

Samsung Innovation Campus

Smart Things Edition

The aim

Samsung Innovation Campus - Smart Things

Edition aims to empower a generation of *problem solvers* by equipping them with **future-proof skills** and giving them **practical understanding of the technologies** that will shape their future and enrich sustainable growth of the world.

The project

Samsung Innovation Campus - Smart Things Edition is an educational path developed by **Samsung** in partnership with some of the best Italian public universities aimed at providing **students of technical-scientific paths** with the **AI, IoT, and soft skills** necessary to drive the **digital transformation** that is revolutionizing the production and organizational dynamics of companies.

The course trains on the application of **IoT and AI technologies** in the Consumer Electronics product market, transfers skills of **ideation, project management and problem solving** and prepares for **professional placement**.

The course includes **100 hours of digital learning**, **49 hours of in-class lectures** held by Samsung and University professors and **80 hours of teamwork** in which students develop their own project.

Target and selection process

Target Students

- **Bachelor students** enrolled in the **third year** and **first year out of course** from:
 - Departments of Computer Science
 - Departments of Information Engineering

Admission criteria



Admission test on programming logic and basic AI and IoT knowledge



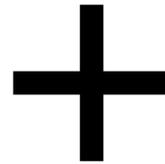
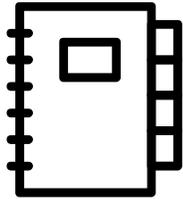
Motivational Interview



Students' university career (exams grades)

**Max 25 students
admitted**

Learning path



In-class lectures

The course consists of 49 hours of in-class or virtual lessons in which Samsung and University teachers lecture students on various topics (see slide 6 for details).

