Existing educational and training programmes

In IoT field in the European Union and worldwide

TALENTJOURNEY

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Examples of existing educational and training programmes

There are countless IoT education and training programs across Europe and the rest of the world. In the field of education, there are mainly postgraduate programs. However, the trainings are mostly shorter and are available either as technical trainings for developers and engineers or as business-oriented workshops for managers and entrepreneurs.

Below are some selected contents of education and training programs.

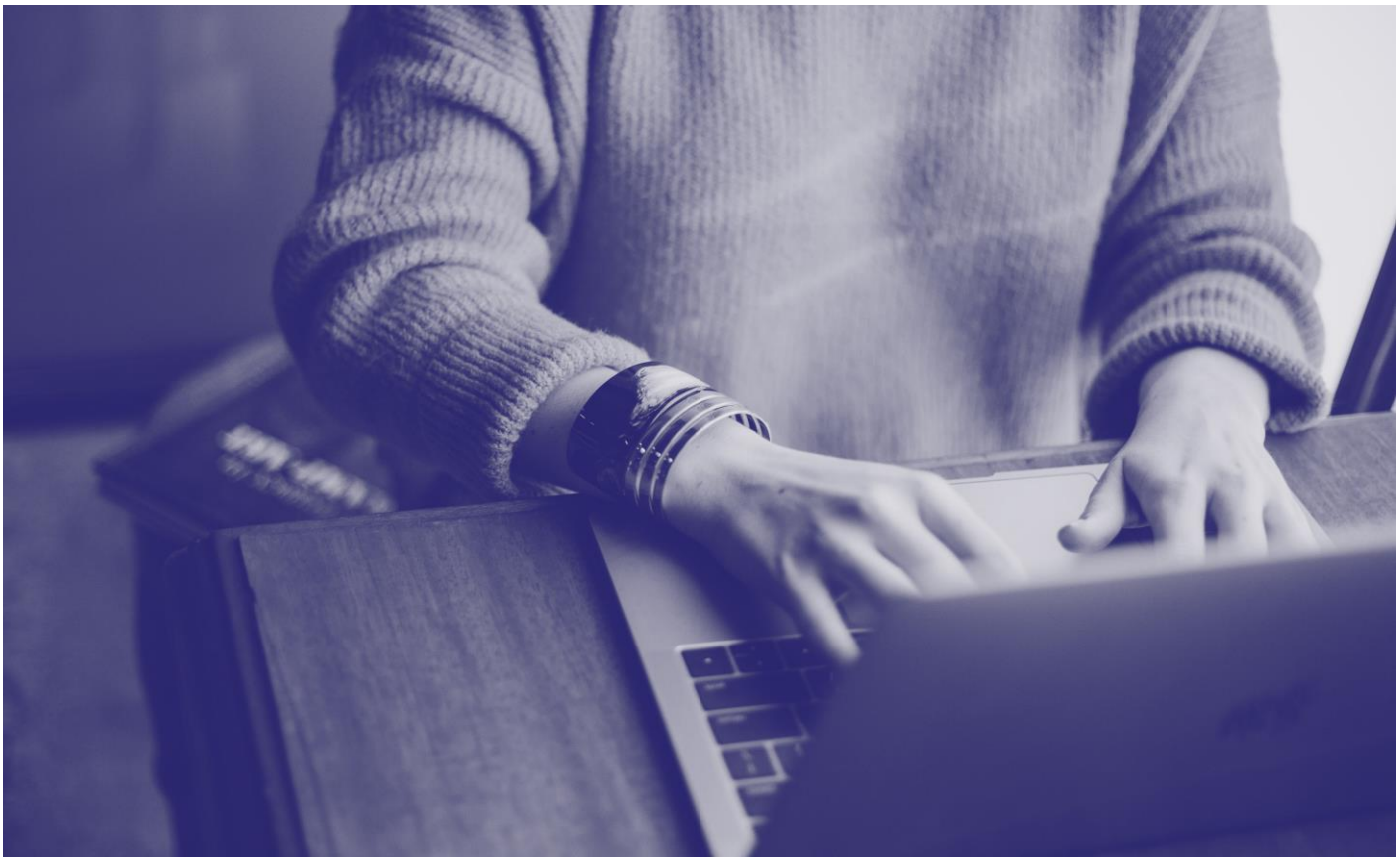
	Educational or Training program	Skills	Level Duration	Link
1	**IoT Solution Architect**	• innovative business model and design thinking • electronics and embedded systems • IT and networks • data science and Artificial Intelligence (AI) • industrial applications	Postgraduate 400 h	https://www.ecoleiot.fr/en/?gclid=EAIaIQobChMI89eQ9bvd6AIVkOmaCh2DdQHdEAAYASAAEgLHx_D_BwE&cn-reloaded=1
2	**Introduction to Design Thinking for the IoT (DT-F101)**	• You know the process and methods of Design Thinking and are able to assess if and how to use them • Understanding the benefits of user-centric product and service development; first impression of interdisciplinary and agile team work • Networking with other participants of the IoT field	/	https://bosch-iot-academy.com/IoTAcademy/Catalog.aspx?id=30221&parentId=30076
3	**Internet of Things (IoT) Product Security (IoT-F503)**	• Understand distinct security aspects regarding connectivity • Learn and understand security basics (e.g., basic terminology) • Establish fundamental knowledge about cryptographic tools, algorithms, and protocols • Understand important aspects of access control (authentication and authorization) • Establish an overview knowledge of secure protocol configurations and pitfalls • Learn the basics about protocols for the internet of things • Comprehend the threats to interfaces and how to alleviate them • Find out the basics about web services and possible vulnerabilities	/	https://bosch-iot-academy.com/IoTAcademy/Catalog.aspx?id=26433&parentId=30073
4	**Programming, Internet of Things, Data Analytics and Big data**	You will learn the basics of programming in Python and apply it in your own IoT project. You will learn to work with the most used IoT platforms for home use: RP and Arduino. You will learn the basics of programming in Python and apply it in data processing and data analytics.	8-9 weeks	https://www.ict-academy.eu/en/iot-academy/internet-of-things-academy

