Syllabus

Transforming Academia with Generative AI

(NEUR-461 | NEUR-592 | PSYC-461 | PSYC-592 | PSYC-892 | BINF-739 | BIOL-691)

Fall Semester 2026

Course Organization

Weekly schedule: Each week runs from Monday (12:01 am) to Sunday (11:59 pm ET), starting August 24, 2026

Instructor: Frank Krueger, Ph.D.

Department: School of Systems Biology

Phone: 703-993-4358

E-mail: fkrueger@gmu.edu (preferred)

Office Hours: Announcements, the Canvas calendar, and optional Zoom office hours work together to support planning, clarification, and connection throughout the semester.

Course Levels: (NEUR-461 | NEUR-592 | PSYC-461 | PSYC-592 | PSYC-892 | BINF-739 | BIOL-691)

This course runs across seven sections at two levels. NEUR-461 and PSYC-461 are the undergraduate sections; NEUR-592, PSYC-592, PSYC-892, BINF-739, and BIOL-691 are the graduate sections. All seven sit the same course, follow the same weekly schedule, and are graded out of the same 800 points.

Graduate students are asked for more depth in four places:

- In the Weekly Discussion, two replies through two distinct lenses (one ethical, one methodological or technical) rather than one reply through one lens.
- In the Weekly AI Project, a short Limitations and Failure Modes note on the tool used that week.
- In the Weekly AI Tool, a short comparative note weighing that week's tool against one already used in the course, in place of the four-sentence reflection.
- In the Final AI Integration Project, a Critical Evaluation and Disciplinary Fit section.

The Key Concepts glossary is identical at every level. Canvas shows you the requirements that apply to your registration.

Course Description

This asynchronous online course comprehensively explores how generative AI technologies reshape academic research, writing, and communication. Through interactive readings, weekly mini-projects, tool-based assignments, and ethical discussions grounded in science fiction narratives from *AI 2041*, students will gain hands-on experience with cutting-edge AI tools, including ChatGPT, Litmaps, SciSpace, Gamma, and more. The course emphasizes technological fluency and ethical literacy, guiding students to apply AI effectively, responsibly, and academically

rigorously. By the end of the course, students will be equipped to critically assess and creatively integrate AI into their scholarly workflows, preparing them for success in an academic future shaped by rapid innovation.

This course is intentionally designed using inclusive STEM teaching principles to support diverse learners in an asynchronous environment. Rather than treating equity and accessibility as accommodations added after the fact, the course structure, assessments, and discussion practices are designed to make expectations transparent, reduce unnecessary barriers, and support sustained engagement with complex technical and ethical material. In the context of rapidly evolving AI tools—which can amplify existing inequities if used uncritically—this course treats responsible AI literacy as both a technical and pedagogical responsibility.

Learning outcomes

By the end of this course, students will be able to:

1. **Critically assess** the role of generative AI in academic settings, including its potential benefits, limitations, and ethical implications across diverse research and educational contexts.
2. **Effectively apply** various AI tools to enhance academic activities such as literature reviews, writing, data visualization, and presentation, while maintaining academic integrity.
3. **Communicate insights** through ethically grounded discussions and multimodal projects that blend traditional academic formats with AI-enhanced methods.
4. **Reflect on AI's societal impact**, drawing connections between science fiction, real-world AI developments, and the future of scholarly work.

Across these outcomes, students will be supported in developing not only technical fluency with AI tools but also the judgment, reflection, and ethical reasoning necessary to use such tools responsibly in academic and professional contexts.

