibility of Participants	B.Tech Students (All Branches)

15.	Selection Criteria	First come first serve basis
16.	Maximum Seats	50
17.	Course Fee	Rs. 500/-
18.	Rules for Successful Completion of course	i. Attendance - Minimum 75% ii. Minimum Marks in test - 50%
19.	Name, Designation & Address of the Course Coordinator(s)	**(1) Dr. Yogesh Misra** Professor, Department of Electronics & Communication Engineering, GMR Institute of Technology Rajam, Vizinagram (AP) – 532127 **(2) Dr. B. Anil Kumar** Sr. Assistant Professor, Department of Electronics & Communication Engineering, GMR Institute of Technology Rajam, Vizinagram (AP) - 532127
20.	Name, Designation & Address of the Technician	**Mr. K. Sankara Rao** Sr.Lab Technician, Department of Electronics & Communication Engineering, GMR Institute of Technology Rajam, Vizinagram (AP) - 532127

We certify that the details given above are correct to the best of my knowledge and belief and I will ensure that all the course outcomes will be achieved.

Place: Rajam

Signature of Coordinator
(Dr. Yogesh Misra)
Date: 23-9-2024

Signature of Coordinator
(Dr. B Anil Kumar)
Date: 23-9-2024

Department of Electronics and Communication Engineering

Minimum Credits to be earned: 160 (for Regular Students)
127 (for Lateral Entry Students)

No	Course Code	Course	POs	Contact Hours			
				L	T	P	C
First Semester							
1	21HSX01	Communicative English	9,10, 12	2	-	-	2
2	21MAX01	Engineering Mathematics I	1,2,3,12	3	-	-	3
3	21PYX01 21CYX01	Engineering Physics / Engineering Chemistry	1,2,12 / 1,6,7,12	3/3	-	-	3/3
4	21BEX01 21BEX06	Basics of Engineering / IT Workshop	1,3,6,7,9,11,12/1,12	3/ -	-	-/ 3	3/1.5
5	21BEX02	Problem Solving and Programming Skills	1, ,2,3,12	3	-	-	3
6	21BEX03	Problem Solving and Programming Skills Lab	2,3,4,12	-	-	3	1.5
7	21BEX04/ 21BEX05	Engineering Drawing / Engineering Workshop	1,5,10,12/1,9,10,12	-	-	3/3	1.5/1.5
8	21PYX02/ 21CYX02	Engineering Physics Lab /Engineering Chemistry Lab	4,9,11/1,3,6,7,12	-	-	3/3	1.5
9	21HSX02/-	Communicative English Lab/-	9,10,12	-	-	3/-	1.5/-
			Total	**14/11**	**0**	**12/12**	**20/17**
Second Semester							
1		Language Elective	10,12	2	-	-	2
2	21MAX02	Engineering Mathematics II	1,2,3,12	3	-	-	3
3	21CYX01/ 21PYX01	Engineering Chemistry /Engineering Physics	1,3,6,7,12/4,9,11	3/3	-	-	3/3
4	21BEX01/ 21BEX06	Basics of Engineering/ IT Workshop	1,3,6,7,9,11,12/1,12	-/3	-	3/-	1.5/3
5	21BEX07	Python Programming	1,2,3,12	3	-	-	3
6	21BEX08	Python Programming Lab	2,3,4,5,12	-	-	3	1.5
7	21BEX05/ 21BEX04	Engineering Workshop / Engineering Drawing	1,9,10,12/1,5,10,12	-	-	3/3	1.5/1.5
8	21CYX02/ 21PYX02	Engineering Chemistry Lab/Engineering Physics Lab	1,3,6,7,12/4,9,11	-	-	3/3	1.5/1.5
9	-/21HSX02	-/Communicative English Lab	9,10,12	-	-	-/3	-/1.5
			Total	**11/14**	**0**	**12/12**	**17/20**
Third Semester							
1	21MA301	Complex Variables	1,2,3, PSO2	3	-	-	3
2	21EC301	Electronic Devices and Circuits	1,2,3,PSO1	3	-	-	3
3	21EC302	Linear Circuit Analysis	1,2,4,5, PSO1	3	-	2	4
4	21EC303	Logic Circuit Design	1,2,3, PSO1	3	-	-	3
5	21EC304	Random Variables and Stochastic Processes	1,2, 3,PSO2	3	-	-	3
6	21EC305	Signals & Systems	1,2,4,5, PSO2	3	-	2	4