5	**Master in Internet of Things (IoT)**	• Design tools for processing and analyzing large amounts of data from sensors; • Design and develop IoT applications and services adapted to industrial needs • Understand and design communication mechanisms adapted to the constraints of the sensors (energy consumption, lack of computing capacities) • Acquire dual competences technical courses in advanced fields (data exploitation, software development, communication networks in constrained environments, Machine Learning, sensor security) associated with courses in Innovation, Project Management, Entrepreneurship, etc.	Postgraduate Duration 4 semesters	https://www.masterstudies.com/Master-in-Internet-of-Things-(IoT)/France/EURECOM/
6	**Architecting Smart IoT Devices**	Internet Of Things (IOT) DebuggingReal-Time Operating System (RTOS)	Approx. 14 hours to complete	https://www.coursera.org/learn/iot-architecture
7	**Introduction to Cyber Security Specialization**	CryptographyCybersecurityRisk AssessmentCyber DefenseCyber AttacksInformation Security (INFOSEC)Denial-Of-Service Attack (DOS)Public-Key Cryptography	Approx. 2 months to complete	https://www.coursera.org/specializations/intro-cyber-security
8	**IoT school**	Learn new skills and discover the power of Microsoft products with step-by-step guidance.		https://iotschool.microsoft.com/en-us/home
9	**Internet of Things (IoT)** **MSc**	Modules *Core* Internet of Things (IoT) (COS7039-B) Advanced IoT (Data Science for IoT) (COS7043-B) Cloud Computing (COS7044-B) Dissertation (COS7004-E) *Option* Software Development (COS7009-B) Business Systems Security (COS7035-B) Big Data Systems and Analytics (COS7006-B) Mobile Application Development (COS7025-B) Big Data Visualisation (COS7046-B) Advanced Machine Learning (COS7045-B) Statistical Data Analysis (COS7005-B)	Postgraduate 1 year	https://www.bradford.ac.uk/courses/pg/internet-of-things/ https://www.bradford.ac.uk/media-v8/aqeo/modules/2019-20/COS7039-B_InternetofThingsIoT201920-MD.pdf https://www.bradford.ac.uk/media-v8/aqeo/modules/2019-20/COS7043-B_AdvancedIoTDataScienceforIoT201920-MD.pdf

