International University of Sarajevo

FENS
Faculty of Engineering and Natural Sciences
International University of Sarajevo

Bachelor of Science (B.Sc.) in

ARTIFICIAL INTELLIGENCE AND DATA ENGINEERING

Info Catalogue
Academic Year 2025-2026

FENS
Faculty of Engineering
and Natural Sciences

ABOUT THE
ARTIFICIAL INTELLIGENCE AND DATA ENGINEERING
STUDY PROGRAM

4 years, 8 semesters

Full-time, in person

Artificial Intelligence and Data Engineering (AIDE) bring together computer science, mathematics, statistics and applied domain knowledge to design intelligent and data driven solutions for complex real-world problems. A defining feature is the **combination of theory and practice:** students learn to design algorithms, develop machine learning and deep learning models, process large volumes of data and apply these techniques in a variety of contexts. **Applications are broad and continue to expand.** In health and bioinformatics, AI and data methods support medical image analysis, patient monitoring and personalized treatment strategies. In business and finance, they inform decision making, risk management and customer insights. In robotics and automation, intelligent systems adapt to their environments and improve performance; in industrial settings, data engineering enables predictive maintenance, process optimization and energy efficiency. **The AIDE program is tailored to this landscape.**
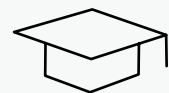
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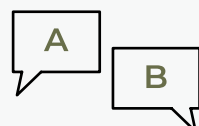Bachelor of Science (B.Sc.) in Artificial Intelligence and Data Engineering

Language: English

The curriculum offers a strong **foundation in computing, mathematics and statistics**, complemented by practical training in data analysis, machine learning, systems design and modern tools. Students learn to process and interpret large datasets, develop and evaluate AI models, and translate technical methods into effective domain specific solutions.

A distinctive feature of the AIDE program is its focus on **the full data lifecycle and the development of intelligent, data driven systems.** Students design data workflows, build analytical and predictive models, and integrate AI components into deployed applications while addressing efficiency, reliability and responsible use of data. This combination of data engineering and applied machine learning prepares graduates to work with **contemporary data intensive technologies,** from large scale processing systems to advanced AI models used in practice.

Graduates of the program have career opportunities such as data analyst, data engineer, database administrator, data scientist, business analyst and artificial intelligence engineer.

Students can participate in **Erasmus+ and bilateral mobility programs**, as well as **double-degree programs in Artificial Intelligence and Data Engineering with Istanbul University (AIDE-IU).**

Students complete the program as adaptable professionals with strong analytical and problem-solving skills, prepared to contribute to organizations developing data products, analytics platforms and intelligent applications.

VISION AND PEDAGOGICAL APPROACH

The AIDE program aims to educate engineers who can:

- Apply fundamental knowledge in artificial intelligence, machine learning, data engineering, and computer science to design intelligent and data driven solutions.
- Develop, implement, and evaluate scalable data processing systems and AI models for diverse real-world applications.
- Contribute effectively to multidisciplinary teams, taking on technical, analytical, leadership, or research-oriented roles in industry or academia.
- Continue lifelong learning through professional development or postgraduate study to advance their expertise in AI and data science.
- Demonstrate ethical and socially responsible practice in the development and application of AI and data technologies.

Teaching is student-centered, emphasizing active learning, critical thinking, and problem-solving. The program combines lectures, tutorials, and hands-on labs with project-based coursework and industry-focused activities. Continuous feedback from students, alumni, and industry partners guides regular curriculum enhancements, ensuring that the program remains current, practice-oriented, and aligned with international standards in artificial intelligence and data engineering.

Study program
EDUCATIONAL OBJECTIVES (EO)

Educational Objectives of the Artificial Intelligence and Data Engineering – First cycle are:

EO1	Seek employment as a computer scientist with expertise on artificial intelligence and data, in local and global industries and organizations, with the ability to use fundamental knowledge, computational principles, and skills in data science to create software of varying size and complexity for various application areas.
EO2	Show an ability to continue learning throughout their career (such as through professional, technical, or postgraduate education), which can enhance their analytical and critical thinking skills and prepare them for advanced computer and data science practices and contribute to the intellectual foundations of the data science field.
EO3	Participate in numerous software projects where they demonstrate proficiency in using theoretical computing knowledge to analyze, model, design, develop, and evaluate computing solutions.
EO4	Become leaders or entrepreneurs in the field of data science.
EO5	Demonstrate an understanding of professional ethics and social responsibility as a data scientist.

