

MASTER MINDS

Overall description

- A new, innovative, and high-level integrated transnational study programmes at Master level in artificial intelligence and engineering systems
- An unique global and European vision of digital transformation
- A common multi-disciplinary shared program involving :
 - 4 European Countries : France, Italy, Germany and Spain
 - 4 institutions : INSA Lyon, University of Passau, University of Milan, Universitat Autònoma de Barcelona
 - 4 thematic areas with customized paths : Computer Vision & Robotics, Cybersecurity, Distributed Systems, AI Engineering
 - Highly connected to (at least) 4 research laboratories of the partners : LIRIS at INSA, SESAR at Milan, DMIS at Passau, CVC at Barcelona
- A 2-years curriculum :
 - providing a strong scientific background : technological and methodological, and a culture of innovation in business and society
 - for international students recruited by a selective admission process
- The four specialities and scientific pillars of IA addressed in Master Minds

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| Computer Vision & Robotics <i>To leverage computers through AI based architectures to be able to observe the outer world real-time visible data and make decisions according to the demand.</i> | Cybersecurity <i>This is a comprehensive program for future experts in computer security and activities where data protection and privacy are essential</i> |
| Distributed Systems <i>To acquire fundamentals and the basis of innovative technologies on distributed solutions through a distributed AI and multi-agent systems</i> | AI System Engineering <i>To acquire the ability to integrate artificial intelligence into existing real-world systems (e.g. media systems, information systems, industrial processes)</i> |

Program's wealth beyond scientific fields - Seven main pillar actions

S1: Integrate industry experts in the teaching teams

S2: Develop high standard seminars and real-life challenges originating from NGOs, local authorities, industries.

S3: Develop academic-industry internships and reduce the gap between education offers and company needs (real-life challenges)

S4: Develop student career mentoring (entrepreneurship and start-up) and professional networking across Europe, facilitating employability through the mobility of staff and students

S5: Develop intercultural programs : source of exchanges and experience sharing

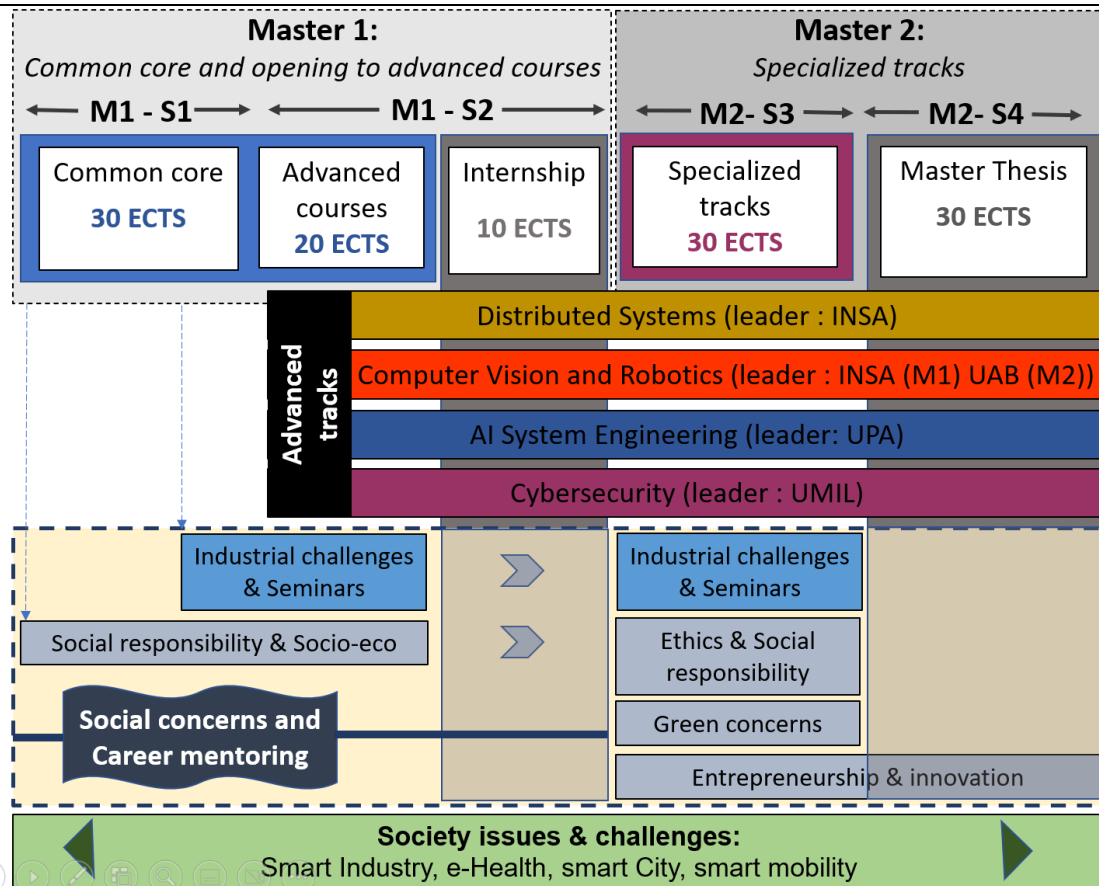
S6: Integrate humanities and sustainability concerns in the program and the challenges.

