ARTIFICIAL INTELLIGENCE INNOVATION (AII)

600 Level Courses

AII 600: *Foundations and Practice of Machine Learning for Artificial Intelligence.* 3 credits.
This course will introduce the foundations of machine learning encountered in Artificial Intelligence (AI). The course will emphasize the practical aspects of machine learning, such as the ability to analyze complex datasets arising in several AI sub-fields. At the end of this course, students will be able to identify problems that benefit from AI solutions, articulate and implement such solutions utilizing appropriate libraries and computing platforms, as well as evaluate solutions against AI risk frameworks.Offered by Engineering & Computing. May not be repeated for credit.
Registration Restrictions:
Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Junior Plus, Non-Degree or Senior Plus.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the Engineering Computing college.

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (http://catalog.gmu.edu/policies/academic/grading/)

AII 601: *Planning and Decision Making for Intelligent Agents.* 3 credits.
This course will introduce the definition of planning domains, including representations for world states and actions. We will cover optimal search-based planning strategies in domains with finite states as well as methods for effective planning and acting in the real world, where both sensing and actions are uncertain. We introduce the framework or Markov Decision Processes for decision making under uncertainty and introduce basic algorithms for finding optimal policies; mapping from states to actions. In the second part of the course we will focus on reinforcement learning problems, covering model-free and model-based reinforcement learning methods, temporal difference learning and policy gradient algorithms. The course will also cover algorithms used to solve multi-arm bandit problems, each with its own trade-offs between exploration and exploitation. Reinforcement learning is an essential part of fields ranging from modern robotics to game-playing (e.g. Poker, Go, and Starcraft).Offered by Engineering & Computing. May not be repeated for credit.
Registration Restrictions:
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Schedule Type: Lecture

Grading:
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AII 602: *Foundations and Practice of Deep Learning for Artificial Intelligence.* 3 credits.
This course will cover an introduction to neural networks and deep learning, including theoretical motivation and practical implementations. We will cover basic building blocks of designing, training and fine-tuning and monitoring deep networks, including explainability and hands-on exercises and programming assignments in Pytorch. We will discuss supervised, self-supervised, and unsupervised learning approaches and cover applications areas of deep neural networks in computer vision, natural language processing and understanding, deep reinforcement learning, generative deep learning, and adversarial learning.Offered by Engineering & Computing. May not be repeated for credit.
Registration Restrictions:
Required Prerequisite: AII 600[B-].
[B-] Requires minimum grade of B-.

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Junior Plus, Non-Degree or Senior Plus.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (http://catalog.gmu.edu/policies/academic/grading/)

AII 603: *Engineering Artificial Intelligence Systems and Pipelines.* 3 credits.
This course gives students hands-on, practical experience with building, deploying, and evaluating large-scale AI technologies with the potential to provide value across a variety of industry sectors. The projects are designed to explore the breadth of AI technologies for engineering scalable API solutions across embedded, edge, and cloud computing platforms. The projects are team-based to prepare students for the environments that they will encounter in industry. At the end of this course, students will be able to engineer effective and value-capturing AI solutions for various sectors.Offered by Engineering & Computing. May not be repeated for credit.
Registration Restrictions:
Required Prerequisite: AII 602[B-].
[B-] Requires minimum grade of B-.

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Junior Plus, Non-Degree or Senior Plus.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (http://catalog.gmu.edu/policies/academic/grading/)