Study program
LEARNING OUTCOMES (LO)

**Program Learning Outcomes of the Artificial Intelligence and Data Engineering –
First cycle are:**

LO1	Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
LO2	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
LO3	Communicate effectively in a variety of professional contexts.
LO4	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
LO5	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
LO6	Apply theory, techniques, and tools throughout the data analysis lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.
LO7	Develop a complete comprehension of the theoretical and practical aspects of Artificial Intelligence related to creating, designing, implementing, and evaluating data-intensive systems.

PROGRAM STRUCTURE

The structure of the Artificial Intelligence and Data Engineering Study Program in the first cycle is organized as follows:

1. **27 mandatory courses (159 ECTS)**
Providing a broad foundation in mathematics, statistics, core data science, AI principles, laboratory work, and professional practice.

2. **4 University Elective courses (15 ECTS)**
Including 2 foreign-language electives and 2 university electives.

3. **2 Faculty Elective courses (12 ECTS)**
Selected from a pool of courses within the student's faculty, providing specialized knowledge outside the core AIDE area.

4. **2 Free Elective courses (12 ECTS)**
Allowing students to explore any course offered at the university.

5. **7 Program Elective courses (42 ECTS)**
Enabling advanced study in specific areas of AI.

A detailed overview of the **curricula for the AIDE Study Program** are available at **aide.ius.edu.ba**

CURRICULUM HIGHLIGHTS

The curriculum moves from foundations in programming, data structures, databases, calculus, linear algebra, discrete mathematics, probability and statistics to core AI and data courses such as Artificial Intelligence, Introduction to Machine Learning, Data Mining, Deep Learning, Big Data Analytics and Applied Data Engineering. It culminates in integration through the Graduation Project and a structured internship. Program electives provide depth and specialization in AI and data-engineering topics.

PRACTICAL TEACHING AND LEARNING

The AIDE study program implements practical teaching through the following approaches:
• **Hands-on Labs**
• **Project-Based Components**
• **Internship/Work Placement (Mandatory Course)**
• **Graduation Projects**

Most courses in the AIDE program follow a consistent structure that combines lectures with mandatory tutorials (hands-on lab sessions). These tutorials allow students to **apply theoretical concepts in practical settings, experiment with tools and technologies, and develop essential technical skills.** In addition to tutorials, many courses incorporate project-based learning, where students collaborate to solve real-world problems using the knowledge gained in lectures and tutorials.

The Graduation Project provides a structured, practice-oriented experience where students apply their knowledge to real problems and defend their solutions. In addition, through collaboration with industry, students may undertake industrial graduation projects that allow students to tackle practical challenges aligned with real-world business needs.

To further strengthen practical learning, the AIDE program also offers **a range of extracurricular activities** designed to inspire innovation, connect students with industry leaders, and build essential professional skills. These activities provide hands-on opportunities for students to apply their knowledge, explore emerging technologies, and prepare for their careers. Events are organized such as **workshops, tech talks and guest lectures, outreach events, and hackathons**, each contributing uniquely to students' learning.
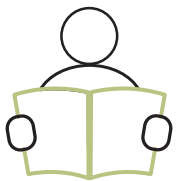
Special Opportunities:

The AIDE program strengthens **academic and professional development** through special opportunities that **broaden students' experiences and prepare them for global, industry-oriented careers**. All AIDE courses are delivered in English, aligning with international study environments and enabling study abroad without language barriers. Academic staff with international backgrounds bring diverse perspectives into the classroom, and the curriculum follows global standards with materials from Pearson, McGraw-Hill, Cisco Networking Academy, AWS Academy, and Fortinet Network Security Academy. Additional opportunities are:
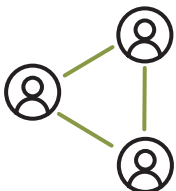
Exchange Abroad (Erasmus+ Mobility)

Students may spend one or two semesters at partner universities worldwide through funded Erasmus+ mobility, exploring different educational systems and cultures while progressing toward the AIDE degree.

Interdisciplinary Learning and Minor Degree Options

Students may broaden their academic profile by completing a minor in another discipline. Minors appear in the diploma supplement.

Industry Links and Practice-Oriented Engagement

Through strong industry collaboration, students secure internship positions and work on company-led, real-life projects. This direct experience bridges classroom and workplace, supports entry into professional roles, and strengthens employability.