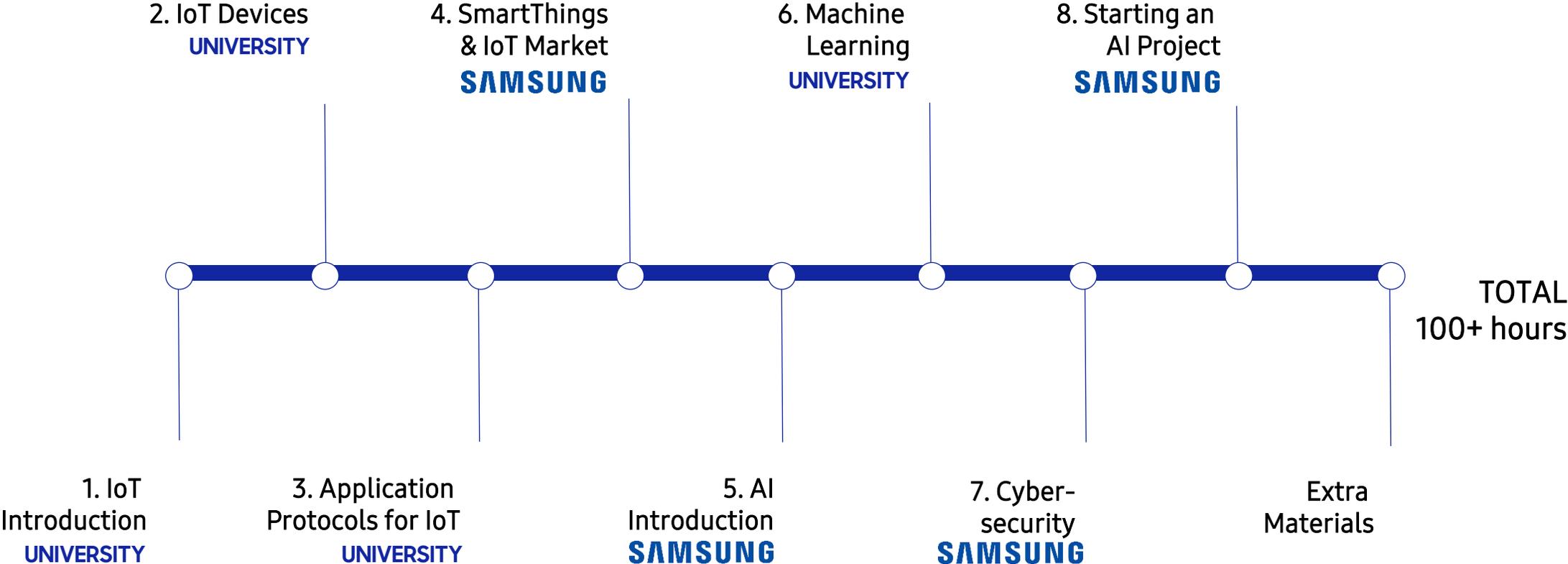
Online materials

In-class (or virtual) lessons are supported by 100+ hours of online preparatory materials.

Project Work

At the end of in-class lessons students are divided in groups of 5 and asked to work on a AI application case supervised by Samsung and University tutors.

Online materials



In **BLUE** topic ownership

Online materials detail

0. Course Introduction

1. IoT Introduction

1. IoT Overview

- 1.1 The 4th Industrial Revolution
- 1.2 Definition of IoT
- 1.3 M2M (Machine to Machine)
- 1.4 Background of IoT's Emergence

2 IoT Application

- 2.1 IoT Technology and Evolution
- 2.2 Smart Healthcare
- 2.3 Smart Home
- 2.4 Smart City
- 2.5 Smart Logistics
- 2.6 Smart Factory
- 2.7 Smart Farm
- 2.8 Connected Car
- 2.9 Smart Energy
- 2.10 IoT Major Services

3. IoT Components

- 3.1 IoT Environment
- 3.2 Cloud Computing

4. IoT Network

- 4.1 IoT Network Overview
- 4.2 IoT Short-range Communication Technology
- 4.3 LPWA

- 4.4 5G Network

2. IoT Devices

1. Devices

- 1.1 IoT Devices Introduction
- 1.2 Sensor and Actuator
- 1.3 Open source HW

2. Sensors

- 2.1 Definition of Sensor
- 2.2 Basic Features of Sensor
- 2.3 Classification of Sensor
- 2.4 Applications and Roles of Sensor

3. Application

Protocols for IoT

1. IoT Platforms

- 1.1 IoT Platform Overview
- 1.2 Basic Structure of the IoT Platform
- 1.3 IoT Platform Technology
- 1.4 Examples of IoT Platform
- 1.5 IoT Open Platform: OCEAN

2. Protocols

- 2.1 What is a Protocol?
- 2.2 HTTP
- 2.3 MQTT
- 2.4 CoAP

- 2.5 WebSocket

3. Home Assistant

- 3.1 Background of Home Assistant
- 3.2 Home Assistant Overview
- 3.3 Home Assistant Example

4. SmartThings

1. Innovation & IoT

- 1.1 Innovation
- 1.2 Innovation: Internet of Things
- 1.3 Innovation: A.I. and Big Data
- 1.4 Innovation: 5G
- 1.5 Innovation: Services & Devices

2. The SmartThings Ecosystem

- 2.1 Smart Home
- 2.2 The SmartThings Ecosystem
- 2.3 SmartThings Architecture
- 2.4 SmartThings API

3. Devices

- 3.1 Basics
- 3.2 Cloud-Connected
- 3.3 Directly Connected
- 3.4 Hub-Connected

4. SmartApp

- 3.1 Basics
- 3.2 Automations
- 3.3 Lifecycles

5. Certification

- D5.1 Publishing a Device

- 5.2 Certified Devices

- 5.3 Compatible Devices

6. IoT Market

- 6.1 I Numeri
- 6.2 La Percezione
- 6.3 L'Ecosistema Samsung

5. AI Introduction

1. Introduction

- 1.1 Past and present of A.I.
- 1.2 Technology panorama
- 1.3 What A.I. means
- 1.4 History of A.I.
- 1.5 Classes of Solutions
- 1.6 How A.I. is transforming jobs

