UPC studies

MASTER'S DEGREE IN MACHINE LEARNING AND CYBERSECURITY FOR INTERNET-CONNECTED SYSTEMS

UPC MANRESA
Manresa School of Engineering

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

MASTER'S DEGREE IN

MACHINE LEARNING AND CYBERSECURITY FOR INTERNET-CONNECTED SYSTEMS

This master's degree responds to the growing need for digital skills described in the European Commission's Digital Decade roadmap for 2030. More than 90% of jobs already require specific digital skills but the number of digital experts does not keep up with demand. This master's degree provides training in three key areas of digitalisation: artificial intelligence (AI), cybersecurity and the Internet of Things (IoT), giving students a unique opportunity to become well-rounded digital professionals. They will be able to integrate and manage complex AI, cybersecurity and IoT systems, apply and develop valid solutions for different types of platforms and carry out safe and efficient systems and data management.

This master's degree is part of the European MERIT project. MERIT's goal is to provide the workforce with advanced digital skills, with a total of 10 partners participating: European universities, SMEs, digital innovation hubs and research centres. It offers unique opportunities for mobility, including grants that are specially designed to facilitate the internationalisation of students.

Curriculum

This information may be subject to change.
Up-to-date information is available at upc.edu

90 ECTS credits

Language: English
Intensive courses: 5 slots per semester, each lasting 3 weeks, with up to 2 courses per slot.
3 semesters, 90 ECTS credits
Face-to-face
Evenings, from Monday to Thursday

1st semester

Fundamentals of Artificial Intelligence	3
Machine Learnings	3
Neutral Networks	3
Cryptography	3
Ethical Hacking	3
Malware Analysis	3
Network Security	3
Non-Relational Database Systems	3
Cloud Computing and Distributed Systems	3
Systems Development Life Cycle: Continuous Development and Integration	3

Compulsory AI subjects
Optional AI subjects
Compulsory Cybersecurity subjects
Optional Cybersecurity subjects

10
prestigious universities, companies and research and innovation centres participating

+90%
of jobs require specific digital skills

300,000
cybersecurity professionals needed in Europe

Why this master's degree?

This master's degree allows students to gain expertise in three key disciplines: artificial intelligence (AI), cybersecurity and the Internet of Things (IoT), giving them a unique opportunity to become well-rounded digital professionals who are perfectly qualified for the job market.
These core disciplines are recognised as the workhorse of future industry and, alone or in combination, they sustain most Industry 4.0 projects. The degree also includes fundamental courses on software development that are specifically oriented to modern trends such as cloud architectures and high performance computing.
The degree's structure is highly modular and allows you to choose your own pathway by taking a particular set of optional subjects. You can choose optional courses to build either a cross-disciplinary CV or a more specialised CV.
Although their foundation is solidly theoretical, the courses stress direct, practical application to industrial use cases. They are eminently practical and foster teamwork on real, integrated projects and promote collaboration, interaction and a close relationship with teaching staff, who have proven experience in the fields of the master's degree.

Who is it for?

Graduates with one of the following bachelor's degrees may be admitted to the master's degree:

- ICT Systems Engineering
- Computer Engineering
- Data Science and Engineering
- Telecommunications Systems Engineering
- Telecommunications Technologies and Services
- Network Engineering

Graduates of other degrees are evaluated for admission to the programme on a case-by-case basis.
The language of instruction is English. Candidates must have Level B2 in English.

Grants

Through the European project Master of Science in Smart, Secure and Interconnected Systems (MERIT), students may apply for grants to cover enrolment fees.

Mobility

MERIT partners Tallinn University of Technology, Vilnius Gediminas Technical University and Riga Technical University have collaborated to codesign the master's programme and provide mobility opportunities with transfer of credits, joint courses and collaborative projects for students from all the institutions. Dedicated scholarships for mobility are available.

Professional opportunities

Graduates can opt for job titles such as specialist in artificial intelligence, specialist in cybersecurity, cybersecurity analyst, data engineer/scientist and IoT engineer.
Graduates will be able to apply ethical, legal and professional standards in the fields of artificial intelligence, cybersecurity and IoT, thus fitting seamlessly into the job market.
They will also have direct access to the world of research in the areas covered, so they may join company R&D departments or continue in academia.

2nd semester

Advanced Deep Learning Modes	3
Sequences and Recurrent Networks	3
Natural Language Processing	3
Optimisation for Machine Learning	3
Probabilistic Methods	3
Wireless System Security	3
Advanced Cryptography	3
Cybersecurity of Industrial Control Systems	3
Network Security Monitoring	3
System Security	3
Introduction to High Performance Computing	3
Systems Development Life Cycle: Analysis and Design	3
Cyberphysical Systems	3
IoT Connectivity	3
IoT Sensor Systems	3

3rd semester

Artificial Intelligence in Healthcare	3
Machine Learning for Cybersecurity	3
Database Security	3
Digital Forensics	3
Networks Solutions for IoT	3
Advanced Relational Database Systems	3
Front and Frameworks	3
Ethical, Legal and Human Aspects of Artificial Intelligence and Cybersecurity	3
Digital Entrepreneurship and Innovation Management	3
Master's Thesis	18

Compulsory IoT subjects
Optional IoT subjects
Compulsory Software Engineering subjects
Optional Software Engineering subjects
Optional transversal subjects

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The **Manresa School of Engineering (EPSEM)** is an internationally recognised school whose wide-ranging research is closely related to the city's business and industrial networks. It offers bachelor's, master's and doctoral degrees in various engineering fields and is distinguished by a close relationship between teaching staff and students, practical training and teamwork.

The **EPSEM** belongs to the **Universitat Politècnica de Catalunya - BarcelonaTech (UPC)**, a renowned public institution of research and higher education in the fields of engineering, architecture, sciences and technology. With 50 years of history and more than 30,000 students, the UPC has the greatest concentration of research and technological innovation in southern Europe. According to the 2024 QS World University Rankings by Subject, it is the best Spanish university in Telecommunications, Electrical and Electronic Engineering and Computer Sciences and Information Systems.

Training the engineers of the future

Further information:

masters.epsem@upc.edu

manresa.upc.edu

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MERIT

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