Research Opportunities

Students participate in faculty-led and international research projects. They may co-author academic papers and present at international conferences, building a verifiable portfolio and strong professional references. These experiences strengthen applications for Research and Development roles, internships, and competitive master's and PhD.

Alongside the AIDE program, IUS also offers prestigious **Double Diploma program in Artificial Intelligence and Data Engineering with Istanbul University**. In this program, students complete two years at IUS and two years at the partner university, graduating with **two accredited diplomas,** broader international networks, and stronger competitiveness for international jobs and top master's and PhD programs.

LABORATORY & RESEARCH FACILITIES

Modern computer laboratories

193 desktop computers running Windows, Linux, and macOS, with a wide range of licensed and open-source software installed.

Free-access course software

Anaconda, Code: Blocks, Cisco Packet Tracer 8.2.2, Java 8, Microsoft Visual Studio Code, Visual Studio Community 2022, NetBeans IDE 8.2, GNU Octave 7.2.0, PyCharm Community Edition 2022.3.1, RStudio, Scilab 6.1.1, and Power BI.

High-performance computing

A Dell PowerEdge R7615 server for compute-intensive tasks such as AI model training, simulations, and optimization problems.

Specialized teaching equipment

Physical equipment for specific courses includes Cisco switches, routers, firewalls, and 10 Raspberry Pi boards with LEDs, jumper wires, and various sensors.

RDC project spaces

Dedicated spaces for collaborative student–faculty research activities.

ADMISSION REQUIREMENTS:

Applicants must hold a recognized high school diploma, and admission is subject to entrance evaluation as per IUS regulations. For more information, please visit **ius.edu.ba.**

TEACHING AND ASSESSMENT:

- Lectures and mandatory tutorials (Hands-on Labs)
- Project-based assignments and design challenges
- Continuous assessment (quizzes, projects, presentations)
- Written examinations
- Assessment criteria are transparent and available via e-Campus. Students may appeal grades according to IUS regulations.

STUDENT SUPPORT

Each student is assigned an **academic advisor** who provides guidance on course selection, study progress, and academic requirements throughout the program. At the program level, the **Program Coordinator** serves as the primary point of contact for students, ensuring timely resolution of student concerns. The **Internship Coordinator** facilitates Work Placement/Internship arrangements, approves learning agreements, and monitors progress with host organizations, so students gain relevant experience. The **Graduation Project Coordinator** oversees the preparation, submission, and evaluation of bachelor projects, while assigned academic mentors provide continuous supervision during the implementation of the Graduation Project. For international mobility, the **Exchange Coordinator** advises on opportunities, manages partner university processes and learning agreements, and ensures academic recognition upon return. Additionally, continuous learning support is available through tutoring, remedial sessions, and regular faculty office hours. IUS supports students with disabilities through its **Support Office**, whose aim is to foster an inclusive environment. The office provides guidance and assistance to students with disabilities and works closely with staff to ensure their full participation in university life.

STUDENT VOICE MATTERS
QUALITY ASSURANCE

At IUS, we are committed to continuously improving student academic experience. That's why we've built a strong **Internal Quality Assurance System**—and students play a key role in it! Our quality assurance system ensures that everything we do—from teaching and research to administration and community engagement—is constantly evolving for the better.

Every semester, we invite students to participate in the **Student Survey**. This is students' chance to share honest feedback about:
• Learning and Teaching effectiveness
• Course content
• Learning resources
• Overall satisfaction

Students' input is carefully analyzed and used to:
• Improve course design and delivery
• Support and develop our academic staff
• Inform strategic planning and decision-making

By participating, students help us build a more s**tudent-centered learning environment**—where their needs, ideas, and experiences truly shape the University's growth.

CAREER OPPORTUNITIES AND FURTHER STUDIES

AIDE Graduates are well-prepared for diverse professional roles across the IT sector and related domains such as:

• Data analyst/scientist
• Data Engineer
• Database administrator
• Machine learning engineer
• Business analyst
• Artificial intelligence engineer
• Researcher (R&D) or academic (with further study)

They are also qualified to pursue master's and PhD programs in Artificial Intelligence and Data Engineering and related fields, locally and abroad.

APPLY TODAY!

Visit **apply.ius.edu.ba** or
call **00 387 957 110**

International University of Sarajevo
Faculty of Engineering and Natural Sciences

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