

Course Change Request

New Course Proposal

Date Submitted: 03/13/26 12:07 pm

Viewing: **COS 303 : Introduction to AI Applications in Science**

Last edit: 03/13/26 12:13 pm

Changes proposed by: jbazaz

In Workflow

1. SC Curriculum Committee
2. SC Assistant Dean
3. Assoc Provost- Undergraduate
4. Registrar-Courses
5. Banner

Are you completing this form on someone else's behalf?

Yes

Requestor:

Name	Extension	Email
Arie Croitoru	5302	acroitor@gmu.edu

Effective Term: Summer 2026

Subject Code: COS - College of Science

Course Number: 303

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Introduction to AI Applications in Science

Banner Title: Intro to AI Application in Sci

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable: May be only taken once for credit, limited to 3 attempts (N3)

Max Allowable Credits: 9

Default Grade Mode: Undergraduate Regular

**Recommended
Prerequisite(s):**

**Recommended
Corequisite(s):**

**Required
Prerequisite(s) /
Corequisite(s)
(Updates only):**

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(Course/Test Code	Min Grade/Score	Academic Level)	Concurrency?

**Registration
Restrictions
(Updates only):**

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog

Description:

This course provides a broad introduction to artificial intelligence (AI) and its applications across disciplines in the natural, mathematical, computational, and data sciences. Students will explore the fundamental concepts of AI, examine ethical considerations surrounding its use, and gain exposure to how AI is integrated and leveraged across various disciplines within the College of Science. Through lectures across scientific disciplines, hands-on experiences, and review of case studies, students will develop an understanding of AI's transformative role in modern scientific practice and inquiry. No programming is required.

Justification:

What: Creating a new course.

Why: To offer a course focusing on scientific AI applications.

Does this course cover material which crosses into another department? No

Learning Outcomes:

Will this course be scheduled as a cross-level cross listed section?

Attach Syllabus

[COS_303_syllabus_03122026.pdf](#)

Additional Attachments

[COS_503_syllabus_03122026.pdf](#)

Staffing:

Dr. Billy Lamberti with guest lectures from COS departmental faculty.

Relationship to Existing Programs:

Currently none.

Relationship to Existing Courses:

Will be crosslisted with a new course, COS 503.

Have you reached out to the Libraries to determine whether there are adequate resources to support your course? If not, please email Meg Meiman, Associate University Librarian for Learning, Research, and Engagement at mmeiman2@gmu.edu.

No

Additional Comments:

Reviewer Comments

COS 303: Introduction to AI Applications in Science

Course Title: Introduction to AI Applications in Science
Course Number: COS 303
Prerequisites: None
Credits: 3
Semester: Fall 2026

Instructor: Dr. Billy Lamberti
Meeting schedule: TBD
Modality: In-person
Location: TBD
Contact Information: wlamber2@gmu.edu
Office hours: TBD

Course Description/Overview: This course provides a broad introduction to artificial intelligence (AI) and its applications across disciplines in the natural, mathematical, computational, and data sciences. Students will explore the fundamental concepts of AI, examine ethical considerations surrounding its use, and gain exposure to how AI is integrated and leveraged across various disciplines within the College of Science. Through lectures across scientific disciplines, hands-on experiences, and review of case studies, students will develop an understanding of AI's transformative role in modern scientific practice and inquiry. No programming is required.

Course Learning Outcomes: Upon successful completion of this course, students will be able to:

- Define artificial intelligence and distinguish among its major subfields, including machine learning, deep learning, generative AI, natural language processing, and computer vision.
- Recognize applications of AI across scientific disciplines in the natural, mathematical, computational, and data sciences.
- Describe how AI is influencing research methodologies in the natural sciences.
- Identify ethical considerations, societal implications, limitations, and potential biases associated with AI in scientific research.
- Evaluate the appropriateness of AI tools for addressing different scientific problems at a foundational level.
- Explain the role of scientific domain knowledge in the effective use of AI and describe related career pathways.
- Discuss the strengths and limitations of AI systems in scientific contexts.

Textbook and course materials: No textbook is required. Students will receive curated readings and class resources each week.