2. Implementation Use Cases

- 2.1 Diagnostic imaging
- 2.2 Television
- 2.3 Vocal Assistant

3. Bixby

- 3.1 How does the vocal assistant work?
- 3.2 Bixby

6. Machine Learning Introduction

1. Introduction

- 1.1. Machine Learning
- 1.2. Supervised Learning
- 1.3. Unsupervised Learning
- 1.4 Reinforcement
- 1.5 Cross Validation
- 1.6 Workflow
- 1.7 Deep Learning

2. Fields of applications

- 2.1. Chatbot
- 2.2. Image Recognition
- 2.3. Predictive Maintenance
- 2.4 Insurance Services

3. Business Cases

- 3.1. Greenbyte
- 3.2 Groceries by MasterCard
- 3.3 AlphaGo

Online materials detail

8. Cybersecurity

1. Cyber Resilienza

- 1.1 Introduzione
- 1.2 Security by Design
- 1.3 Detection e Remediation
- 1.4 Il contesto delle reti 5G
- 1.5 Sicurezza di dispositivi e apparati
- 1.6 Strategia OEM (Original Equipment Manufacturer)

2. Il Fattore Umano

- 2.1 Introduzione
- 2.2 Lo Scenario nel Mondo Aziendale
- 2.3 Lo Scenario nel Mondo Consumer
- 2.4 L'Ingegneria Sociale

3. Workshop

9. Starting an AI Project

1. Design Thinking

- 1.1. What is Design Thinking and Why?
- 1.2. Characteristics of Design Thinking

Extra materials Part I

1. Understanding of Probability

- 1.1. Probability Theory
- 1.2. Probability Rules
- 1.3. Random Variable
- 1.4. Discrete Probability Distribution

2. Understanding of Statistics I

- 2.1. Continuous Probability Density
- 2.2. Conjoint Probability

3. Understanding of Statistics II

- 3.1. Descriptive Statistics
- 3.2. Central Limit Theorem
- 3.3. Estimation Theory

4. Statistical Hypothesis Testing

- 4.1. Principles of Hypothesis Testing
- 4.2. Hypothesis Testing in Action

Extra materials Part II

1. IoT Device and Software

- 1.1 IoT Device
- 1.2 IoT Software

2. How to run Raspberry P

- 2.1 Raspberry Pi Overview
- 2.2 Getting Started with Raspberry Pi

- 2.3 Practice Environment Configuration

3. Sensor Device II

- 3.1 Basics of Electronics
- 3.2 Types of Electronic Parts
- 3.3 Interpretation of Circuit Diagram

4. Sensor Device III

- 4.1 Digital Input and Electric Circuit
- 4.2 LED
- 4.3 Ultrasonic Sensor
- 4.4 7-Segment(4 Digit LED)
- 4.5 Temperature-Humidity Sensor
- 4.6 Primary Control Programming
- 4.7 UART Communication
- 4.8 Making Device

5. Node-RED

- 5.1 Introduction to Node-RED
- 5.2 Standalone Installation
- 5.3 Fundamentals
- 5.4 Docker Installation
- 5.5 Configuration
- 5.6 Understanding Node Structure, Developing and Testing

6. OpenHAB (Open Home Automation Bus)

- 6.1 OpenHAB Overview

- 6.2 OpenHAB Installation & Demonstration

- 6.3 Configuring OpenHAB for MQTT Binding

7. Data Analysis & Visualization

- 7.1 Matrix collection tools : Graphite
- 7.2 Open source visualization tools : Grafana
- 7.3 R Programming

8. Project Preparation

- 8.1 Project Planification
- 8.2 Searching for Project Ideas

Project work

- **AI-IoT Project Work based on Bixby technology**
 - Students will develop the Project Work in groups of five components
 - Project work will be evaluated by Samsung and University
- **Final Test on lectures contents**

TOTAL: 80 hours

5 students with the highest grades in Project Work and Final Test will receive an economic prize*

* The prize will be comparable to the average one-year tuition fee of Italian Public Universities

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<https://www.samsung.com/it/campaign/smart-things/>

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Enabling People

Education for Future Generations