

# Master of Science in Artificial Intelligence

## 1 Title of the Degree/Program

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Master of Science MS in Artificial Intelligence

## 2 Proposed Timeframe of Commencement

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September 2021 (Fall semester)

## 3 Program Offered by

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This MS Artificial Intelligence program will be offered by the Sino-Pak Center of Artificial Intelligence under Faculty of Electrical, Computer, IT & Design (FECID) at Pak-Austria Fachhochschule: Institute of Applied Sciences and Technology (PAF-IAST).

## 4 Admission Requirements

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- HEC recognized degree is required in relevant subject of Science or Engineering, earned from a HEC recognized university after 16 years of education with at least 60% marks or CGPA of at least 2.5 (on a scale of 4.0). The related areas include Computer Science, Computer Engineering, Software Engineering, Mathematics, Engineering, Physics, Remote-sensing, Geo-information, Data Science, Artificial Intelligence, or relevant discipline.
- The GAT-General conducted by the National Testing Service with a minimum 50% cumulative score will be required at the time of admission.

## 5 Program overview and scope

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The research and development in interdisciplinary domains of artificial intelligence applications can solve many daily routine problems and improve our lifestyle by offering products in many domains such as smart homes, smart cities, smart agriculture, smart vehicles, business intelligence, smart surveillance, and smart health-care. To meet these objectives, it is required to equip our upcoming students with the latest technologies and essential skills in AI covering both theory and practical aspects. The MS AI program shall enable the students to learn essential theoretical knowledge and learn marketable skills in AI. This program offers basic courses to understand core concepts of machine learning as well as specialized elective courses to train students with state-of-the-art skills in AI and also teach them how to apply it in inter-disciplinary data science domains. This program will not only produce AI-trained scientists and engineers who can meet the requirements of AI and data science in the Pakistani industry/globally but also it will help the students who like to start a research-based career and planning to enroll in a PhD program.

The objective of this program is to develop AI related theoretical and research skills in students. In this context, the two-year program is divided into parts. The first year is dedicated to course work and second year is dedicated to a research project. In the first year (2 semesters), the students will take fundamental AI courses along with electives, enhancing their skills in advanced applications of AI. In third semester, the students will start working on their thesis which will continue in 4th semester. The students will individually select among different research projects with industrial or academic collaborations.

## 6 Career prospects

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AI job market is evolving in Pakistan. In coming years, it is expected that AI and data science experts will be needed in many sectors such as banking and business entities, security agencies, defense organizations, telecom companies, agriculture, farming, construction companies, and healthcare. The AI-based nature of jobs is summarized as follows:

- Banking and business entities: the business sector is looking for AI applications for business intelligence to predict the demand of the products, inflation, optimum unitization of available resources, product popularity, and its usage trend, and so on.
- Security/Cyber agencies: AI can play a key role in developing systems to maintain public security through automatic surveillance, audio/speech recognition, and cybersecurity.
- Defense organizations: AI is required for many defense products such as automatic drones, geographic target detection, autonomous path tracking in missiles, autofocus in tanks and guns, target detection and recognition, night vision.
- Telecom: In Pakistan, the AI applications in telecom companies are related to business intelligence which include customer's call tariff prediction and calls package recommendations.
- Smart agriculture and farming are a new area in Pakistan's job market. The companies investing in this area are looking for developing automatic drones to detect pesticides for starting spraying sessions.
- Healthcare is also a new area in the Pakistani job market. Healthcare has a lot of potential and its jobs could range from developing healthcare products to analyzing surveys for various health disorders or epidemics. The analysis of data and decision-making about public health policies from the perspective of social trends/habits could be interesting fieldwork in Pakistan, creating many jobs.

## 7 Curriculum of the Program

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### **Duration of the program:**

The program minimum duration will be 2 years and maximum duration will be 4 years.

### **Curriculum:**

This program is offered to students who want to specialize in Artificial intelligence for industrial applications. The scheme of studies covers basic courses in Artificial intelligence including different

techniques in machine learning, knowledge engineering, probabilistic modeling, and reasoning. The industrial applications will be focused on different areas of AI such as IoT based smart systems, recommender systems, computer vision, robotics, and Natural language processing (NLP).

### Core Courses

No.	Crdt.	Code	Course name
1	3	COMP-832	Knowledge Engineering
2	3	COMP-844	Advanced Machine Learning
3	3	COMP-845	Advanced Deep learning
4	2+1	COMP-831	Tools and Techniques for Data Science

### Elective Courses

No.	Crdt.	Code	Course name
1	3	COMP-842	Expert and Recommender Systems
2	3	COMP-849	Computational Intelligence and IoT
3	3	COMP-940	Computer Vision and Pattern Identification
4	3	COMP-941	AI for Biomedical Engineering
5	3	COMP-942	AI in Smart Energy Systems

Total credit hours will be 30.

### Evaluation:

1 submitted SCI (Sciences Citation Index) ranked paper along with thorough evaluation by supervisor and external reviewer.

### Semester-wise course structure:

The proposed course structure is according to the HEC criteria for MS programs, where in first 3 semester we are offering 4 courses and 4th semester is dedicated to thesis and necessary course work required for thesis/project. The semester-wise course breakdown is given as:

- Semester – 1: 2 core courses +1 elective course
- Semester – 2: 2 core courses + 1 elective courses
- Semester – 3: MS thesis part 1 + 1 elective courses
- Semester – 4: MS thesis part 2 + 1 elective

The semester-wise course break down is given below:

No.	credits	Code	Course Title
<b>Semester 1</b>			
1	2+1	COMP-831	Tools and Techniques for Data Science
2	3	COMP-844	Advanced Machine Learning
3	3		Elective-1
<b>Semester 2</b>			
1	3	COMP-845	Advanced Deep learning

2	3	COMP-832	Knowledge engineering
3	3		Elective-2
<b>Semester 3</b>			
1	3	COMP-899	MS project (part-1)
2	3		Elective-3
<b>Semester 4</b>			
1	3	COMP-899	MS project (part-2)
2	3		Elective-4