EMAI — Erasmus Mundus joint Master in Artificial Intelligence

Universitat Pompeu Fabra Barcelona · SAPIENZA Università di Roma · Radboud Universiteit · University of Ljubljana · Co-funded by the European Union

# EU4EU STAFF MOBILITY 2024

**María-Elvira Prieto**
EMAI Project Manager

## **Consortium** Partner universities:

- **Universitat Pompeu Fabra, Barcelona, Spain**
- Sapienza Università di Roma, Rome, Italy
- Radboud Universiteit Nijmegen, Nijmegen, The Netherlands
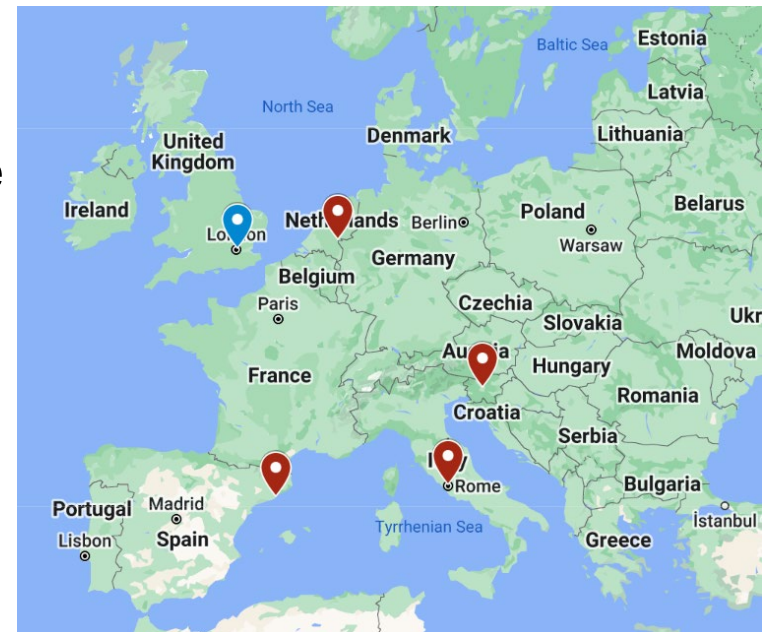- Univerza v Ljubljani, Ljubljana, Slovenia



## Distinguished Associated Partner:

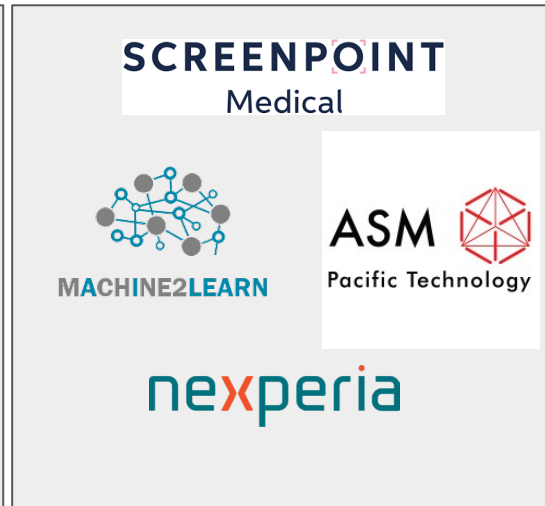- UCL Centre for Artificial Intelligence
  London, UK



+ Associated Partners

# Industrial Partners



Barcelona



Nijmegen



Ljubljana

The European Commission and Member States agreed to join forces on AI policy and investment in 2018. ☐ Maximising resources and coordinating investments was a critical component of the **European Commission's AI strategy**

The 2018 **European Commission Coordinated AI Plan** identified the significant and persistent ICT skills gap as a critical challenge to the development of AI in Europe.

In 2020, results of the **European enterprise survey on the use of technologies based on AI**, carried out by the European Commission, showed a lack of skills among existing staff and reported as a key barrier

According to the objectives of the EMJMs, the EMAI contributes to the **integration of the European Higher Education Area (EHEA)** by bringing together teaching experiences from the south, centre and eastern Europe.

# Rationale

# Main Objectives

Prepare students to be the future European professionals who will design and implement the AI solutions of the future

Intensify the existing solid cooperation between all partner academic institutions and their networks

Use the excellence and potential of all partners in creating and sharing innovative teaching and research methods

Contribute to the integration, visibility and strengthening of the European Higher Education Area.

