

<b>COURSE TITLE</b>	<b>FUNDAMENTAL SKILLS IN SENSOR INTERFACING</b>
<b>COURSE CODE</b>	<b>01OE0008</b>
<b>COURSE CREDITS</b>	<b>3</b>

**Objective:**

- 1 After completion of this course, a student will be able to:  
Introduction to various types of sensors and their working principles, Types of sensors and their applications, Sensor interfacing with microcontroller like Arduino, Intelligent systems using sensors and communication modules like Wi-Fi, Bluetooth.
- 2 Introducing various types of sensors and their working principles along with their applications and interfacing with different micro-controller like Arduino. Building intelligent systems using sensors that can communicate over protocols like Wi-Fi and Bluetooth
- 3 After completion of this course, student will be able to understand various types of sensors and their working principles, Types of sensors and their applications, Sensor interfacing with microcontroller like Arduino Intelligent systems using sensors and communication modules like Wi-Fi, Bluetooth..

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Understand application-based programming concept
- 2 To create programs for various open-source programmable boards
- 3 To develop programs for specific requirements with interfacing of various components and modules
- 4 To develop hardware and software interfacing for engineering applications

**Pre-requisite of course:**na

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	0	0	50	30	20	0	0

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Open source boards and IDE</b> Overview, various boards, hardware specifications, components and various pins, , gui of ide, installation of ide, combination of software and hardware, connection with hardware and libraries	3
2	<b>Programming using IDE</b> Program structure, data types, variables, constants, operators, , control statements, loops, functions, arrays, strings	7
3	<b>Function libraries</b> Input and output functions, character functions, math functions, tone generation, , communication protocols and trigonometric functions	3

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
4	<b>Sensors and its interfacing with hardware board</b> Sensors and its classification, analog and digital sensors, active and passive sensors, , application specific sensors, working principle of various sensors, interfacing of various sensors with Arduino board.	10
5	<b>Actuators</b> Actuators and its classification, types of motion actuators, types of energy actuators, application specific actuators, , working principle of various actuators, interfacing of various actuators with Arduino board.	5
6	<b>Communication protocols</b> Wired and Wireless communication protocols, Working principle of various protocols like UART, I2C, SPI, Bluetooth, ZigBee and it's interfacing with Arduino Board, GSM module working and it's interfacing with Arduino board	5
7	<b>Project Implementation using Cloud Connectivity</b> RFID Case Study, Designing, developing, coding of electronic projects by making use of sensors, actuators and Arduino, , communication protocols and internet connectivity to solve the real world problems, troubleshooting and debugging skills to implement the project	9
<b>Total Hours</b>		<b>42</b>

#### **Textbook :**

- 1 Getting Started with Arduino, Massimo Banzi, O'Reilly Media, 2011
- 2 Arduino For Beginners, Rui Santos and Sara Santos, Amazon Kindle, 2020

#### **References:**

- 1 Arduino Cookbook, Arduino Cookbook, Michael Margolis, O'Reilly Media, 2011
- 2 Introduction to Arduino: A Piece of Cake, Introduction to Arduino: A Piece of Cake, Alan G. Smith , CreateSpace Independent Publishing Platform, 2011

#### **Suggested Theory Distribution:**

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
<b>Remember / Knowledge</b>	<b>Understand</b>	<b>Apply</b>	<b>Analyze</b>	<b>Evaluate</b>	<b>Higher order Thinking / Creative</b>
10.00	10.00	30.00	20.00	10.00	20.00

**Instructional Method:**

- 1 This course will be taught using blended instructional methods such as hands on demonstration, visual aids like presentations, white board, in 3 theory lectures

**Supplementary Resources:**

- 1 <https://www.arduino.cc/en/Main/Education>
- 2 <https://www.tutorialspoint.com/arduino>
- 3 <http://tronixstuff.com/tutorials>
- 4 <https://www.arduino.cc/en/Guide/HomePage>
- 5 <https://startingelectronics.org/software/arduino/learn-to-program-course>