Hardware: a working computer with internet access.

Software: A supported up-to-date web browser ([check your browser is compatible with Canvas](#)) and Microsoft 365 (free for Mason students, please refer to [these details](#) for additional information). No additional specialized software is required. Students will interact with publicly available AI tools through web interfaces (e.g., Patriot AI). All tools used will be freely accessible.

Teaching Methods: The course will be delivered through a combination of the following methods:

- Lectures and discussions led by course instructor and guest faculty
- In-class demonstrations of AI tools and applications
- Small group activities and problem-solving exercises
- Video case studies showcasing real-world AI applications
- Guided exploration of publicly available AI tools (no programming required)
- Student presentations

Grading and Course Policies

Grading Schema: Grades are determined using point values and the following formula:

$$\text{Grade} = (\text{Points Earned} + \text{Extra Credit}) / (\text{Points Available})$$

The table converting points to letter grades is provided below:

Points Range	Letter Grade
192 - 200	A+
180 - 191	A
174 - 179	A-
168 - 173	B+
160 - 167	B
154 - 159	B-
148 - 153	C+
140 - 147	C
134 - 139	C-
128 - 133	D+
120 - 127	D
114 - 119	D-
0 - 113	F

Grade Weights:

Item	Points (weight)
Participation and in-class activities (weekly reflection questions or discussion posts)	40
Homework assignments (4 assignments exploring AI concepts and applications)	60
Midterm exam	40
Final project (group report and presentation on AI applications in a chosen scientific field)	60
Total	200

Grading-related Policies: TBD

Email communication: Students must monitor their Mason email account regularly, and use it to send/receive University information, including communications related to this class. We cannot respond to messages sent from a non-Mason email account. Email messages received Monday through Friday during regular business hours will be answered within 24 hrs. Messages received during weekends or university-observed holidays will be answered on the following business day. Efficient and professional communication is important when contacting the course team. For information and tips on this subject please review the following resource: [Sending Email to Faculty and Administrators](#). Please also refer to the “FERPA and Use of GMU Email Addresses for Course Communication” section in the GMU Common Course Policies section for additional details.

GMU Common Course Policies

Students in this course are required to familiarize themselves with GMU’s Common Course Policies at <https://stearnscenter.gmu.edu/home/gmu-common-course-policies/>

Use of AI Tools in this course: Use of various AI tools is required in this course. Students will interact with publicly available AI tools through web interfaces (e.g., Patriot AI). Throughout the course, students may be asked to self-report, reflect on, and critique their use of AI tools, as well as collect information related to their AI activities.

Important Dates: please refer to the Office of the University Registrar for information about the Fall 2026 Academic Calendar: https://registrar.gmu.edu/calendars/fall_2026/. The final exam schedule for that semester is available at: <https://registrar.gmu.edu/wp-content/uploads/Final-Exams-202570.pdf>

Weekly Course Schedule

Week 1: Introduction to AI and Course Overview

- What is artificial intelligence? Definitions and historical context
- Overview of AI subfields: generative AI, machine learning, deep learning, natural language processing, computer vision, robotics
- How AI differs from traditional computational approaches
- The machine learning paradigm: learning from data
- Course structure and expectations
- Introduction to the College of Science departments and disciplines

Week 2: Foundations of Machine Learning (Conceptual Overview)

- The machine learning paradigm: learning from data
- Supervised vs. unsupervised learning: key distinctions
- Training, validation, and testing: why it matters
- Overfitting and generalization in plain language

Week 3: Ethics of AI in Science

- Foundational principles of ethics in scientific research
- Bias in AI systems: sources, consequences, and mitigation strategies
- Data privacy and consent in AI-driven research
- Reproducibility and transparency in AI-assisted science
- Responsible AI development and deployment
- Case studies: ethical failures and successes in scientific AI applications

Week 4: AI in Computational and Data Sciences

- **Guest Lecturer(s):** the Computational and Data Sciences Faculty
- Introduction to Computational and Data Sciences
- Machine learning fundamentals and workflows
- Big data analytics and AI
- High-performance computing for AI applications
- AI applications in modeling and simulation
- Current CDS research utilizing AI
- **Assessment:** Assignment 1