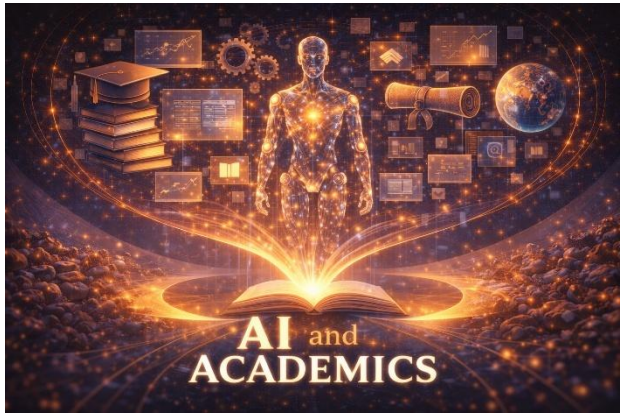

Image created by ChatGPT 5.2: AI meets academia in harmony

Prerequisite

Prerequisites are completion or concurrent enrollment in all other required general education courses or permission from the instructor. This course is essential for anyone interested in the rapidly developing field of generative AI in academic contexts. Major components of the course include reading current literature, conducting AI-assisted research projects, creating AI-enhanced academic outputs, and engaging in collaborative discussions on AI ethics.

Textbook & Course Materials

Required Text, Recommended Texts, and Other Readings

- Readings will be made available on Canvas (See Learning Modules).

Course readings and examples are intentionally selected to reflect a range of scholarly perspectives, including contributions from early-career researchers, interdisciplinary scholars, and authors from diverse backgrounds. Artificial intelligence is not a value-neutral technology, and exposure to multiple intellectual traditions strengthens critical thinking, ethical reasoning, and academic rigor. Students are also encouraged to share relevant scholarly sources that broaden or challenge the perspectives represented in the course, provided they meet academic standards of quality and relevance.

Course Logistics

This course will use a distance learning format; the primary meeting space will be on Canvas; and we will use other means of keeping in touch, such as e-mail, telephone, and Zoom. This is a rigorous course: you will accomplish the following activities in a typical week:

- Reading about 35-50 pages, reflecting on the content, and discussing the material with your classmates,
- Completing online activities and responding to weekly requirements, and
- Working on assignments, completing in Canvas according to the assignment schedule.

Although the delivery method differs, it should take you the same amount of time as a typical full-semester course. You should **expect to spend approximately 9 hours on coursework each week** (including the time you would have spent in a classroom). It is critical to keep up with weekly requirements. Each week, I will provide announcements via e-mail and a module in our Canvas course to specify required activities and assignments (available by clicking on 'Modules' on the course menu in Canvas).

Weekly announcements are used intentionally to scaffold learning across the week: early-week announcements provide orientation and relevance (often linking to current AI news or newsletters), midweek reminders support deeper engagement with course readings and optional book chapters, and end-of-week announcements offer reflective extensions, such as films or broader cultural examples related to the topic.

The weekly structure of this course is intentionally scaffolded to support learning in an asynchronous environment. Activities such as glossary work, discussions, tool exploration, and mini-projects are sequenced to build understanding progressively, allowing students to practice new skills in lower-stakes contexts before applying them in more integrative assignments.

Canvas (Available on August 24, 2026)

We will use Canvas for the course. Additional guidance on individual assignments and discussion questions will be posted there. Please visit our Canvas site regularly.

Access Canvas by following these steps:

1. Go to http://mymason.gmu.edu.
2. Log in using your NETID and password.
3. Click on the 'Dashboard' tab.
4. Click on 'Transforming Academia with Generative AI."

Deadlines and Late Submissions

All assignments will be submitted through Canvas for grading. Deadlines in this course are intended to structure learning and support timely feedback, not to serve as punitive cutoffs. Students are encouraged to submit work by the posted due dates whenever possible.

Late submissions are permitted. However, after the due date, assignments may no longer be visible for submission in Canvas. In such cases, students must contact the instructor to request re-activation of the assignment and briefly explain the reason for the delay.

There is no automatic grade penalty for late submissions. Final grades reflect the quality and completeness of submitted work. Missing work is not graded automatically and remains ungraded until submitted or addressed directly with the instructor.

This approach is designed to balance academic rigor with flexibility, recognizing that students may be managing complex schedules, responsibilities, or unexpected challenges while engaging in a demanding STEM course.

Instructor-Student Communication

I will respond to your e-mails from Monday (9 am) through Friday (6 pm) within 24 hours. If I am away from e-mail for more than two days, I will send an announcement to the class.

