

Postgraduate Program for International Students in Artificial Intelligence

1. Discipline Introduction

Artificial Intelligence (AI) is a cutting-edge interdisciplinary field integrating computer science, mathematics, cognitive science, robotics, and data science. This program emphasizes both theoretical foundations and practical applications, focusing on areas such as machine learning, deep learning, natural language processing (NLP), computer vision, and robotics. The curriculum is designed to equip students with the skills to develop intelligent systems that address real-world challenges in healthcare, environmental sustainability, autonomous systems, and beyond.

The school of computer science and technology currently has 123 faculty and staff members, including 19 professors, 37 associate professors, and 63 faculty members with doctoral degrees. The college houses multiple provincial research platforms, including the Henan Key Laboratory of Food Safety Data Intelligence, the Network Engineering & Data Intelligence Pilot Base, and the Emergency Platform Information Technology Engineering Laboratory, alongside advanced teaching facilities like the Computer Science Elite Student Training Base and IoT Experimental Teaching Demonstration Center. Supported by stable on- and off-campus internship bases, it delivers exceptional practical training environments for students.

2. Program Objectives

1. **Ethical and Responsible AI Practitioners:** Cultivate professionals committed to ethical AI development, emphasizing fairness, transparency, and societal impact.
2. **Technical Mastery:** Master core AI techniques: supervised/unsupervised learning, reinforcement learning, neural network architectures (CNNs, RNNs, Transformers), and optimization algorithms (SGD, Adam). Gain proficiency in programming (Python, TensorFlow, PyTorch) and tools (Jupyter, Docker, Git).
3. **Research and Innovation:** Develop independent research capabilities to solve cutting-edge problems (e.g., explainable AI, federated learning, AI safety).
4. **Global Competence:** Strengthen English proficiency for academic writing, presentations, and collaboration. Participate in international conferences and workshops.

3. Research Directions

1. Machine Learning and Deep Learning

Theoretical foundations of neural networks (e.g., optimization, generalization bounds). Applications in recommendation systems, anomaly detection, and autonomous decision-making.

2. Natural Language Processing (NLP)

Multilingual language models, sentiment analysis, dialogue systems, and low-resource language processing.

3. Computer Vision and Robotics

3D reconstruction, video understanding, SLAM (Simultaneous Localization and Mapping), and AI-driven robotic control.

4. AI for Social Good

Healthcare (medical image analysis, drug discovery), climate modeling, and ethical AI policy design.

4. Program Structure

Duration

- **Full-time:** 2–3 years (flexible for research-intensive projects).

Credit Requirements

Category	Credits	Details
Core Courses	≥20 credits	Includes public and discipline-specific courses.
Elective Courses	≥10 credits	Tailored to research interests.
Compulsory Modules	6 credits	Thesis proposal, internships, academic activities.
Total	≥36 credits	

5. Detailed Curriculum

Core Courses (20 Credits)

Course Name	Credits	Semester	Description
Artificial Intelligence	4	1	Introduces foundational AI concepts, including search algorithms, knowledge representation, logic, and probabilistic reasoning.
Machine Learning	4	2	Covers supervised/unsupervised learning, regression, classification, ensemble methods, and evaluation metrics.
Computer Vision	4	2	Focuses on image processing, feature extraction, object detection, segmentation, and deep learning for vision tasks (CNNs, GANs).
Design and Analysis of Algorithms	4	1	Explores algorithm paradigms (divide-and-conquer, dynamic programming), complexity analysis, and NP-completeness.
Discrete Mathematics	4	1	Covers graph theory, combinatorics, logic, and discrete structures essential for AI and algorithm design.
Pattern Recognition	4	3	Examines statistical and neural approaches for pattern classification, clustering, and dimensionality reduction.

Elective Courses (10 Credits)

Course Name	Credits	Semester	Description
Deep Learning Architectures	4	3	Advanced topics in neural networks: Transformers, attention mechanisms, and

			self-supervised learning.
Natural Language Processing	3	3	Techniques for text analysis, machine translation, and large language models (e.g., BERT, GPT).
Reinforcement Learning	3	4	Markov decision processes, Q-learning, policy gradients, and multi-agent systems.
Advanced Algorithms	4	3	Graph algorithms, approximation algorithms, and randomized algorithms.
Robotics and Autonomous Systems	4	3	SLAM, motion planning, and AI-driven control systems.

Compulsory Modules (6 Credits)

1. **Thesis Proposal (1 credit):** Submit a detailed research plan with literature review, methodology, and timeline.
2. **Mid-term Review (1 credit):** Present progress to a faculty committee.
3. **Academic Seminars (2 credits):** Attend 15 seminars and present once.
4. **Internship/Practical Training (2 credits):** 3-month internship in industry or research lab.

6. Thesis Requirements

1. **Topic Selection:** Must address an unresolved AI challenge (e.g., adversarial robustness, AI interpretability). Approved by a supervisory committee of 3 faculty members.
2. **Research Standards:** **Innovation**, demonstrate novel contributions (e.g., new algorithms, datasets, or applications). **Technical depth**, rigorous experimentation with SOTA baselines (e.g., ablation studies, cross-dataset validation). **Ethics**, address potential societal impacts and biases.
3. **Dissertation Format:** follow ACM/IEEE templates, minimum 50 pages (excluding references).
4. **Defense:** public presentation followed by Q&A with a panel of 5 experts. At least one peer-reviewed publication required for graduation.

7. Support for International Students

Language Support: Free Mandarin courses (beginner to advanced). Writing center for thesis editing and proofreading.

Cultural Integration: Workshops on Chinese business etiquette and cross-cultural communication. Guided tours to tech hubs (e.g., Shenzhen, Beijing).

Career Services: Job fairs with multinational companies. Alumni mentorship program.

8. Graduation and Degree Award

- Complete all credits and compulsory modules.
- Pass thesis defense and publish at least one paper.
- Degree: **Master of Science in Artificial Intelligence.**