Artificial Intelligence Essentials

ENGINR 2550 | Syllabus | Spring 2026

Catalog description	This introductory course is designed to build AI literacy among undergraduate students, with an emphasis on generative AI (GenAI). Topics will include basics of AI technologies, AI ethics, prompt engineering techniques, selected AI tools, practical applications of AI in various fields. This course is designed for students from all majors, providing foundational AI knowledge without requiring prior programming experience. (3 CH)
Prerequisites	None
Schedule	Three 50-minute lectures each week, MWF at 2:00–2:50 pm. Monday: concepts; Wednesday: discussion and demonstration; Friday: hands-on application. Friday activities feed into homework.
Required materials	Laptop computer with a web browser. No prior programming experience or paid AI subscription is required. Use instructor-approved tools; access instructions will be provided in Canvas.
Textbooks and references	Free, openly accessible references. Read selected sections as assigned; no payment, subscription, or enrollment is required to read these materials. Elements of AI. University of Helsinki and MinnaLearn. Selected open readings on AI foundations, machine learning, neural networks, and societal implications. Agentic Design Patterns Part 1. Andrew Ng, DeepLearning.AI (2024). A short introduction to reflection, tool use, planning, and multi-agent collaboration. Building Effective Agents. Anthropic (2024). Selected conceptual sections on tools, workflows, agents, evaluation, and human oversight.

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Learning outcomes	By the end of the course, students will be able to: • Explain foundational AI, machine learning, generative AI, and LLM concepts and limitations. • Analyze ethical implications, including bias, privacy, attribution, and responsible use. • Use AI tools to create and critically assess text, multimedia, and simple interactive artifacts. • Apply practical prompting and source verification to improve AI-assisted work. • Design, execute, and evaluate a multistep AI workflow; explain how agents use tools and feedback. • Test reliability, identify failures, and justify human oversight and the value of using AI.

Topics

- Foundational AI knowledge: Understand AI history, learning approaches, generative models, and their limitations.
- Creative and practical applications: Explore writing, research, multimedia, AI-assisted coding, and tasks across majors.
- Practical prompting: Use clear tasks, relevant context, examples, structured outputs, and iterative refinement.
- Workflows and agentic AI: Connect tools, information, and feedback to solve bounded problems with appropriate human control.
- Evaluation and responsible use: Verify claims, test outputs, examine bias and privacy, and compare benefits with effort and cost.

Weekly schedule

This outline uses 15 teaching weeks rather than calendar dates. Specific meetings, assignment deadlines, and any schedule adjustments will be posted in Canvas. Prompting, evaluation, and responsible use continue throughout the course.

Week 1: Introduction to AI literacy	AI history; capabilities and limitations; AI, ML, and generative AI.
Week 2: Ethics and responsible use	Bias, fairness, privacy, academic integrity, and appropriate uses of AI.
Week 3: Machine learning fundamentals	Supervised and unsupervised learning; reinforcement learning overview; training versus testing; measures of success.

Week 4: Neural networks and LLMs	Neural networks, deep learning, tokens, transformers, and generative models; why outputs can be wrong.
Week 5: Practical prompting	Clear tasks, context, constraints, examples, structured outputs, and iterative refinement; evaluate rather than assume improvement.
Week 6: Writing, research, and verification	AI-assisted drafting and revision; checking sources and claims; attribution and authorship.
Week 7: Multimedia creation	Image, video, voice, and audio generation; accessibility, consent, copyright, and synthetic media.
Week 8: AI-assisted coding and creation	Specify a small interactive artifact; generate, inspect, test, and revise it without prior programming experience.
Week 9: AI across majors and workplaces	Match tools to tasks; compare AI-assisted work with a simpler approach; assess quality, effort, and limitations.
Week 10: Tools, retrieval, and grounded answers	Tool use, document-grounded responses, retrieval-augmented generation (RAG), and a conceptual introduction to Model Context Protocol (MCP).
Week 11: From prompts to workflows	Prompt chaining, routing, and evaluator feedback; structured handoffs and intermediate checks.
Week 12: Agentic AI	Goals, state, tools, action/feedback loops, and bounded autonomy; distinguish fixed workflows from agents that select actions.
Week 13: Agent reliability, safety, and cost	Permissions, prompt injection, human oversight, stopping rules, tool failures, recovery, and cost/latency tradeoffs.
Week 14: Project testing and improvement	Peer feedback, test evidence, failure analysis, responsible use, and usability.
Week 15: Demonstrations and reflection	Communicate results, limitations, and lessons; decide when AI adds value and when human judgment is essential.