Before sending an e-mail with questions, please check the following (available on your Canvas course menu) **unless the e-mail is of a personal nature**:

1. Syllabus.
2. Tutorials on how to use Canvas features.
3. Canvas Q&A (resources specific to Mason).
4. Technology Requirements.

Mason E-MAIL

- Mason requires that the Mason e-mail be used for all courses. I will be sending messages to your Mason e-mail address, and you are responsible for ensuring you have access to them.

- You may forward your Mason e-mail to other accounts, but always use your Mason e-mail when communicating with me to verify your identity.
- You must regularly check your Mason e-mail account and keep your mailbox maintained so that messages are not rejected for being over quota.
- When you e-mail me, you can expect a response within 24 hours (*Monday through Friday*). If I am going to be away from e-mail for more than two days, I will send an announcement to the class.
- When you e-mail me, be sure to include '**Academia & AI'** at the beginning of the subject heading to alert me that I have received a message from one of my online students.

Participation

Netiquette For Online Discussions

Our discussion should be collaborative, not combative; you create a learning environment, share information, and learn from one another. Respectful communication is essential to your success in this course and as a professional. Please re-read your responses carefully before you post them so others will not take them out of context or as personal attacks. Be positive to others and diplomatic with your words, and I will try my best to do the same. Be careful when using sarcasm and humor. Without face-to-face communication, your joke may be viewed as criticism. Experience shows that even an innocent remark in the online environment can be easily misconstrued.

Netiquette prepared by Charlene Douglas, Associate Professor, College of Health & Human Services, GMU.

In Week 1, students will participate in a structured activity to co-create a small set of operational agreements for respectful dialogue and collaboration. These agreements—developed collectively and revisited as needed—will guide discussion and interaction throughout the semester. Respectful engagement is treated as an academic skill that supports ethical reasoning, perspective-taking, and productive disagreement.

Participation in this asynchronous course is defined as meaningful academic engagement rather than constant visibility. Students may demonstrate participation through discussion posts, reflective writing, project work, and thoughtful interaction with course materials and peers. Evaluation emphasizes the quality of reasoning and engagement, not communication style or frequency alone.

Technology Requirements

Technology requirements for the course are:

- Internet connection (DSL, LAN, or cable connection desirable).
- Supported web browser (e.g., Chrome, Edge, Safari, or Firefox) for Canvas and optional live sessions.
- MS Office 365 ProPlus is provided at no cost via the Microsoft Student Advantage Program (Access is tied to your @gmu.edu e-mail address).

Student Responsibilities

Mason E-mail

Students are responsible for the content of university communications sent to their George Mason University e-mail account and are required to activate their account and check it regularly. For accessibility and privacy, the university, school, and program will send communications to students solely through their Mason e-mail account —students should respond accordingly.

Patriot Pass

Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Canvas, University Libraries, Mason E-Mail, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See]

AI Guidelines

These resources provide a framework and guidance for the responsible and ethical use of AI across our academic community. [See]

Students with Disabilities

Students with disabilities who seek accommodations in a course must register with the George Mason University Office of Disability Services (ODS) and inform their instructor in writing at the beginning of the semester. [See]

Academic Integrity

Students must be responsible for their work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be the foundation of our university culture. [See]

Honor Code and Virtual Classroom Conduct

Students must adhere to the guidelines of the George Mason University Honor Code. [See]

University Policies

Students must follow university policies (See).

Responsible Use of Computing

Students must follow university policies. [See]

University Calendar

Details regarding the current Academic Calendar [See].

University Catalog

The current university catalog [See].

Student Services

Writing Center

The George Mason University Writing Center staff provides various resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. ESL Help: The program was designed specifically for students whose first language is not English who feel they might benefit from additional, targeted support throughout the semester [See].

University Libraries

University Libraries provide resources for distance students [See].

Counseling and Psychological Services

The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counselors, clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops, and outreach programs) to enhance students' personal experience and academic performance [See].

Students experiencing challenges related to mental health, food security, housing stability, or other basic needs are strongly encouraged to make use of these services. Seeking support is a responsible and proactive step, and doing so will not negatively affect your standing in the course.