# EU Funding

Erasmus Mundus Joint Masters programme (EMJM Erasmus+)

The project covers **five years** (four intakes of students)

Total budget: **~ 4.2M €**

- **Institutional costs: 1.9M** €  (108 student enrolments)

- **EM Scholarships**: **2.3M €**

# Fee Waivers and Scholarships

As an Erasmus Mundus Joint Master (EMJM), the EMAI provides fee waivers and Erasmus Mundus Scholarships (EMS)

- **Fee waiver**: A Fee Waiver covers the costs of the tuition fees

- **EMS**: €1,400/month for the full length of the programme (travel, installation and subsistence costs)
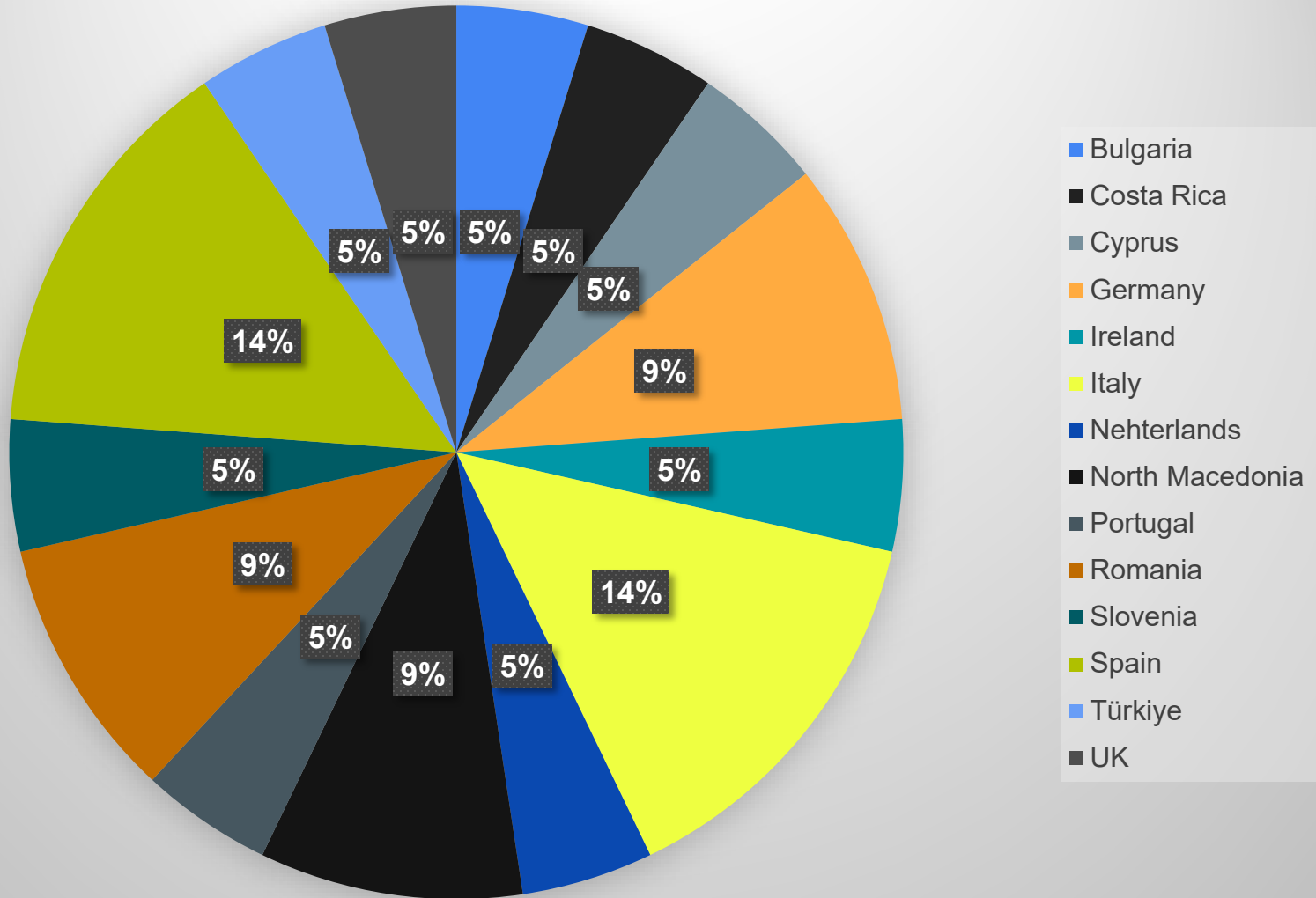
# Attracting Talent Worldwide