Week 5: AI in Biology, Bioinformatics, and Computational Biology

- **Guest Lecturer(s):** Biology Department Faculty
- AI applications in genomics and bioinformatics and medicine
- Protein structure prediction (AlphaFold and related tools)
- Species identification and biodiversity monitoring
- Exploring Evolutionary and Ecological Data/modeling
- Drug discovery and development
- Current biology research at GMU utilizing AI

Week 6: AI in Chemistry and Biochemistry

- **Guest Lecturer(s):** Chemistry and Biochemistry Department Faculty
- AI in molecular modeling and simulation
- Predicting chemical properties and reactions
- AI-assisted drug design and materials discovery
- Spectroscopy analysis using machine learning
- Laboratory automation and AI
- Current chemistry research at GMU utilizing AI

Week 7: AI in Physics and Astronomy

- **Guest Lecturer(s):** Physics and Astronomy Department Faculty
- AI in particle physics and high-energy experiments
- Gravitational wave detection and analysis
- Cosmological simulations and AI
- Quantum computing and AI intersections
- AI for experimental data analysis
- Current physics research at GMU utilizing AI
- **Assessment:** Assignment 2

Week 8: Midterm Review and Assessment

- Review of AI fundamentals and ethical considerations
- Synthesis of departmental applications covered thus far
- **Assessment:** Midterm Exam

Week 9: AI in Earth Sciences

- **Guest Lecturer(s):** Environmental Science and Policy Faculty, Atmospheric, Oceanic & Earth Sciences Faculty
- Climate modeling and prediction using AI
- Remote sensing and satellite image analysis
- Wildlife tracking and conservation applications
- Air and water quality monitoring
- Sustainable resource management with AI

- Current environmental science research at GMU utilizing AI

Week 10: AI in Neuroscience

- **Guest Lecturer(s):** Neuroscience Department Faculty
- Brain imaging analysis with AI
- Neural signal processing and brain-computer interfaces
- Computational models of cognition
- AI in mental health diagnostics and treatment
- Connectomics and neural network mapping
- Current neuroscience research at GMU utilizing AI

Week 11: AI in Mathematical Sciences

- Guest Lecturer(s): Mathematical Sciences Department Faculty
- The mathematical foundations of AI
- Optimization algorithms in AI
- Harnessing AI to advancing mathematical sciences
- Current mathematical sciences research at GMU utilizing AI
- **Assessment:** Assignment 3

Week 12: AI in Forensic Science

- Guest Lecturer(s): Forensic Science Program Faculty
- AI in forensic DNA analysis
- Pattern recognition: fingerprints, facial recognition, ballistics, evidence collection and analysis
- AI in forensic toxicology
- Legal and ethical considerations unique to forensic AI: legal considerations and challenges in federal and state courts re: expert scientific testimony and AI
- Current forensic science research at GMU utilizing AI

Week 13: AI in Geography and Geoinformation Science

- **Guest Lecturer(s):** Geography and Geoinformation Science Department Faculty
- Geographic Information Systems (GIS) and AI integration
- Spatial data analysis and machine learning
- Urban planning and smart cities
- Natural disaster prediction and response
- Remote sensing and satellite image analysis
- Current GIS research at GMU utilizing AI
- **Assessment:** Assignment 4

Week 14/15: Final Project

- **Final project (groups of 2-3 students):** Students will identify, select, and review scholarly literature on the use of artificial intelligence in one scientific field of their choice in order to produce a critical literature review. In the project, they will gather and examine relevant sources, analyze how AI is being used within the field, and evaluate the purpose, quality, and implications of these AI applications. Students will also apply their understanding of AI concepts to assess issues such as ethics, accuracy, and transparency across the literature. Drawing on this analysis, they will organize and compose a clear, evidence-based review that summarizes how AI is being used in the field, and the strengths, limitations, and ethical use of AI in this scientific practice context.
- Peer feedback and discussion
- **Assessment:** Final presentation and a written report