10	**INTERNET OF THINGS**	Modules you will study focus on: • Planning, analysing, developing, evaluating, • Deploying , managing IoT systems/services for modern day organisations/ businesses All modules respect the themes of Internet of Things. You will also be introduced to unique and challenging modules, for example: • Mobile Networks and Smartphone Applications • Data Mining and Visualization • Ethics for IT professionals • Object-oriented Analysis and Design • Research Design and Methods • Emerging Topics in Smart Networks • Master's project Optional modules include: • Internet-of-Things • Advanced Wireless Networking Technologies Two of the modules you will study focus on research and the latest trends in the field, namely: • Research Design and Methods • Emerging Topics in Smart Networks	Postgraduate 1 year	https://www.uws.ac.uk/study/postgraduate/postgraduate-course-search/internet-of-things/?utm_source=findamasters&utm_campaign=courseid[52421]&utm_medium=courselisting&utm_content=textLink#!#course-details
11	**Internet of Things with Entrepreneurship**	• Cover the theory and practice that will be valuable for a career in the emergent IoT industry or starting your own IoT venture. • Develop the deep expertise in the underlying technologies of electronics, sensing and communications that will enable you to exploit the demand and opportunities for engineers with both technical skills and an awareness of the business implications of IoT. • Learn to apply your knowledge to create new inventions and ideas, and bring them to reality. • Develop an entrepreneurial perspective that is essential for designing innovative products with a module from the Sir John Cass Business School, renowned as one of the UK's leading business schools.	Postgraduate 12 months	https://www.city.ac.uk/study/courses/postgraduate/internet-of-things-with-entrepreneurship

12	**Internet of Things Training Programme (IoT TP)**	The modules of the IoT TP: OM: Overview Module FM1: Introduction to the Internet of Things FM2: Standards, Architectures and Interoperability FM3: Policies and Regulations Pertaining to the IoT FM4: Design & Functioning of Wireless IoT Technologies FM5: Physical IoT Infrastructure and Network Planning: from Devices to Cloud FM6: IoT Data Security, Privacy and Trust FM7: Introduction to IoT Data Science FM8: Global IoT Use Cases AM1: Understanding & Designing Sensor Electronics AM2: Advanced Wireless IoT Design in 5G AM3: Designing & Programming of the Web of Things AM4: AI and Machine Learning for IoT Big Data AM5: Social & Ethical Implications and Case Studies AM6: Business Models and Case Study Implementations AM7: IoT Entrepreneurship	/	https://academy.itu.int/main-activities/curriculum-development/internet-things-training-programme-iottp https://academy.itu.int/sites/default/files/media/file/IoT%20TP%20Report.pdf
13	**MSc Internet of Things (1 year full-time)**	COMPULSORY Project Preparation Secure Hardware Design Foundations of Embedded IoT Systems IoT Networks OPTIONAL Biometrics Open Data Innovation Foundations of Data Science Mobile Applications Development Microsensor Technologies Biologically Inspired Robotics Embedded Processors Cryptography Machine Learning for Wireless Communications	Postgraduate 12 months	https://www.ecs.soton.ac.uk/programmes/internet-of-things#modules
14	**IoT Programming and Big Data**	Appreciate the software needs of an IoT project Understand how data is managed in an IoT network Apply software solutions for different systems and Big Data to your IoT concept designs Create Python scripts to manage large data files collected from sensor data and interact with the real world via actuators and other output devices.	5 Weeks 4–6 hours per week	https://www.edx.org/course/iot-programming-and-big-data https://www.edx.org/learn/iot-internet-of-things

15	**Internet of Things (IoT) Training**	Introduction- Concepts and Technologies behind Internet of Things (IoT) IoT Reference Architectures IoT Device Design and Management Communication Technologies and Protocols Data Representation & Modeling Edge Computing and IoT Brokers IoT Analytics Predictive Analytics and Machine Learning using Python Machine Learning using Python IoT Cloud platforms IoT Security IoT use cases and case studies Internet of Things course is designed for professionals with a basic understanding of electronic circuit design, microcontrollers, and programming languages, as well as knowledge of computer fundamentals.	48 hours of live, online, instructor-led training	https://www.cognixia.com/pdffiles/Internet-of-Things.pdf https://www.cognixia.com/course/internet-of-things-certification