S7: Benefit from the experience and skills of the various partners, strengthens collaborations.

International program and curriculum

- To be multi-disciplinary covering four domains of speciality in the field of advanced research in AI and cutting-edge technologies

- To offer for each student - from the 2nd semester of M1 and until the end of the M2 - the opportunity to build his or her own curriculum by choosing a coherent subset of teaching units (UE) among the courses offered by the common core.
- To deliver courses taken by any student in English language



Scientific fields

- **Main topics :** Computer Vision & Robotics, Cybersecurity, Distributed Systems, AI Engineering
- **Sub-domains (shared between M1 and M2):**
 - Data sciences & basics of statistical learning – Data sciences & probabilistic graphical models – Optimization for AI
 - Big data applications & Large scale analysis
 - Logic and symbolic artificial intelligence
 - Architecture of intelligent systems – software development technologies
 - Computer security systems - privacy and data protection –
 - Distributed and pervasive systems –
 - Machine learning for images
 - Clustering - supervised/unsupervised/semi-supervised/transfert/dimensionality reduction – neural network
 - Visual tasks - deep learning systems (GPU programming for learning)
 - Reinforcement learning and learning for robotics
 - Advanced concepts in machine learning
 - Ethics, sustainability and deontology in artificial intelligence
- **Applications :**
 - Image processing and imaging – applied natural language processing

- Objects recognition / document understanding
- Medical imaging
- Biometric systems
- Media security

Collaboration with industrial partners to address real-life challenges

- **Real case studies** : integrate a strong partnership dimension with industry in an inclusive way, by targeting project and internship topics connected to the world and to real issues.
- **Master seminar** (with industrials)
- The dimensions of ethics and sustainability are addressed in all tracks of the student's curriculum

Prerequisites and entry requirements (for the M1)

- Bachelor of Science, preferably in Computer Science with a minimum of 50% Computer Science.
- A strong background in Computer Science reflected, for example, in solid programming and software development skills, but also in data sciences, and mathematics

English skills

- Applicants need to provide at least a certified B2 level in English (CEFR).
- IELTS: overall score of 7.0 with no sub-test below 6.5.
- TOEFL iBT: at least 100 overall with no sub-test less than 22 (no TOEFL iBT Home Edition).
- (Pearson PTE: at least 76 overall with no sub-test below 70)

Expected class

- 10 to 15 students in M1 (first year of master M1 for 2023-2024) – to be defined for M2 in 2023

Organization

- **3 months** of internships in M1 with recommended mobility in one of partners, with possible connection with industries and societies.
- **6 months** of internships in M2 with mandatory mobility

Main opportunities and careers

Students following the Master Minds' pathway have all the career choices and options as described for general Advanced Computer Science.

In addition, students of curriculum are ideally placed to work in positions requiring an understanding of modern AI formalism and technologies (such as Machine Learning, Deep Learning, Semantic Technologies like Natural Language Processing), but also Security system, Big data analytics and distributed software engineering. This includes the obvious positions in the digital industry, but also positions in scientific research.

The Master Minds maintains close relationships with potential employers through various activities, including career fairs, guest lectures, and projects run jointly with partners from industry.

- Careers in the industry as Data scientists : IA, digital transformation, computer sciences
- PhDs and Scientific careers: most graduates could go on with PhD studies but others will go into self-employment careers through the training and development of entrepreneurial skills