- **Cohort 2023 - 2025**   1st intake

  - Approximately 1,000 student applicants

    - 637 eligible (from 492 male vs 145 female)

  - 21 students were selected (19 scholarships & 2 fee waivers)

- **Cohort 2024 - 2026**   2nd intake

  - Four application rounds

    - After the 1st round, >1,300 student applications

    - Currently applications for self-funded students
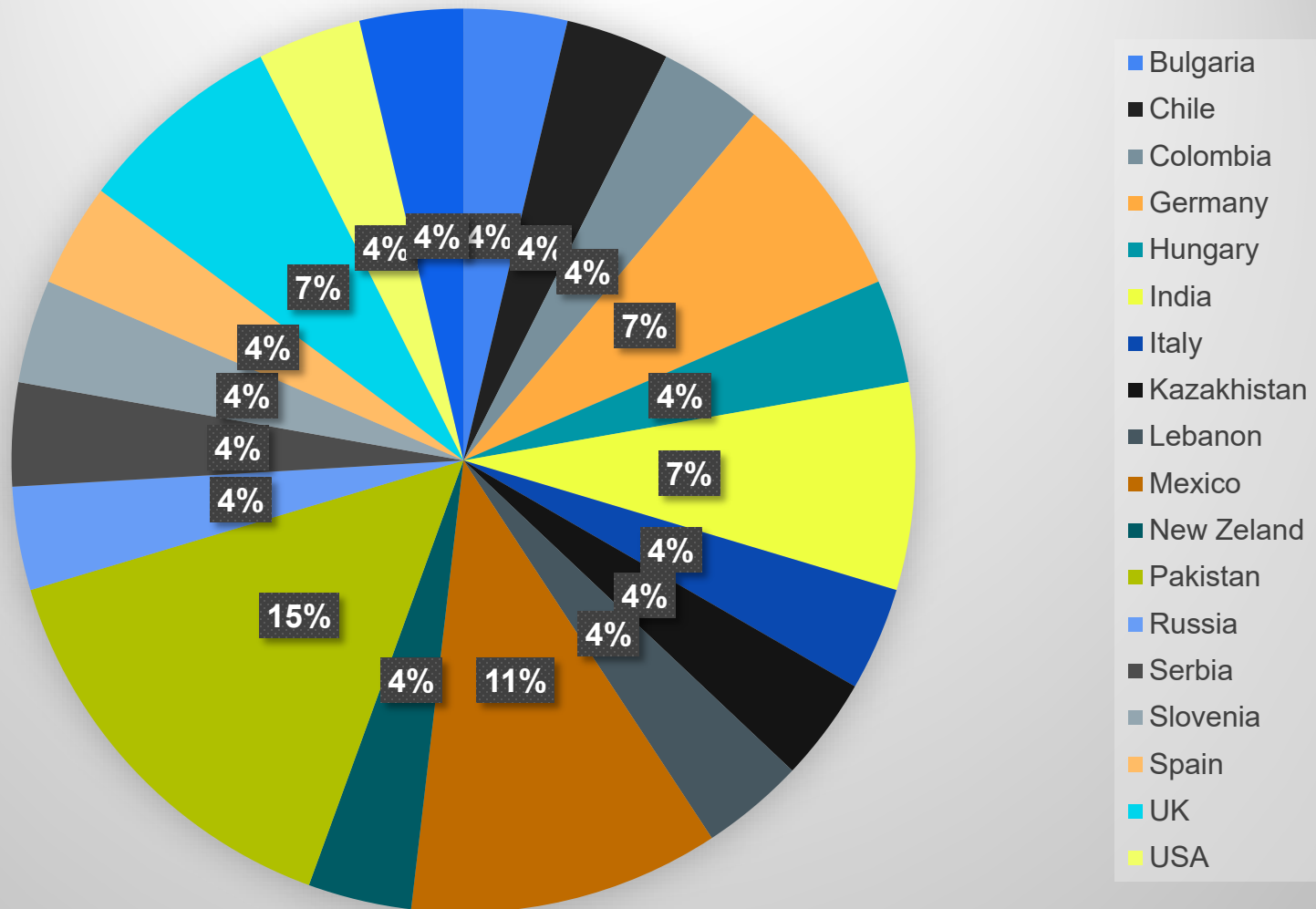
# Attracting Talent Worldwide

