LM-18 Computer Science - academic year 2026-2027

Instructions on choosing which classes to take each semester

Starting from A.A. 2023/2024, the teaching proposal is organized in such a way that all the courses can be chosen and attended both in the first and second year of the course.
Each course is associated with a semester in which the lessons are delivered.

The courses are divided into four groups, which are given the names of[1]:

- Ada Lovelace
- Charles Babbage
- Joan Clarks
- Alan Turing

The two groups **Ada Lovelace** and **Charles Babbage** contain courses taught in the **first semester**, while the two groups **Joan Clarks** and **Alan Turing** contain courses taught in the **second semester**.

The lessons of the courses in each group will be organized in a timetable without overlapping as much as possible (some courses are borrowed from other degree courses).
Therefore, to attend the courses of interest without any overlap in timetable, during each semester, attend the lessons of the same group (chosen between Ada Lovelace and Charles Babbage in the first semester, and between Joan Clarks and Alan Turing in the second semester); the lessons relating to the courses of the remaining groups can be attended during the second year.

Below is a list of the courses for the four groups:

Group Ada Lovelace - First Semester
Automatic Verification of Intelligent Systems
Autonomous Networking
Biometric Systems
Blockchain and Distributed Ledger Technology
Computational Complexity
Computer Network Performance
Cryptography
Network Algorithms
Security in Software Applications

Group Charles Babbage - First Semester
Advanced Machine Learning and Computer Vision
Big Data Computing
Computer Vision
Distributed Systems
Foundations of Data Science
High-Performance Computing
Methods in Computer Science Education
Models of Computation

[1] **Ada Lovelace** (1815-1852) is considered the first programmer in history, known for having contributed to the analytical engine designed by **Charles Babbage** (1791-1871), a mathematician and proto-computer scientist who first had the idea of a programmable calculator.
Joan Clarks (1917-1996) was a cryptanalyst who worked on the decoding of the German cipher machine "Enigma" alongside **Alan Turing** (1912-1954), a British mathematician, logician and cryptographer, considered the father of computer science.

Quantum Computing

Group Joan Clarks - Second Semester
Advanced Algorithms
Advanced Architectures
Cloud Computing
Concurrent Systems
Graph Theory
Internet of Things
Logics and Reasoning

Group Alan Turing - Second Semester
Advanced Software Engineering
Data and Network Security
Deep Learning and Applied Artificial Intelligence
Formal Methods for AI-based systems engineering
Human-Computer Interaction on the Web
Multimodal Interaction
Natural Language Processing
Practical Network Defense

An **example** is given to better clarify the possibilities for attending lessons.

If in your study plan you have chosen the following courses:

- *Autonomous Networking* (group *Ada Lovelace*)
- *Security in Software Applications* (group *Ada Lovelace*)
- *Advanced Machine Learning* (group *Charles Babbage*)
- *Models of Computation* (group *Charles Babbage*)
- *Advanced Algorithms* (group *Joan Clarks*)
- *Methods in Computer Science Education* (group *Joan Clarks*)
- *Advanced Software Engineering* (group *Alan Turing*)
- *Human-Computer Interaction on the Web* (group *Alan Turing*)

the following possibilities may hold:

- In the **first semester of the first year**, you will be able to freely choose whether to attend the lessons taught in the *Ada Lovelace* group or those taught in the *Charles Babbage* group;
- In the **second semester of the first year**, you will be able to freely choose whether to attend the lessons taught in the *Joan Clarks* group or those taught in the *Alan Turing* group;
- In the **first semester of the second year**, it will be necessary to choose to attend the lessons of the courses in the group not chosen in the first year, between *Ada Lovelace* and *Charles Babbage*; therefore, if in the first year you attended *Autonomous Networking* and *Security in Software Applications* (in the *Ada Lovelace* group), in the second year you will attend *Advanced Machine Learning* and *Models of Computation* (in the *Charles Babbage* group);
- In the ***second semester of the second year***, it will be necessary to choose to attend the lessons of the courses in the group not chosen in the first year, between *Joan Clarks* and *Alan Turing*; therefore, if in the first year you attended *Advanced Software Engineering* and *Human-Computer Interaction on the Web* (in the *Alan Turing* group), in the second year you will have to attend *Advanced Algorithms* and *Logics and Reasoning* (in the *Joan Clarks* group).

To prepare their study plan, students are invited to follow the Recommended Completion Paths (hereinafter referred to as RCPs). These are intended to provide students with a clearer view of the specialization areas in computer science and to guide them toward building a coherent curriculum. The list of RCPs, in alphabetical order, is:

- Algorithms
- Artificial Intelligence
- Computational Models for Systems Design
- Data Science
- Multimedia Computing and Interaction
- Networks and Systems
- Security
- Software Engineering

The following are the courses characterizing each of the proposed RCPs. The number of CFUs relating to the characterizing courses is shown in brackets.

Algorithms (36 CFU)

ADVANCED ALGORITHMS
COMPUTATIONAL COMPLEXITY
CRYPTOGRAPHY
GRAPH THEORY
NETWORK ALGORITHMS
QUANTUM COMPUTING

Artificial Intelligence (30 CFU)

ADVANCED MACHINE LEARNING AND COMPUTER VISION
BIG DATA COMPUTING
COMPUTER VISION
DEEP LEARNING AND APPLIED ARTIFICIAL INTELLIGENCE
NATURAL LANGUAGE PROCESSING

Computational Models for Systems Design (30 CFU)

AUTOMATIC VERIFICATION OF INTELLIGENT SYSTEMS
CONCURRENT SYSTEMS
FORMAL METHODS FOR AI-BASED SYSTEMS ENGINEERING
LOGICS AND REASONING
MODELS OF COMPUTATION

Data Science (30 CFU)

ADVANCED MACHINE LEARNING AND COMPUTER VISION
BIG DATA COMPUTING
CLOUD COMPUTING
DATA AND NETWORK SECURITY
FOUNDATIONS OF DATA SCIENCE

Multimedia Computing and Interaction (36 CFU)

BIOMETRIC SYSTEMS
COMPUTER VISION
DEEP LEARNING AND APPLIED ARTIFICIAL INTELLIGENCE
HUMAN-COMPUTER INTERACTION ON THE WEB
MULTIMODAL INTERACTION
NATURAL LANGUAGE PROCESSING

Networks and Systems (42 CFU)

ADVANCED ARCHITECTURES
AUTONOMOUS NETWORKING
CLOUD COMPUTING
COMPUTER NETWORK PERFORMANCE
DISTRIBUTED SYSTEMS
HIGH PERFORMANCE COMPUTING
INTERNET OF THINGS

Security (36 CFU)

BIOMETRIC SYSTEMS
BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLOGIES
CRYPTOGRAPHY
DATA AND NETWORK SECURITY
PRACTICAL NETWORK DEFENSE
SECURITY IN SOFTWARE APPLICATIONS

Software Engineering (36 CFU)

ADVANCED ALGORITHMS
ADVANCED SOFTWARE ENGINEERING
AUTOMATIC VERIFICATION OF INTELLIGENT SYSTEMS
BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLOGIES
SECURITY IN SOFTWARE APPLICATIONS
FORMAL METHODS FOR AI-BASED SYSTEMS ENGINEERING