

Course Syllabus

Arduino 201

This course is intended for those that are curious about learning Arduino but have no experience at it. We will cover the very basics both in hardware and software, including coding, transistors, leds, Irds, resistors, led displays and more. This course is a 3-credit equivalent course and each session will explore theory and practice giving the participant a chance to experience all that is being taught. This course is a preparatory course so that participants can later develop their own projects in Arduino for Arts 301.

Objectives

The purpose of this course is to provide the participants with all of the basic knowledge into Arduino. It is an intense course that will cover both theory and practice along with understanding software and hardware starting from the very basics. Participants will have to understand and use the principles of different components and coding methods in order to execute the tests in class.

This course is divided in two parts:

- 1- Theory: where you will learn the basics in Arduino, (Software and hardware)
- 2- Practice: projects you will produce and test in class.

Learning Outcomes

At the end of the course the student will be able to:

1. **Understand** coding for Arduino
2. **Understand** hardware and components
3. **Explore** the use of electronic components
4. **Explore** the integration between software and hardware
5. **Understand** the basic theories of electronics
6. **Practice** the application of the coding

Course Literature:

- Programming Arduino: Getting started with sketches, *Simon Monk*.
- Exploring Arduino, *Jeremy Blum*

Course PROJECTS:

This course does not contain any projects designed by the participant and all projects are small exercises at the end of each class in order for the participant to put into practice what was covered.

Course CONTENT:

Notes	Class Content	Session
	Arduino Board & IDE / Arduino Code Structure & Flow / Serial Monitor / Delays / AC & DC Power / Ohms Law / Breadboard / LEDs Practice: Serial Monitor / Basic Coding / Resistors and LEDs	1
	Arduino Pins / Input & Output (Analog & Digital) / PWM / Voltage Divider / Potentiometer / Push Buttons & Switches Practice: LEDs (Blinking, Dimming / Traffic Light / RGB LED) / Potentiometer / Push Buttons / Switches	2
	Coding in Depth: Data Types / Variables / Constants / Operators / Functions / Control Statements (If Statement, If-else Statement, While Loop, For Loop, Switch, Continue, Break) / Arrays Practice: Coding / LEDs	3
	Intro to Sensors & Sensor Modules Practice: Temperature Sensor / Flame Sensor / LDR / Sound Sensor / Active Buzzer	4
	Power in Depth: External Power, Transistors, Relay, Adapters, Powering Arduino, High Power Applications Practice: Transistor, Relay Module, Lighting AC Bulb	5
	Types of Motors / Motor Drivers / Speed Control / Torque Practice: Servo Motor, DC Motor, Stepper Motor	6
	Displays (7-Segment, LED Matrix LCD Screen) / Modules (Keypad, RFID, Joystick) / I2C Communication / SPI Communication Practice: Displays & Modules / Keypad Password Lock	7
	Tilt Switch, IR Remote, RTC Clock, Passive Buzzer Practice: Timed Alarm, Switch off Device on tilt, Control using Remote	8
	Serial Communication / Types of Wireless Communication / Input from Serial Monitor Practice: Bluetooth Module	9
	Interrupt Pins / Interrupt Functions / Integrated Circuits Practice: Writing interrupt functions / Interface sensors using interrupt pins / Shift Register	10
	Sensors in depth Part I Practice: Using different sensors	11
	Sensors in depth Part II Practice: Using different sensors	12
	Sensors in depth Part III Practice: Using different sensors	13
	Arduino Boards and Applications / How to destroy your Arduino / Prototyping with Arduino / Project Design, Testing, Troubleshooting / Safety Practices Practice: Project Design and Implementation (Theoretical)	14
Troubleshooting and reviewing.	Coding Review Session	15
Troubleshooting and reviewing.	Hardware Review Session	16
Participants will work on a given project.	Project Coaching	17
Participants will work on a given project.	Project Coaching	18