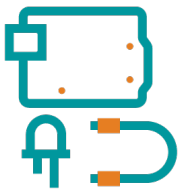
ARDUINO EDUCATION

STARTER KIT



STARTER KIT REMOTE COURSE SYLLABUS

*Duration includes going through the content in the Projects book + training video
**For each project you will always need a computer, Arduino Uno board, breadboard and jumper wires

LESSON 1: INTRODUCTION

DURATION*: 45 min
TRAINING VIDEO: Week 17
BOOK PAGES: 4-19

Description: Welcome to Arduino, Install the IDE and set up your tools.

Discover: Microcontrollers and Arduino IDE.

Materials**:

- Computer
- Starter Kit is optional for this lesson

LESSON 2: PROJECT 01 - GET TO KNOW YOUR TOOLS

DURATION*: 45 min
TRAINING VIDEO: Week 17
BOOK PAGES: 20-31

Description: Make a simple circuit with some switches, an LED and a resistor

Discover: Basic electrical theory, understanding OHM's Law, how a breadboard works, components in series and parallel

Materials:**

- 2x Switch
- Red LED
- 220 ohm resistor

LESSON 3: PROJECT 02 - SPACESHIP INTERFACE

DURATION*: 60 min
TRAINING VIDEO: Week 18
BOOK PAGES: 32-41

Description: Build a control panel with a switch and lights that turn on when you press the switch

Discover: Digital input and output, creating a first program, variables, conditional statements, how to read resistor color codes

Materials:**

- Switch
- 2x Red LED
- 1x Green LED
- 220 ohm and 10k ohm resistors

LESSON 4 : PROJECT 03 - LOVE-O-METER

DURATION*: 60 min
TRAINING VIDEO: Week 18
BOOK PAGES: 42-51

Description: Use a temperature sensor to measure and LED's to indicate how warm you are.

Discover: Analog input, using the serial monitor.

Materials:**

- Temperature sensor
- 3x Red LED
- 3x 220 ohm resistor

LESSON 5: PROJECT 04 - COLOR MIXING LAMP

DURATION*: 60 min
TRAINING VIDEO: Week 19
BOOK PAGES: 52-61

Description: Create a lamp that smoothly changes colors depending on external lighting conditions

Discover: Analog output, mapping values

Materials:**

- 3x Phototransistor
- RGB LED
- 3x 220 ohm and 10k ohm resistors
- 3x colored gel

LESSON 6: PROJECT 05 - MOOD CUE

DURATION*: 75 min
TRAINING VIDEO: Week 19
BOOK PAGES: 62-69

Description: Use a servo motor to make a mechanical gauge to point out what sort of mood you're in that day

Discover: Mapping values, servo motors, using built-in libraries

Materials:**

- Potentiometer
- Servo motor
- Motor arm

- 2x 100uf Capacitor
- Male Header Pin (3 pins)

LESSON 7: PROJECT 06 - LIGHT THEREMIN

DURATION*: 60 min
TRAINING VIDEO: Week 20
BOOK PAGES: 70-77

Description: Make a light-based theremin using a phototransistor and a piezo element

Discover: Making sound with the tone() function, calibrating, analog sensors

Materials:**

- Piezo
- Phototransistor
- 10k ohm resistor

LESSON 8: PROJECT 07 - KEYBOARD INSTRUMENT

DURATION*: 60 min
TRAINING VIDEO: Week 20
BOOK PAGES: 78-85

Description: Build a small musical keyboard with few resistors and buttons

Discover: Resistor ladders, arrays, tone() function

Materials:**

- 4x Switch
- Piezo
- 220, 10k, 1M ohm resistors

LESSON 9: PROJECT 08 - DIGITAL HOURGLASS

DURATION*: 60 min
TRAINING VIDEO: Week 21 + quiz
BOOK PAGES: 86-93

Description: Create a digital hourglass that turns on an LED every ten minutes using Arduino's built-in timer

Discover: Long data type, creating a timer with a millis() function

Materials:**

- Tilt switch
- 6x Red LEDs
- 220 and 10k ohm resistors

LESSON 10: PROJECT 09 - MOTORIZED PINWHEEL

DURATION*: 60 min
TRAINING VIDEO: Week 21
BOOK PAGES: 94-101

Description: Get the Arduino to spin a colorful pinwheel using a motor.

Discover: Transistors, high current/voltage loads

Materials:**

- Switch
- Mosfet transistor
- 10k ohm resistor
- Diode
- Motor
- 9V battery
- Battery snap

LESSON 11: PROJECT 10 - ZOETROPE

DURATION*: 45 min
TRAINING VIDEO: Week 21
BOOK PAGES: 94-101

Description: Create moving images in forward and reverse with your Arduino when you connect a motor to an H-bridge and some images

Discover: H-bridges

Materials:**

- Switch
- Potentiometer
- H-bridge
- 10k ohm resistor
- Motor
- 9V battery
- Battery snap

LESSON 12: PROJECT 11 - CRYSTAL BALL

DURATION*: 75 min
TRAINING VIDEO: Week 22
BOOK PAGES: 114-123

Description: Create a crystal ball to tell your future

Discover: LCD displays, switch/case statements, random()

Materials:**

- Switch
- 220 and 10k ohm resistors
- Potentiometer
- LCD screen

LESSON 13: PROJECT 12 -KNOCK LOCK

DURATION*: 75 min
TRAINING VIDEO: Week 23
BOOK PAGES: 124-135

Description: Make your own secret locking mechanism to keep unwanted guests out of your space

Discover: Input with a piezo, writing your own functions

Materials:**

- Switch
- 3x LED
- 220, 10k and 1M ohm resistors
- 100uf capacitor
- Servo motor
- Male header pin
- Piezo

LESSON 14: PROJECT 13 - TOUCHY-FEELY-LAMP

DURATION*: 60 min
TRAINING VIDEO: Week 23
BOOK PAGES: 136-143

Description: Create a lamp that turns a light on and off when you touch a piece of conductive material

Discover: Installing third party libraries, creating a touch sensor

Materials:**

- LED
- 220 and 1M ohm resistors
- Conductive material (aluminum foil or copper mesh)

LESSON 15: PROJECT 14 - TWEAK THE ARDUINO LOGO

DURATION*: 60 min
TRAINING VIDEO: Week 24
BOOK PAGES: 144-155

Description: Control a Processing sketch with the Arduino via serial communication

Discover: Serial communication with a computer program, Processing programming environment

Materials:**

- Potentiometer

LESSON 16: PROJECT 15 - HACKING BUTTONS

DURATION*: 60 min
TRAINING VIDEO: Week 24
BOOK PAGES: 156-161

Description: Get control of other components around you.

Discover: Optocoupler, connecting with other components.

Materials:**

- Optocoupler
- 220 ohm resistor

LESSON 17: OPEN ENDED CHALLENGE

DURATION*: 75 min
TRAINING VIDEO: Week 24

Description: Tackle a real world problem and create your own project with the components and programming concepts you have learned while building the 15 projects.

Discover: Problem-solving, creativity, critical thinking

Materials:** Students can decide what components they want to use

LESSON 18: FUNDAMENTALS EXAM

DURATION*: 75 min

Description: Officially certify your knowledge of Arduino in the field of programming and electronics.

Discover: *https://store.arduino.cc/digital/cert_fundamentals#*

Materials:** Computer