16	**Internet of Things Security Expert Training**	Python *Python overview* • Syntax and structure • Comparisons to other languages (C, C++, Java, etc) • Available Python Resources • Whitespace, Indentation and program formatting • Variables and Naming Conventions • Operators • Statement structure • Comments • Program Construction *Data Types* • Built-in Types • Strings and Numbers • Formatting Data, Numbers, Dates • Using Lists/Arrays • Tuples • Dictionaries • Understanding Dynamic Typing • Working with Functions • Python Code Execution • Basic Input / Output • String Operations • Working with Tuples and Lists • Introducing Control Flow Statements *Functions* • Variable Scope • Variable Parameters • Default Values • Positional Parameters • Keyword Parameters • Introducing Lambdas • Exception Handling *Classes in Python* • Creating Classes in Python • Classes are Namespaces • Constructors • Self and Instances • Class Variables • List Comprehensions • Advance Python Modules • Default Values • Positional Parameters • Keyword Parameters • Introducing Lambdas • Exception Handling Advance IoT Training & Certification Program Internet of Things Security	9 week course	https://www.cognixia.com/courses/internet-of-things-security-expert

17	**Big Data Architect Training**	This program is customized based on current industry standards that comprise the major sub-modules as a part of the training process. This program is designed by industry experts to provide hands-on training with tools that are used to speed up the training process.	126 hours of live online training, including live POC and assignments.	https://www.cognixia.com/courses/big-data-architect
18	**IIoT**	Curriculum • Introduction to Industrial Internet of Things • Industrial automation: PLC and SCADA • Sensor Data Mining and Analytics • Wireless Sensor Area Networks (WSAN) • Design and Development of IIoT systems • Industry 4.0: Smart factory initiative • Industrial cloud platforms • Industrial IoT security The course is recommended for anyone with basic computer skills who is keen to build a career in the field.	16 hours of live, online, instructor-led training	https://www.cognixia.com/course/industrial-internet-of-things-iiot-training https://www.cognixia.com/courses/category/internet-of-things
19	**IOT-OPEN.EU project**	IOT-OPEN.EU project is funded by the European Community under Erasmus+ programme KA2 (Strategic Partnership for Higher Education). The consortium is lead by Silesian University of Technology MOOC materials on IoT, for tutors	/	http://iot-open.eu/io2-tutors/
20	**Introduction to IoT (IOTFND) 1**	Module 1: Defining Industrial Internet of Things • Lesson 1: Defining IoT and Industrial IoT • Lesson 2: IIoT Examples • Lesson 3: IIoT Motivation and Standards • Lesson 4: IIoT Components • Lesson 5: Common IIoT Architecture Module 2: Examining Common IIoT Verticals • Lesson 1: Major IIoT Verticals • Lesson 2: IIoT Manufacturing Vertical • Lesson 3: IIoT Mining Vertical • Lesson 4: IIoT Utilities Vertical • Lesson 5: IIoT Transportation Vertical • Lesson 6: IIoT Smart Cities Vertical • Lesson 7: IIoT Health Care Vertical • Lesson 8: IIoT Environment and Job Roles of OT and IT Module 3: Examining Cisco IIoT Networking Devices • Lesson 1: Overview of IIoT Networking Devices • Lesson 2: Cisco Industrial Routers • Lesson 3: Cisco Industrial Switches and Access Points	1 day	https://learninglocator.cloudapps.cisco.com/#/course-details/907521