## Cohort 2023-2025



**Legend:**
- Bulgaria
- Costa Rica
- Cyprus
- Germany
- Ireland
- Italy
- Nehterlands
- North Macedonia
- Portugal
- Romania
- Slovenia
- Spain
- Türkiye
- UK

20 students = 14 nationalities

# Attracting Talent Worldwide

## Cohort 2024-2026

Legend:
- Bulgaria
- Chile
- Colombia
- Germany
- Hungary
- India
- Italy
- Kazakhistan
- Lebanon
- Mexico
- New Zeland
- Pakistan
- Russia
- Serbia
- Slovenia
- Spain
- UK
- USA

27 students = 19 nationalities
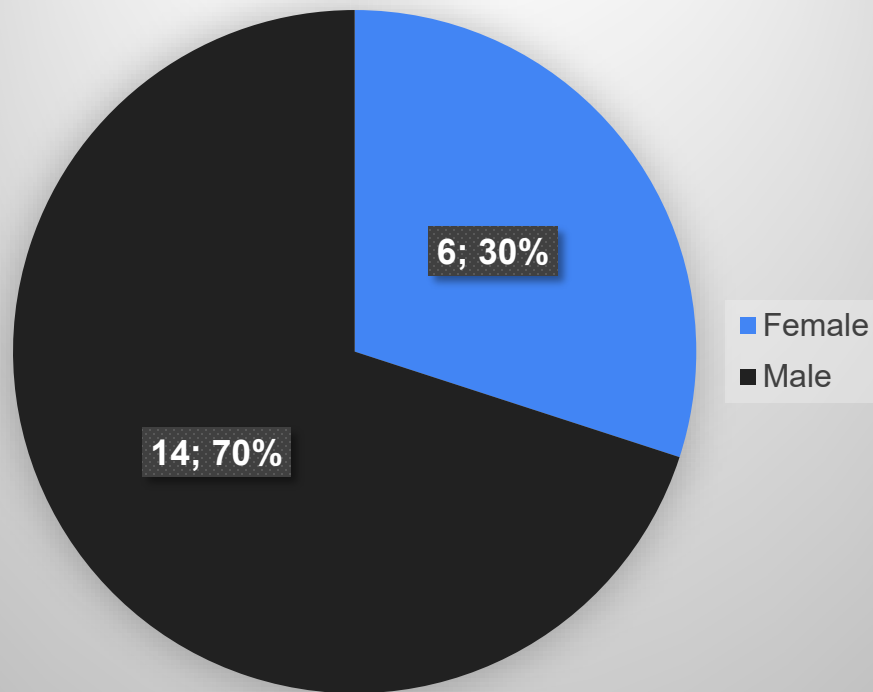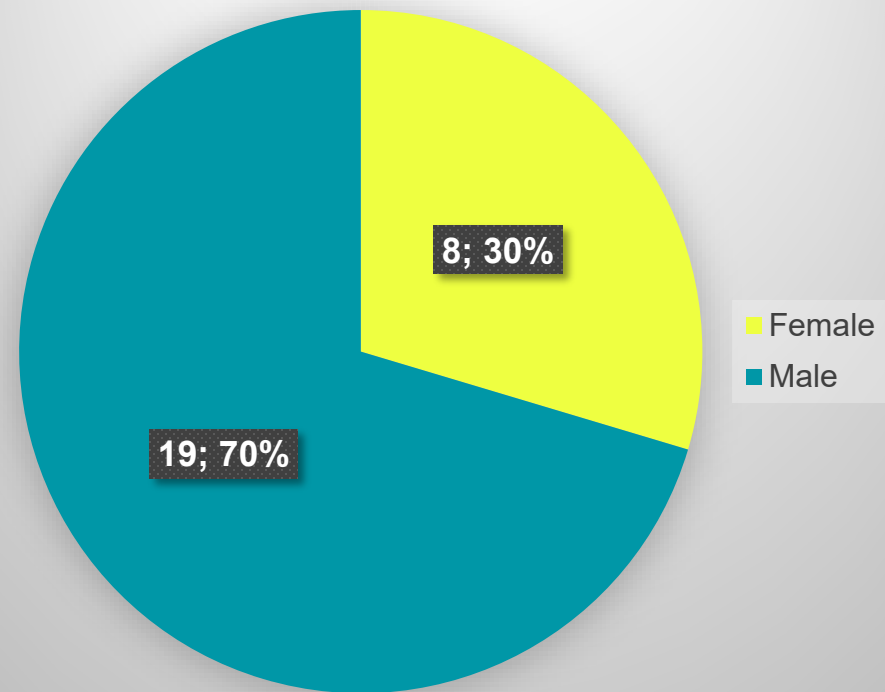
# The EMAI programme in short

