AI: ARTIFICIAL INTELLIGENCE, MS

Banner Code: EC-MS-AI

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Artificial Intelligence (AI) is a transformative field of computing that is reshaping problem-solving, decision-making, and automation across industries and government. AI technologies are driving advancements in critical areas such as healthcare, finance, national security, autonomous systems, and scientific discovery. From machine learning-powered recommendation systems to deep learning models capable of generating human-like responses, AI is revolutionizing the way we interact with technology and approach complex challenges.

AI now encompasses a diverse set of technologies and methodologies that enable computers and systems to perform tasks traditionally requiring human intelligence. These tasks include problem-solving, reasoning, learning from data, understanding natural language, and recognizing patterns. AI-driven solutions are now fundamental to business innovation, public policy, and scientific progress, making AI expertise essential for professionals across multiple domains.

The Master of Science in Artificial Intelligence provides students with a rigorous foundation in the principles and methodologies of AI, equipping them with the skills to develop, implement, and optimize AI-driven solutions. The program focuses on three core domains within AI: machine learning, planning and decision-making, and deep learning. Machine learning enables AI systems to automatically improve from data, planning and decision-making algorithms support AI-driven systems in navigating complex environments, and deep learning techniques power applications such as image recognition, natural language processing, and generative AI models.

Students in the program will learn to assess AI risks across computing platforms—including embedded systems and cloud computing—to ensure secure and responsible AI applications. They will develop the expertise to train and fine-tune AI models for optimized system performance. Additionally, the program emphasizes the ethical and societal considerations of AI, ensuring graduates are prepared to contribute to the responsible development and deployment of AI technologies.

Admissions & Policies

Admissions

Admission is competitive. Strong candidates will have obtained a BS in an engineering or quantitative discipline. Specific application requirements and deadlines can be found at: https://cec.gmu.edu/application-requirements-and-deadlines (https://cec.gmu.edu/application-requirements-and-deadlines/).

Policies

Please see AP.6. Graduate Policies. (https://catalog.gmu.edu/policies/academic/graduate-policies/)

Requirements

Degree Requirements

Total credits: 30

Required Coursework

Students must complete 18 credits of required coursework:

Code	Title	Credits
AII 600	Foundations and Practice of Machine Learning for Artificial Intelligence	3
AII 601	Planning and Decision Making for Intelligent Agents	3
AII 602	Foundations and Practice of Deep Learning for Artificial Intelligence	3
AII 603	Engineering Artificial Intelligence Systems and Pipelines	3
ECE 590/ME 576	Selected Topics in Engineering (AI: Ethics, Policy, and Society)	3
GBUS 662	Management of Information Technology and The Digital Enterprise	3
Total Credits		**18**

Electives

Students must complete 3 credits from each of the following four tracks (12 credits):

- Track 1: AI Policy, Ethics, and Society
- Track 2: Advanced AI
- Track 3: Scalable and Secure AI Infrastructures
- Track 4: Use-inspired AI

AI: Policy, Ethics, and Society

Code	Title	Credits
Choose one:		**3**
AIT 679	Law and Ethics of Big Data	
BIOD 760	National Security Technology and Policy	
GCP 501	Data Analysis for Global Political Economy	
GCP 604	New Technologies in the Global Economy	
ME 575	AI Design and Deployment Risks	
POGO 793	Big Data Analytics for Policy and Government	

Advanced AI

Code	Title	Credits
Choose one:		**3**
AIT 616	Interactive Machine Learning and Artificial Intelligence	
AIT 618	Human-AI Interaction	
AIT 526	Introduction to Natural Language Processing	

AIT 726	Natural Language Processing with Deep Learning
ECE 553	GenAI and LLM Technologies
OR 664	Bayesian Artificial Intelligence
or SYST 664	Bayesian Artificial Intelligence
OR 774	Reinforcement Learning

Scalable and Secure AI Infrastructures

Code	Title	Credits
Choose one:		**3**
AIT 542	Fundamentals of Computing Platforms	
AIT 660	Cyber Security Fundamentals	
AIT 670	Cloud Computing Security	
AIT 687	IoT and Edge Systems	
AIT 689	AI and Cybersecurity	
CS 695/ SWE 699	Special Topics in Computer Science (AI Safety and Assurance)	
ECE 554	Machine Learning for Embedded Systems	
ECE 653	Machine Learning Security and Privacy	

Use-inspired AI

Code	Title	Credits
Choose one:		**3**
AIT 636	Interpretable Machine Learning	
CYSE 689	Artificial Intelligence Methods for Cybersecurity	
STAT 646	Probabilistic Machine Learning	

Plan of Study

The plan of study consists of 30 credit hours, 18 of which are required/core coursework, and 12 of which are electives. The electives are organized in four thematic tracks, and students will complete at least 3 credit hours in each track.

Program Outcomes

At the end of this program, students will be able to:

- Identify and execute Artificial Intelligence opportunities to advance Artificial Intelligence research and applications.
- Translate complex Artificial Intelligence technical details into clear, actionable insights for diverse audiences.
- Demonstrate the ability to rapidly adapt to AI advancements and industry trends.
- Apply the entire Artificial Intelligence Operations pipeline, from model development, to model training, tuning, evaluation, selection, and deployment using cutting-edge libraries and tooling platforms and in embedded systems, on the edge, and in the cloud.
- Demonstrate an in-depth understanding of the foundation and practice of AI algorithms and frameworks.
- Implement safe, secure, and trustworthy Artificial Intelligence solutions and evaluate them against Artificial Intelligence risk frameworks.
- Articulate ethical, policy, and societal implications of Artificial Intelligence algorithms and technologies.