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act of 1974 (FERPA), or the 'Buckley Amendment,' is a federal law that protects students' educational records and provides students with certain rights. [See].

Weekly Schedule

Distance learning courses are dynamic—to ensure we achieve our learning outcomes, we may need to negotiate changes to the weekly schedule. We will focus on learning, fairness, and reason for any approved changes. Each week's activities — reading assignments on topics, watching videos, defining key concepts (via a glossary), sharing and discussing your knowledge with classmates (via the discussion forum), and completing assignments to build the AI toolbox — **require approximately 9 hours.**

Submission deadlines and late submission procedures are described in the *Deadlines and Late Submissions* section above

Note that this course has no final exam, but students complete a project using the developed AI Toolbox during the exam week. The table below lists the weekly schedule, significant activities, significant assignments, points, and due dates for this course. Final grades will be based on the total points earned in the class.

The course structure emphasizes continuous engagement and reflection rather than high-stakes testing, supporting sustained learning and multiple pathways for students to demonstrate mastery of course outcomes.

Week	Major Topics and Methods	Assignments	Points	Due Dates (11.59 pm ET)
Week 1		Orientation Quiz	5	Sunday, August 30
Monday, August 24		Self-Introduction	10	
—	AI Foundations: From Deep Learning to Modern AI	Topic: Glossary	10	Thursday, August 27
Sunday, August 30	AI Ethical Focus: Innovation vs. Responsibility	Ethics: Discussion (Part 1)	10	
		Ethics: Discussion (Part 2)	10	Sunday, August 30
	AI Phase 1: Discovery & Idea Generation: Tool: ChatGPT – Prompt Powerhouse	Project: Prompt Design for Scholarly Explanation	20	
Week 2	AI Foundations: Generative Models & LLMs	Topic: Glossary	10	Thursday, September 3
Monday, August 31	AI Ethical Focus: Reliance vs. Judgment	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, September 6
Sunday, September 6	*Phase 1*: Discovery & Idea Generation: Litmaps – Literature Mapper	Project: Literature Mapping & Research Positioning	20	
Week 3	AI in Academia: Research, Writing, and Learning	Topic: Glossary	10	Thursday, September 10
Monday, September 7	AI Ethical Focus: Speed vs. Integrity	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, September 13
Sunday, September 13	*Phase 1: Discovery & Idea Generation:* Perplexity – Academic Research Assistant	Project: Rapid Literature Scan & Evidence Summary	20	
Week 4	AI in Practice: Deep Learning, Data, and Discovery	Topic: Glossary	10	Thursday, September 17
Monday, September 14	AI Ethical Focus: Optimization vs. Autonomy	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, September 20
Sunday, September 20	*Phase 1: Discovery & Idea Generation:* Elicit – Evidence Finder	Project: Research Question & Study Concept Brief	20	
Week 5	AI in Practice: Computer Vision & Visual Intelligence	Topic: Glossary	10	Thursday, September 24
Monday, September 21	AI Ethical Focus: Authenticity vs. Manipulation	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, September 27
Sunday, September 27	*Phase 2: Deep Analysis & Writing:* SciSpace – AI Analyst	Project: Methods & Claims Comparison Memo	20	
Week 6	AI in Practice: Natural Language Processing	Topic: Glossary	10	Thursday, October 1