# Why?

The EMAI offers a unique academic programme based on four universities of research excellence, with four possible specialisations:

- ○ **Intelligent Decision Making** in Barcelona

- ○ **Robotics** in Rome

- ○ **Cybersecurity** in The Netherlands

- ○ **Data Science** in Ljubljana

# Programme Structure



1st Semester — Universitat Pompeu Fabra Barcelona (upf.)

2nd Semester — Sapienza Università di Roma / Radboud University Nijmegen / University of Ljubljana
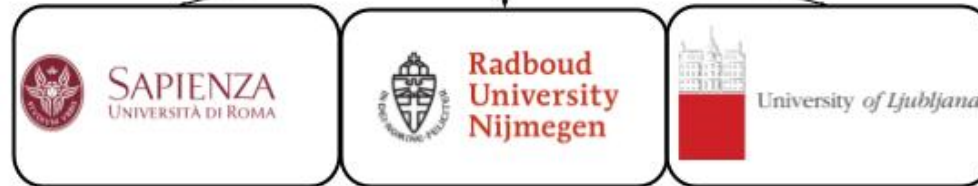
Summer School — UCL

3rd and 4th Semesters (Specialisation)
- Intelligent Decision Making — Universitat Pompeu Fabra Barcelona (upf.)
- Robotics — Sapienza Università di Roma
- Cyber Security — Radboud University Nijmegen
- Data Science — University of Ljubljana

# 1st semester in UPF, Barcelona

- **EMAI courses (30 ECTS, 6 ECTS each course)**

  - Autonomous Systems

  - Reinforcement Learning

  - Symbolic Reasoning

  - Introduction to Machine Learning

  - Natural Language Interaction

# 2nd semester

## In one of the other partner universities

**2nd Semester**

### SAPIENZA — UNIVERSITÀ DI ROMA

- **Human-Robot Interaction**
- **Artificial Intelligence**
- **Vision and Perception**

+*Two Elective from:*

- Internet-of-Things
- Interactive Graphics
- Data Management for Data Science

### Radboud University Nijmegen

- **Machine Learning in Practice**
- **Security and Privacy of Machine Learning**
- **Natural Computing**

+*Two Elective from:*

- Physical Attacks on Secure Systems
- Online Tracking and Privacy
- Artificial Intelligence in Medical Imaging

### University of Ljubljana

- **Big Data**
- **Machine Learning for Data Science 1**
- **Data Science Project**

+*Two Elective from:*

- Network Analysis
- Natural Language Processing
- High Performance Computing

# 2nd year Specialisation

## UPF in Barcelona: Intelligent Decision Making

Important decisions at the business level are made or **influenced by artificial agents** capable of planning and negotiating, creating alliances, and participating cooperatively or competitively.

Modern society is increasingly supported by household appliances, offices, buildings, and transport, whose control and operation are increasingly characterised by a more advanced interaction with their users and by **intelligent decision-making.**

*upf.*
**Universitat Pompeu Fabra**
*Barcelona*

# 2nd year Specialisation

## UPF in Barcelona: Intelligent Decision Making





**UPF Universitat Pompeu Fabra Barcelona**

Research Methodology (5 ECTS)
Critical Data Studies (5)
Advanced Topics on Intelligent Systems (5)
Master Thesis (30)

+ 15 ECTS from elective

*Elective:* Research Internship (15)
Mobile Robotics (5)
Structured Probabilistic Models (5)
Data-driven Social Analytics (5)

# 2nd year Specialisation

## Sapienza in Rome: Robotics

At its core, robotics involves creating, enhancing, and practically **applying intelligent systems** that can perceive their surroundings, process information, take independent actions to accomplish specific tasks or goals and operate autonomously in the real world.

