Enabling People

Samsung Innovation Campus

Smart Things Edition

Università degli Studi di Cagliari

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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**, **60 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

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Target Students

Bachelor and master students from STEM areas, belonging to the following departments:

- "Ingegneria Elettrica ed Elettronica"
- "Matematica e Informatica"

Admission criteria

Admission test on programming logic and basic AI and IoT knowledge

Motivational Interview

Students' university career (exams grades)

Max 25 students admitted

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Learning path

In-class lectures

The course consists of 60 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.

Keynote speech event

3 hours of virtual eventi dedicated to students by inviting experts from cybersecurity to sustainability

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.

In-class lectures

TBC

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N. Lezione	Titolo Lezione	Giorno	Ora	Durata (ore)	Owner	Docente
Day 0	Incontro di Benvenuto	Mercoledì 01 Sett 2021	14:30-15:30	1	All	
Day 1	IoT Introduction	Mercoledì 01 Sett 2021	15:30-18:30	3	Università degli Studi di Cagliari	
Day 2	IoT Devices	Giovedì 02 Sett 2021	15:30-18:30	3	Università degli Studi di Cagliari	
Day 3	Application Protocols for IoT	Venerdì 03 Sett 2021	14:30-18:30	4	Università degli Studi di Cagliari	
Day 4	Lezione SmartThings & IoT Market	Lunedì 06 Sett 2021	16:30-18:30	2	Samsung	Dott. Bruno Laudicina, Dott. Davide Bigoni
Day 5	Lezione SmartThings & IoT Market	Martedì 07 Sett 2021	16:30-18:30	2	Samsung	Dott. Bruno Laudicina, Dott. Davide Bigoni
Day 6	Lezione Peer-to-Peer Coaching	Mercoledì 08 Sett 2021	16:30-18:30	2	Samsung	5 Mentors (TBD)
Day 7	Lezione Job Preparation - CV/Colloquio	Giovedì 09 Sett 2021	16:30-18:30	2	Samsung	Dott.ssa Raffaella Lixi
Day 8	Lezione Job Preparation - Soft skills	Venerdì 10 Sett 2021	16:30-18:30	2	Samsung	Dott.ssa Daniela Liuni
Day 9	Lezione Job Preparation - Soft skills	Lunedì 13 Sett 2021	16:30-18:30	2	Samsung	Dott.ssa Daniela Liuni
Day 10	Lezione AI Introduction	Martedì 14 Sett 2021	16:30-18:30	2	Samsung	Dott. Giovanni Locatelli
Day 11	Machine Learning	Mercoledì 15 Sett 2021	14:30-18:30	4	Università degli Studi di Cagliari	
Day 12	Machine Learning	Giovedì 16 Sett 2021	14:30-18:30	4	Università degli Studi di Cagliari	
Day 13	Deep Learning	Venerdì 17 Sett 2021	14:30-18:30	4	Università degli Studi di Cagliari	
Day 14	Deep Learning	Lunedì 20 Sett 2021	14:30-18:30	4	Università degli Studi di Cagliari	
Day 15	Deep Learning	Martedì 21 Sett 2021	14:30-18:30	4	Università degli Studi di Cagliari	
Day 16	Lezione Cybersecurity	Mercoledì 22 Sett 2021	16:30-18:30	2	Samsung	Dott. Matteo Rigoni, Dott. Mauro Maconi
Day 17	Lezione Cybersecurity	Giovedì 23 Sett 2021	16:30-18:30	2	Samsung	Dott. Matteo Rigoni, Dott. Mauro Maconi
Day 18	Lezione Idea and Business Model Generation	Venerdì 24 Sett 2021	14:30-18:30	4	Samsung + Doing	Design Thinking Team
Day 19	Lezione Develop an AI Project	Lunedì 27 Sett 2021	16:30-18:30	2	Samsung	Dott. Giovanni Locatelli, Dott. Davide Bigoni
Day 20	Lezione Develop an AI Project	Martedì 28 Sett 2021	16:30-18:30	2	Samsung	Dott. Giovanni Locatelli, Dott. Davide Bigoni
Day 21	Keynote speech event	Mercoledì 29 Sett 2021	09:00-12:00	3	Esperti Esterni - Samsung	
			Totale Ore	**60**		
			Samsung	30		
			Università	30		

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Online materials

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1. IoT Introduction
UNIVERSITÀ DEGLI STUDI DI CAGLIARI

2. IoT Devices
UNIVERSITÀ DEGLI STUDI DI CAGLIARI

3. Application Protocols for IoT
UNIVERSITÀ DEGLI STUDI DI CAGLIARI

4. SmartThings & IoT Market
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5. AI Introduction
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6. Machine Learning
UNIVERSITÀ DEGLI STUDI DI CAGLIARI

7. Deep Learning
UNIVERSITÀ DEGLI STUDI DI CAGLIARI

8. Cyber-security
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9. Starting an AI Project
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Extra Materials

TOTAL
100+ hours

In BLUE topic ownership

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Online materials detail

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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

1. Data preprocessing
1.1. Machine learning with Scikit-Learn
1.2. Data Preprocessing
1.3. Feature Engineering
2. Unsupervised learning
2.1. Clustering Analysis
2.2. Principal Component Analysis (PCA)
2.3. Applications of Principal Components
3. Regression
3.1. Training and Testing in Machine Learning
3.2. Linear Regression Basics
3.3. Linear Regression Diagnostics
3.4. Other Regression Types
4. Classification Prediction (Basic)
4.1. Logistic Regression Basics.
4.2. Logistic RegressiPerfon ormance Metrics.
4.3. Naïve Bayes Algorithm.
4.4. KNN Algorithm.
4.5. SVM Algorithm.
5. Classification Prediction (Advanced)
5.1. Tree Algorithm.
5.2. Ensemble Algorithms.

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Online materials detail

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7. Deep Learning

1 Introduction to Deep Learning
1.1. TensorFlow Basics
1.2. Machine Learning with TensorFlow
1.3. Tensor Board
1.4. Artificial Neural Network
2. Deep Learning Various Topics
2.1. Convolutional Neural Network (CNN)
2.2. Recurrent Neural Network (RNN)
2.3. AutoEncoder
2.4. Generative Adversarial Networks (GAN)
3. Deep Learning with Keras
3.1. Keras Basics
3.2. AI with Keras
3.3. Natural Language Processing with Keras

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 Ruspberry 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 Devide 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

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In-class lectures by Samsung

	SAMSUNG	SAMSUNG	SAMSUNG	SAMSUNG	SAMSUNG	SAMSUNG	SAMSUNG	SAMSUNG
Welcome & Introduction	SmartThings & IoT Market	Peer-to-Peer Coaching	Job Preparation	AI Introduction	Cybersecurity	Idea & Business Model Generation	Develop an AI project	Keynote speech Event
		From Samsung Millennials Employees				Lab	AI Application cases: Bixby	
	P&S	P&S	Training	P&S	P&S		P&S	
1 hours	4 hours	2 hours	6 hours	2 hours	4 hours	4 hours	4 hours	3 hours

TOTAL: 30 hours

In LIGHT-BLUE lectures with no online materials

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In-class lectures by Università degli Studi di Cagliari

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Contents to be defined according to university-specific capabilities

TOTAL: 30 hours

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Project work

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- AI-IoT Project Work:
  - Students will develop the Project Work in groups of five components
  - Project work will be evaluated by Samsung and University
- Final Test on lectures and contents uploaded on the online platform

3 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

TOTAL: 80 hours

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Timeline

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TO BE CONFIRMED BY UNIVERSITÀ DEGLI STUDI DI CAGLIARI

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

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