This course covers the contents of the Technology, Programming and Robotics subject of 1st year of Secondary Education, published in the Official Gazette.

The projects that will be developed are:

- A Scratch video game for students to learn how to program.
- A Scratch animation to simulate a speed meter
- A game for students to learn how to build mobile applications.
- A chat application in order to send and receive messages.
- A website created with HTML and CSS
- A ramp to measure the speed of a ball, a maker project made with Arduino
- Several IoT (Internet of things) exercises to simulate real network cases with Cisco Packet Tracer.

Students will learn in a more fun and effective way, using active pedagogy with challenges, learning by discovery, teamwork and “learning by doing”.

Technological objectives:

**Programming of video games:**
- Know how to use the Scratch user interface
- Learn stage dimensions and main directions
- Create and edit stages
- Use “When green flag is clicked” block
- Edit character’s costumes
- Switch character’s costumes
- Move objects
- Change the objects position
- Learn to create motion paths
- Learn how to use loops, conditionals, math and logic operators, variables, etc.
- Learn the modes of interaction between:

**Recommended course and / or school stage:**
1st year of Secondary Education

**Recommended age:**
12 years old

**Languages:**
☑ Spanish ☐ English

**Estimated teaching hours:**
65 hours

**Technologies:**
Scratch, App inventor, HTML&CSS, Arduino, Cisco Packet Tracer

**Curriculum and key competencies:**
BOCM 48/2015

**Course accreditation:**
TECHNOCAL YOUTH PASSPORT
The contents of this course are part of the qualifications of:
- Video Game Developer
- Apps Developer
- Maker DIY Engineer
- Internet of Things Architect
Mobile Application Programming:
- Know the App Inventor interfaces
- Use the Design Interface
- Use the Programming Interface
- Know how to set component properties
- Test projects in the emulator
- Install and run applications on a physical device
- Use passive and active user interface components
- Learn to configure layout components
- Use mathematical operators
- Learn to use global variables
- Learn to call procedures
- Show pop up notifications
- Provide Bluetooth connectivity
- Repeat processes periodically
- Learn to use conditionals
- Use logical operators
- Use text operators

Electronics and Robotics:
- Use the Arduino IDE interface and its main tools.
- Understand the relationship between Arduino IDE (software), Arduino board and electronic circuits (hardware).
- Learn to program using programming blocks (Ardublock)
- Classify electronic devices: actuators, sensors and others.
- Learn what is a variable and its types
- Use the Monitor Serie in order to show data
- Learn to use a breadboard
- Understand what a digital input is reading the state of a push button
- Understand the conversion signal process: from digital to analog
- Learn how to use conditionals
- Use different types of operators
- Understand the operation of a buzzer and its use
- Learn how to control a servomotor
- Control a DC motor using Arduino
- Understand the operation and uses of an Infrared sensor.
- Use a led as light emitter
- Identify correctly the pin out of different electronic components
- Calculate the energy and power consumed by a circuit and relate it to the power supply system used

Curricular competences

Programming of video games:
- Use the different programming environment tools.
- Place and move objects along a specific direction.
- Start and stop running a program.
- Use the main groups of blocks correctly.
- Analyze the code of a program and find out how it works.
- Edit the appearance of objects. Create new objects: characters, backgrounds and sounds.
- Use variables and lists correctly.
- Describe the animation designing process and the main game development phases.
- Identify and consider the implications of “design for all”.

**Programming of Mobile Applications:**
- Describe the mobile app designing process and the main app development phases.
- Use the development environment tools appropriately.
- Distinguish different data types and their forms of presentation and storage.
- Classify the available objects, their methods and events.
- Identify the interaction possibilities with the mobile device sensors.
- Develop computer applications for mobile devices using different sensors and user interface components.
- Describe the apps requirements and developer policy rules of different platforms to publish applications.

**My first website:**

Analyze the structure of a Web page: mark-up languages, style sheets and links to resources.
- Use appropriate standard marking labels, style sheets and databases for your programs.

**Safe use of the internet and other networks**
- Identify and know differences between Virus and Malware.
- Identify types of malicious software.
- Manage the use of passwords properly, choose safer passwords.
- Use private browsing on public systems when it is needed.
- Impersonation and phishing.
- Recognize harassment, abuse, cyberbullying, sexting and other illegal situations on the Internet.
- Acknowledge the difference between “abuse” and “crime”, act appropriately and report it to a responsible adult.
- Report any anomalous behaviour in Internet to a responsible adult.
- Use presentation software for the exhibition of private or collaborative documents in the network.

**Fundamentals of electronics:**
- Understand and calculate the main electrical variables that explain the operation of these circuits: voltage, intensity, resistance, power and energy.
- Distinguish the meaning of open circuit from short circuit.
- Calculate the energy and power consumed by a circuit and relate it to the power supply system used.
- Calculate current, energy and power consumption values.
- Measure the main electrical variables (current, voltage and resistance) using adequately the instrumentation, of an electrical circuit.
- Identify the differences between serial transmission systems and parallel transmission systems.

**Robotics:**
- Classify the basic components of a direct current circuit: power supply, resistors, switches, light bulbes
- Use fixed value resistor
- Use a led as light emitter
- Correctly identify the pin out of different electronic components
- Use other simple elements such as motors or buzzers.
- List the characteristics of other components such as lights or buzzers.
- Describe the recycling conditions of electrical and electronic materials.
- Light radiation, infrared and ultraviolet light.
- The infrared spectrum.
- Diodes and transistors as light detectors (phototransistor).
- Identify the basic motors and actuators features.
- Servomotors and servo-mechanisms.
- Use function libraries available on the Internet.
- Analyse actuators and motors characteristics.
- DC motors.
- Identify physical and operation principles of other types of sensors (for example ultrasonic sensor, presence sensor, and magnetic sensors).
- Sensor defined as other variables converter.
- Determine the basic characteristics and differences between analog sensors and digital sensors.
- Assemble electronic circuits according to circuit schematics.

Development of a technological project:
- Demonstrate to have technical skills in the use of materials, tools and machines during the construction of prototypes. Respect safety and hygiene rules in the work.
- Identify the mechanical properties of materials for technical use.
- Respect electrical and physical safety rules.
- Uses cutting and fixing systems with precision and safety.
- Analyse relevant documentation before starting a new process in the workshop.
- Discuss and act responsibly during team work and during all phases of the technical project development.
- Collaborate with your partners to reach the final objective
- Dialogue, reason and discuss their proposals and those presented by others
- Assume responsibility for your part of work and total work
- Adopt favourable attitudes to solve technical problems, developing interest and curiosity towards the technological activity.
- Analyse objects and technical systems to explain their operation, distinguish their elements and the functions they perform.
- Lists the main phases of a technological project and plans its development properly.
- Project with autonomy and creativity, individually and in group, technological problems working in an orderly and methodical way, from the analysis phase of the problem to the evaluation of the operation phase, including its documentation.
- Prepare technical documents, depending on the difficulty of the processes carried out and maturity, starting with respect to standardization.
- Use presentation software for the exhibition of private or collaborative documents in the network.

Simulation software:
- Securely install and uninstall basic software (office automation, antivirus, graphic design, robotics and technology simulators).