7	21EC306	Electronic Devices and Circuits Lab	1, 2, 4, PSO1	-	-	3	1.5
8	21EC307	Logic Circuit Design Lab	1, 2, 4, 5, PSO1	-	-	3	1.5
9	21ESX01	Employability Skills I	1,2,5,8,10,12	-	-	2	-
10	21HSX11	CC & EC Activities I	6,7,9,10	-	-	1	-
			Total	**18**	**0**	**13**	**23**
Fourth Semester							
1	21CSE01	Object Oriented Programming	1,2, 3,5	3	-	-	3
2	21EC401	Analog and Digital Communications	1,2, 3,PSO2	3	-	-	3
3	21EC402	Analog Electronic Circuits	1, 2, 4,5, PSO1	3	-	2	4
4	21EC403	Electromagnetic Fields and Waves	1,2, 3,PSO2	3	-	-	3
5	21EC404	Linear Control Systems	1, 2, PSO1, PSO2	3	-	-	3
6	21CSE02	Object Oriented Programming Lab	1,2,4,5	-	-	3	1.5
7	21EC405	Analog and Digital Communications Lab	1, 2, 4,5, PSO2	-	-	3	1.5
8	21ESX01	Employability Skills I	1,2,5,8,10,12	-	-	2	2
9	21HSX11	CC & EC Activities I	6,7,9,10	-	-	1	1
			Total	**15**	**0**	**11**	**22**
Fifth Semester							
1	21EC501	Linear and Digital IC Applications	1,2,3, PSO1	3	-	-	3
2	21EC502	Microprocessors and Microcontrollers	1, 2, 3, 4, 5, PSO1	3	-	2	4
3	21EC503	VLSI Design	1, 2,3, 4, 5, PSO1	3	-	2	4
4	21EC504	Antennas and Microwave Engineering	1,2,3, PSO2	3	-	-	3
5		Elective I (Professional Elective)		3	-	-	3
6		Elective II (Open Elective I)		3	-	-	3
7	21EC505	Linear IC Applications Lab	1,2,3, 4, PSO1	-	-	3	1.5
8	21TPX01	Term Paper	1,4,9,10,12,PSO1,PSO2	-	-	3	1.5
9	21ESX02	Employability Skills II	1,2,5,8,10,12	-	-	2	-
10	21HSX12	CC & EC Activities II	6,7,9,10	-	-	1	-
11	21SIX01	Summer Internship I	1,2,8,10,12	-	-	-	1
			Total	**18**	**0**	**13**	**24**
Sixth Semester							
1	21HSX10	Engineering Economics and Project Management	1,10,11,12	3	-	-	3
2	21EC601	Cellular and Mobile Communications	1,2,3, PSO2	3	-	-	3
3	21EC602	Digital Signal Processing	1,2, 3,PSO2	3	-	-	3
4		Elective III (Professional Elective)		3	-	2	4
5		Elective IV (Open Elective II)		3	-	-	3
6	21EC603	Digital Signal Processing Lab	1,2,4,5, PSO2	-	-	3	1.5
7	21MPX01	Mini Project	ALL	-	-	3	1.5
8	21ESX02	Employability Skills II	1,2,5,8,10,12	-	-	2	2
9	21HSX12	CC & EC Activities II	6,7,9,10	-	-	1	1
10	21ATX01	Environmental Studies	1,6,7,12	-	-	-	-
11	21ATX02	Human Values and Professional Ethics	----------	-	-	-	-

12	21ATX----	Audit Course	----------	-	-	-	-
			Total	**15**	**0**	**11**	**22**
Seventh Semester							
1	21PWX01	Project Work	ALL	-	-	16	8
2		Elective V (Professional Elective)		3	-	-	3
3		Elective VI (Professional Elective)		3	-	-	3
4		Elective VII (Open Elective III)		3	-	-	3
5	21SIX02	Summer Internship II	1,2,8,10,12	-	-	-	1
			Total	**9**	**0**	**16**	**18**
Eighth Semester							
1	21FIX01	Full Semester Internship (FSI)	1,2,5,8,9,10, PSO1, PSO2	-	-	**-**	8
2		Elective VIII (Professional Elective)		-	-	**-**	3
3		Elective IX (Open Elective IV)		-	-	**-**	3
			Total	**0**	**0**	**-**	**14**