Monday, September 28	AI Ethical Focus: Support vs. Shaping	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, October 4
Sunday, October 4	*Phase 2: Deep Analysis & Writing:* Paperpal – Precision Writer	Project: Academic Paragraph Revision & Style Audit	20	
Week 7	AI in Practice: Robotics & Embodied Intelligence	Topic: Glossary	10	Thursday, October 8
Monday, October 5	AI Ethical Focus: Safety vs. Connection	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, October 11
Sunday, October 11	*Phase 2: Deep Analysis & Writing:* Grammarly – Style & Clarity Coach	Project: Abstract & Research Pitch Polishing	20	
Week 8	AI in Practice: Extended Reality (VR / AR / MR)	Topic: Glossary	10	Thursday, October 15
Monday, October 12	AI Ethical Focus: Authentic Experience vs. Curated Reality	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, October 18
Sunday, October 18	*Phase 2: Deep Analysis & Writing:* Consensus – Evidence Engine	Project: Claim Validation & Evidence Alignment Brief	20	
Week 9	AI in Practice: Autonomous Systems & Driving	Topic: Glossary	10	Thursday, October 22
Monday, October 19	AI Ethical Focus: Automation vs. Responsibility	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, October 25
Sunday, October 25	*Phase 3: Communication & Creativity*: Gamma – Structure Master	Project: Ethical Systems Timeline Briefing	20	
Week 10	AI in Practice: Quantum Computing & Intelligent Discovery	Topic: Glossary	10	Thursday, October 29
Monday, October 26	AI Ethical Focus: Capability vs. Control	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, November 1
Sunday, November 1	*Phase 3: Communication & Creativity:* DALL·E 3 – Image Generator	Project: Conceptual Figure: Ethical Futures of Quantum AI	20	
Week 11	AI & Society: Work, Automation, and Job Displacement	Topic: Glossary	10	Thursday, November 5
Monday, November 2	AI Ethical Focus: Productivity vs. Purpose	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, November 8
Sunday, November 8	*Phase 3: Communication & Creativity:* ElevenLabs – Synthetic Voice Studio	Project: Audio Research Summary (Conference-Style)	20	
Week 12	AI & Well-Being: Happiness, Design, and Human Values	Topic: Glossary	10	Thursday, November 12
Monday, November 9	AI Ethical Focus: Efficiency vs. Meaning	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, November 15
Sunday, November 15	*Phase 4: Collaboration & Integration:* HeyGen – Digital Avatar Creator	Project: Future Ethics Briefing: AI-Mediated Well-Being	20	

Week 13	AI & Society: Plenitude, Abundance, and Meaning	Topic: Glossary	10	Thursday, November 19
Monday, November 16	AI Ethical Focus: Abundance vs. Equity	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, November 22
Sunday, November 22	*Phase 4: Collaboration & Integration:* PatriotAI (DocuMate)	Project: Plenitude Insight Brief	20	
Thanksgiving Break				
Monday, November 23				
Sunday, November 29				
Week 14	AI Futures: AI Atlantis & Intelligent Economies	Topic: Glossary	10	Thursday, December 3
Monday, November 30	AI Ethical Focus: Abundance vs. Agency	Ethics: Discussion (Part 1)	10	
—		Ethics: Discussion (Part 2)	10	Sunday, December 6
Sunday, December 6	*Phase 4: Collaboration & Integration:* Google NotebookLM – AI Integrator	Project: Scenario Synthesis & AI Design Brief	20	
		Course Evaluation (optional)	15	
Exam Week	Phase 5: Final Integration	Project: Final AI Integration Project	85	Sunday, December 13
Monday, December 7		Tool Mastery Bonus (optional)	15	
—		Final Reflection Portfolio (optional)	20	
Sunday, December 13				
		Total	**850**	

Grading Scale (points)

Final grades for this course will be based on the percentage of total points earned, calculated from a core total of **800 points**. In addition to the required weekly assignments, you can earn up to **50 extra points** through optional activities. These include a *Tool Mastery Badge (15 points)*, *Final Reflection Portfolio (20 points)*, and submission of your *GMU course evaluation (15 points)*. While not required, these bonus points can help boost your final grade, compensate you for missed work, or even move you into a higher-grade bracket. Your final grade will be determined solely based on the 800-point core, and any extra credit will be added on top. As a result, earning more than 100% is possibly a meaningful reward for students who go above and beyond. These opportunities are a chance to enrich your experience, reflect deeply, and demonstrate your full engagement with the course.

Letter Grade	Percentage	Points	Performance
A^+	98–100%	784–800 (800+ with extra credit)	Superb work
A	93–97%	744–783	Excellent work
A^-	90–92%	720–743	Nearly excellent work

Letter Grade	Percentage	Points	Performance
B^+	87–89%	696–719	Very good work
B	83–86%	664–695	Good work
B^-	80–82%	640–663	Mostly good work
N/A	<80%	<640	Failing work