21	**Securing Industrial IoT Networks with Cisco Technologies (ISECIN) 1.0**	Description: It is recommended that a learner has the following knowledge and skills before attending this course: - IP Networking Basics: INICS, ICND1 equivalent - OT Networking Basics: ICINS, IMINS or IMINS2 - Network Security Basics: IINS or CCNA Security equivalent Objective: This course provides an overview of the IoT enabled industrial verticals (manufacturing, energy, O&G, utilities, process control), architectures, and IIoT security requirements, frameworks, and regulations. Security protocols, vulnerabilities, and the process of securing against the vulnerabilities are examined in depth and practiced in the hands-on lab environment. Upon completion of this course, you will be able to: - Understand the convergent enterprise and industrial IoT architecture, components and applications - Contrast enterprise IT vs. industrial OT security - Define layered security requirements from the network edge to the core, and from access to applications layer - Protect endpoints, communications as well as data at rest and in motion - Compliance to standards and regulations and auditing - Understand protocols, applications and IPv6 for IIoT - Identify vulnerabilities and threat - Familiarize with common implementation issues - Assess, monitor and detect vulnerabilities - Walk through IIoT attacks - Adopt best practices in design principles and process for securing and segmenting IIoT networks - Application of the converged security model for the broader industry: manufacturing, utilities, transportation, O&G - Secure and monitor/detect the IIoT framework with next generation security products and tools Who should attend • Security Engineer • Security Operations • Security Analysts • Systems, Solutions Architects • System Integrators • Senior OT Engineers	5 days	https://learninglocator.cloudapps.cisco.com/#/course-details/8574

22	**Internet of Things Training at New Horizons**	Internet of Things IoT Courses • IoT and Blockchain Training • Big Data on AWS • CertNexus Certified Internet of Things Practitioner (CIoTP) • CertNexus Internet of Things for Business Professionals (IoTBIZ) • Data Engineering on Google Cloud Platform • From Data to Insights with Google Cloud Platform • Google Cloud Platform Big Data and Machine Learning Fundamentals • QQ144 IBM Essentials of IBM Rational Rhapsody for Systems Engineers V8.1.1 • UX100 SAP Fiori - Foundation • UX200 SAP Fiori – System Administration • VMware NSX® SD-WAN by VeloCloud™ - Deploy and Manage About Internet of Things (IoT) IoT offers a wide range of benefits, enabling organizations to collect and analyze massive quantities of data. But putting IoT systems into place can be a complicated proposition, and fraught with hazards. Solutions may involve devices and technologies from many different vendors, requiring a good understanding of software and hardware and strategies to integrate them, as well as the risks associated with security, privacy, and the safety of those whose working and living environments are managed by these systems.	1 – 3 days courses	https://clc.newhorizons.com/training-and-certifications/technical-courses/internet-of-things
23	**Bosch.IO · IoT Academy**	Bosch IoT Academy offers courses, workshops, and certification programs that enable to plan, build, and roll out solution. Offers Fundamentals, Basics, Advanced, and Expert courses cater to every skill level.	Various lenght	https://bosch-iot-academy.com/IoTAcademy/Catalog.aspx?target=_blank&LoginDomain=INST&ParentId=0&Id=30073&LoginUsername=guest&LoginPassword=97329d723d2e0094dd9ddb7a9653b30c&language=en-US&forceReload=true
24	**IoT4Industry project**	The IoT4Industry project seeks to support EU growth and competitiveness through the development of a new cross-sectoral industrial value chain based on the integration and use of IoT and related components (Digital Security, Cloud Computing, Big Data, Artificial Intelligence…) into manufacturing tools, machines and robots, industrial processes, factories environment, through the cross-border collaboration between SMEs and other RDI actors of the ICT and advanced manufacturing sectors.	/	https://www.iot4industry.eu/files/cto_layout/img/IOT4INDUSTRY/Results/D1.2_ICT%20competencies%20for%20existing%20(ready%20to%20use)%20or%20potential.pdf

25	**Industrial IoT Center**	The IoT transfer center offers various training programs. Besides scheduled courses offered by FOKUS Academy there are customized courses tailored to the individual requirements and interests of our customers. The following training modules are currently offered: IoT Basics Fundamental Knowledge (3 hrs – 2 x 90 min): IoT Advanced Comprehensive Overview (6 hrs – 4 x 90 mins): IoT Technology Deep-Dive Industrial Internet of Things (IIoT) IoT in der industriellen Nutzung (3 hrs – 2 x 90 min)	Short training	https://www.iiot-center.org/iiot/offers/training https://www.fokus.fraunhofer.de/en/fokus/akademie