# 2nd year Specialisation

## Sapienza in Rome: Robotics
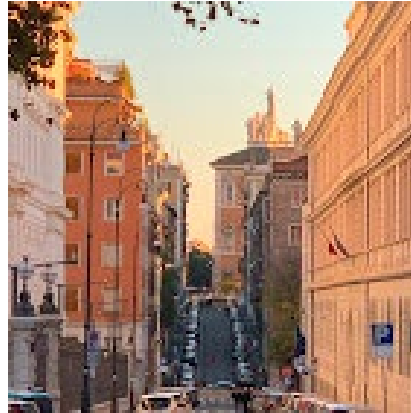


Robot Programming (3 ECTS)
Robotics I (6)
Seminars in AI and Robotics (3)
Final Exam (Master Thesis) (30)

+ 18 ECTS from elective

*Elective:*
Planning and Reasoning (6)
Formal Methods (6)
Knowledge Representation (6)
Advanced Topics in AI & Robotics (6)
Robotics II (6)
Medical Robotics (6)

# 2nd year Specialisation

## RU in Nijmegen: Cybersecurity

Cybersecurity is a critical concern across various industries and sectors, including those heavily **relying on AI technologies**, such as finance, healthcare, infrastructure, and much more.

Radboud University Nijmegen

# 2nd year Specialisation

## RU in Nijmegen: Cybersecurity



**Radboud University Nijmegen**

Cyber Security and AI Seminar (6 ECTS)
Philosophy and Ethics for Computing and Information
Science (6)
Applied Cryptography (3)
Master Thesis (30)

+ 15 ECTS from elective

*Elective:*

Research Internship (15)
Software Security (6)
Information Retrieval (6)
Hardware Security (3)
Bayesian Networks (6)

# 2nd year Specialisation

## UL in Ljubljana: Data Science

To comprehensively understand the critical role data plays in developing and **utilising AI systems**. Data science is the foundation upon which **AI algorithms** are built, enabling the extraction of valuable insights, patterns, and knowledge from vast amounts of data.

This specialisation equips students to process, analyse, and interpret data to uncover insights, patterns, and trends to **train AI models** that drive business growth, optimise processes, and enhance decision-making and problem-solving.

University *of Ljubljana*

# 2nd year Specialisation

# UL in Ljubljana: Data Science



University *of Ljubljana*

Machine learning for data science 2 (6 ECTS)
Deep Learning (6)
Web information extraction and retrieval (6)
Master Thesis (30)

+ 12 ECTS from electives

*Elective:*
Network Analysis (6)
Natural Language Processing (6)
High Performance Computing (6)
Biomedical signal and image processing (6)
Image based biometry (6)
Principles of uncertainty (6)
Advanced Methods in Computer Vision (6)

# 2nd year

## Internship (15 ECTS, optional)

- UPF and RU offer internships
- In academy or industry
- Excellent opportunity to gain experience in future work field

## Master Thesis (30 ECTS)

- Full-time in 4th semester
- Research work: a mixture of practice in the design, construction and elaboration using scientifically sound methods and evaluation
- The thesis work will be considered for submission to scientific conferences
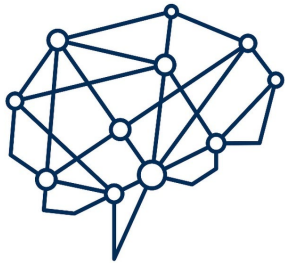
# 2nd year: Special Events

## Spring Event (April)

- 1st and 2nd year EMAI students will meet each other and share their experience and build the community of EMAI students

- Intensive training in:
✓ Research methods, with special emphasis in the human-centric perspective of AI

