Presentation of the Master’s Degree

Academic Year 2021/2022
Objectives and Structure of the Master’s Program

Paolo Baldan, Coordinator of the degree

Information Technology: Key Enabler to Innovation

Ruggero Frezza, Start Up Incubator M31 Italia, President

Questions and Answers
UNDERGRADUATE DEGREE

• **Mathematical basis**
calculus, probability & statistics, numerical analysis, logics

• **CS basics**
computer architecture, operating systems, data bases, networking, algorithms, programming, sw engineering
AIM: beyond the basics!

- Deepen the foundations
- Widen the horizon to advanced and innovative topics, often at the border with research

Not only new notions but advanced skills for
- Recognising and classifying complex problems
- Developing original solutions
- Contribute to strategic decisions
Three main study tracks, with a wide-spectrum offer and a long-term educational perspective

- Artificial Intelligence [AI]

- Internet, Mobile and Security [IMS]

- Programming Languages and Systems [PLS]
Focus on **informatics-driven innovation**, seen from different perspectives

- **Economic and entrepreneurship aspects**
- **Courses on**
  - Economics and Management of Innovation
  - Start-Ups in ICT
Interactions with advanced technology companies, incubators and accelerators

During the studies
- Start-up lab (crash course)
- ICT challenges for startup (seminars)

Internships for developing the master project:
- Collaboration in existing projects
- Development of new products
- Start-up creation
Interactions with advanced technology companies, incubators and accelerators

During the studies

- Start-up lab (crash course)
- ICT challenges for startups

Internships for developing the master project:

- Collaboration in existing projects
- Development of new products
- Start-up creation
ENTRY REQUIREMENTS
BSc (or equivalent), providing a reasonable background in

- **computer science**
  - computer architectures, operating systems, networking, databases, algorithms, programming

- with the corresponding **mathematical basis**
  - calculus, probability, logics

**Concretely:**

- BSc in Computer science or Computer engineering
- or another BSc but with proven skills in CS

**Language requirements:**

- B2 Level
Italian students
July 17 – September 30, 2021

EU students
June 2 – September 2, 2021

Non-EU students
March 2 – June 2, 2021
PROGRAMME STRUCTURE
Bureaucratic structure

120 credits in 2 years

- **78 credits (65%)** for courses
  (typically 13 courses of 6 credits)
  - **54 credits (9 ex.)** in computer science
  - **12 credits (2 ex.)** in related fields
    (economics, math, bio, inf. theory)
  - **12 credits (2 ex.)** in free-choice courses

- **6 credits (5%)** for other activities (seminars, internships, …)

- **3 credits (2.5%)** for English lang. (B2 writing/speaking)

- **33 credits (27.5%)** for the master project (one semester)
Building a study plan

Opportunity to build a customised study plan choosing, with a large degree of freedom, among a wide offer of course units.
Three mandatory courses

- **Computability** (6 credits)
  Foundations of the theory of computation, what are the problems that a computer can solve?

- **Advanced algorithms** (6 credits)
  Algorithms on graphs, strings, parallel, randomized, ...

- **Economics and management of innovation** (6 credits)
  Taught by a professor of Economics, in cooperation with start-ups, incubators and company experts
7 additional CS courses have to be chosen:

Organised in

- **MAJORS**
  groups of 5 courses that deepen a thematic area

- **MINORS**
  groups of 2 courses with a specific focus
Artificial intelligence [AI]

1. Artificial intelligence
2. Machine learning
3. Deep learning
4. Knowledge representation and learning
5. Vision and cognitive systems
Internet, Mobile and Security [IMS]

1. Wireless networks for mobile applications
2. Mobile programming and multimedia
3. Web information management
4. Runtimes for concurrency and distribution
5. Computer and network security
Programming Languages and Systems [PLS]

① Advanced topics in programming languages
② Functional languages
③ Languages for concurrency and distribution
④ Software verification
⑤ Formal methods for cyberphysical systems
MINOR

**Internet of Things and Embedded Systems [ITES]**

1. Mobile and IoT security
2. Real-time kernels and systems

**Data and process management [DM]**

1. Process mining
2. Big data computing

**Innovation and entrepreneurship in ICT [INN]**

1. IT service management
2. Start ups in ICT
One more elective course in the following group, with natural connections to Majors/Minors

- Cryptography [IMS, ITES]
- Data mining [DM]
- Type theory [PLS]
- Game theory [AI, PLS]
- Bioinformatics [DM]
- Structural bioinformatics [AI]
- Mathematical models and numerical methods for big data [DM]
- Methods and models for combinatorial optimization [AI, IMS]
STUDY PLAN APPROVAL

Automatically approved if it “follows” a Major

- It contains at least 4 courses from a Major
- The remaining courses can be chosen freely

Customised study-plan

- Individual study path defined by the student
- Submitted for approval to the “Mentoring commission”
MASTER PROJECT

• **One semester full-time** (33 credits)

• Significant work on *research/innovation problems in CS* (e.g. development of original research results or innovative software products)

• In some cases as an **extended internship** within a partner organization for
  • Cooperating in the development of innovative projects
  • Working on new products
  • Creating a start-up
Research & Career Opportunities
• Professors are quite active in research

• Most course units are research-centered and involve contacts with research themes

• Master project
  • Theoretical research
  • Applied research (sometimes in a company)

• Labs (standard labs, mobile devices & sensors, cluster & virtualisation)

• PhD Program “Brain Mind and Computer Science”
You'll find a job immediately after (very often before) graduating!

A wide range of opportunities:

- Software analyst and designer
- AI specialist
- Computer networks specialist
- Web application analyst and designer
- Data and process analyst
- Cybersecurity specialist
- Entrepreneur or manager of IT companies
• ~ 0% unemployment rate

• 92% - 100% working in CS (after 1, 3, 5 years)

• 100% judge the Master’s in CS useful in their job

• 25% increase in salary (undergrad vs graduate)

https://www.almalaurea.it/universita/indagini/laureati/occupazione