# 2nd year: Special Events
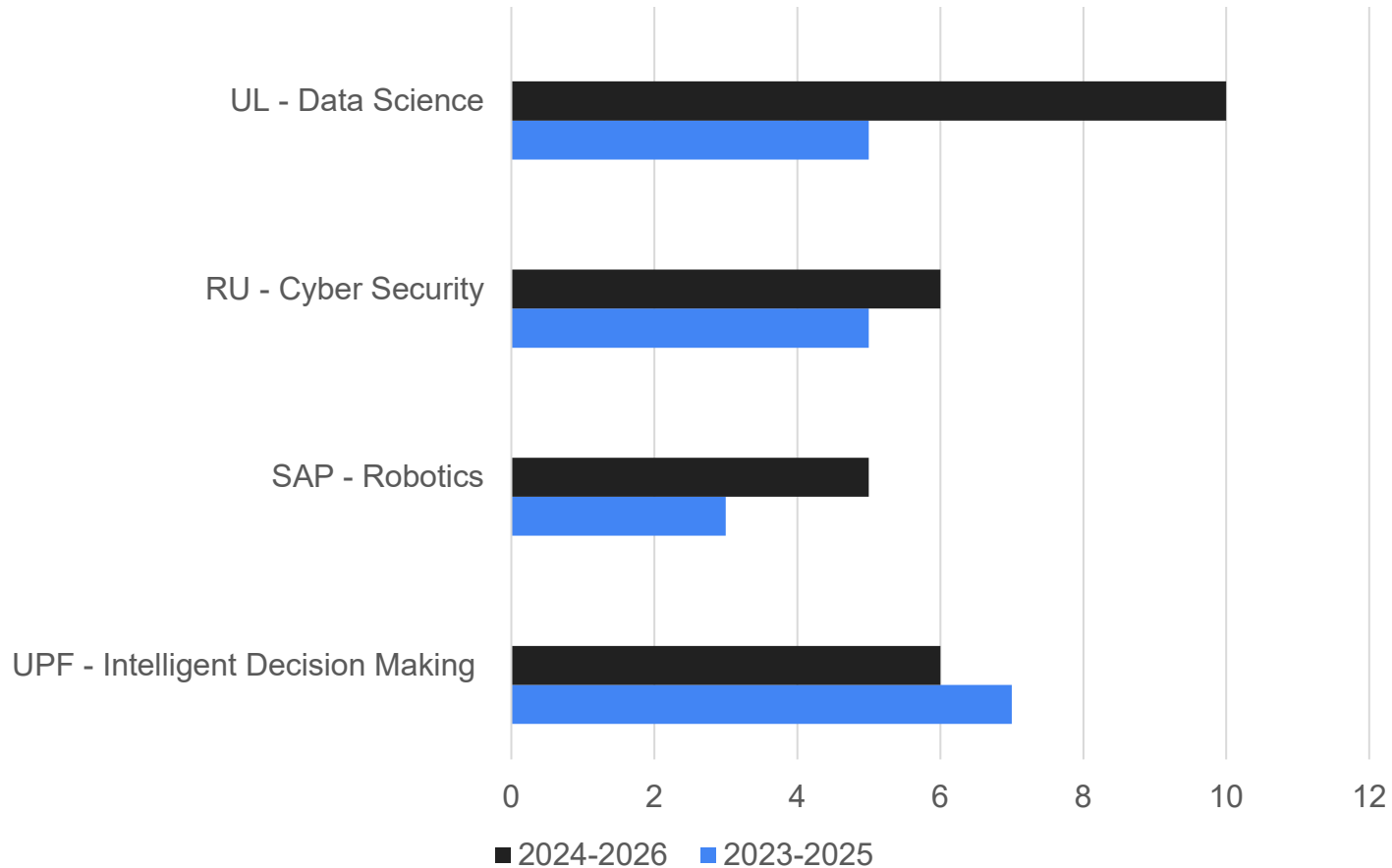
## Summer School (July)



**UCL CENTRE FOR ARTIFICIAL INTELLIGENCE**



- 3 days of presentations from leading researchers in AI and industry experts from companies with deep technical expertise in AI

- Training on topics of
  - ✓ AI Ethics and regulation
  - ✓ AI Entrepreneurship
  - ✓ AI for Good projects
  - ✓ Others

# Trends among current cohorts



## Specialisations

| Specialisation | 2024-2026 | 2023-2025 |
|---|---|---|
| UL - Data Science | 10 | 5 |
| RU - Cyber Security | 6 | 5 |
| SAP - Robotics | 5 | 3 |
| UPF - Intelligent Decision Making | 6 | 7 |

■ 2024-2026  ■ 2023-2025

# Advancing Education with AI

**1.      Legislations**

•     European Union:
- Artificial Intelligence Act (AI Act)
- Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators

•     United Nations Educational, Scientific and Cultural Organization (UNESCO)
 - Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development Education

**2. Institutional Approach**

•      Pompeu Fabra University (UPF)
•      Universitat Oberta de Catalunya
•      University of Tartu
•      University of Yale
•      University of Helsinki
•      University College London

**3. Departmental Approach**

•     Department of Information and Communications Technologies (DTIC) at UPF

**Thank you!**

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https://www.upf.edu/web/emai

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