The Agentic AI Project replaces the final exam. There is no separate midterm or final exam.

Grading:

Participation	10%
Homework	75%
Agentic AI Project	15%

Participation reflects attendance and active engagement in discussions, peer feedback, and hands-on activities. Homework includes work developed during Friday activities and completed or refined afterward; labs are not a separate grading category. Assignment instructions, grading criteria, and due dates will be posted in Canvas.

Agentic AI Project

Create an agentic AI project that brings together components explored throughout the course to address a practical problem of your choosing. Combine approaches such as prompting, tools, retrieval, and multistep workflows into a useful solution, and explore how it can plan, act, and respond to feedback. Evaluate its usefulness and limitations, considering reliability, responsible use, and the role of human oversight.

Accessible tools and alternatives

Use instructor-approved browser tools. A paid subscription, programming environment, or deployed autonomous agent is not required. Required activities will have an accessible alternative, so grading does not depend on purchasing access.

Grading Scale

Grade	Percent	Grade	Percent
A+	99–100	C	73.3–76.6
A	94.3–98.9	C-	70–73.2
A-	90–94.2	D+	66.6–69.9
B+	86.6–89.9	D	63.3–66.5
B	83.3–86.5	D-	62–63.2
B-	80–83.2	F	0–61.9
C+	76.6–79.9		

Artificial Intelligence

AI tools will be integrated into this course. Assignments in this course have been purposefully designed to integrate AI tools in support of the learning objectives. In class, we will discuss how Generative AI is used within this discipline, including how to navigate its potential uses and abuses, how and when to attribute sources, and other developing topics.

Each assignment will specify permitted AI use. Disclose which tools you used and how; verify factual claims and citations, and remain responsible for the final work. Use public, synthetic, or otherwise approved data rather than sensitive personal information. Agent activities must use

bounded permissions, stopping rules, and human approval before consequential external actions.

Academic Integrity

Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor or the Office of Academic Integrity.

Students are expected to adhere to this honor pledge on all graded work whether or not they are explicitly asked in advance to do so: "I strive to uphold the University values of respect, responsibility, discovery, and excellence. On my honor, I pledge that I have neither given nor received unauthorized assistance on this work."

Academic Inquiry, Course Discussion and Privacy

When students record something that happens in a course (a lecture, class discussions, meetings, etc.) it has an impact on the rights of the people captured in that recording. For example, the instructor and the University may have rights to the intellectual property contained in that recording. At the same time, another student who may have been recorded has the right to privacy. In order to protect these rights, MU employs a policy (called "Executive Order No. 38") to govern both situations you may encounter while taking a course – when an instructor allows recordings and when they do not.

Instructors should inform students which applies to their course:

- In this class, students may not make audio or video recordings of course activity, except students permitted to record as an accommodation undersection 240.040 of the Collected Rules.
- In this class, students may make audio or video recordings of course activity unless specifically prohibited by the faculty member. However, the redistribution of audio or video recordings of statements or comments from the course to individuals who are not students in the course is prohibited without the express permission of the faculty member and of any students who are recorded.

If the instructor doesn't specifically prohibit recording course activity, then the students are allowed to record and the same prohibitions regarding distribution apply.

Students who violate this policy are subject to discipline in accordance with provisions of section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.

FERPA

The Family Educational Rights and Privacy Act (FERPA) of 1974 is a federal law designed to protect the privacy of educational records; to establish the rights of students to inspect and review their education records; and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. The law applies to any individual who is or has been in attendance at an institution *and* regarding whom the institution maintains educational records. Once students have matriculated to the University of Missouri, i.e. enrolled in course work, FERPA rights transfer to the student, regardless of the student's age.

Students can enable certain individuals to have access to their education records by signing a FERPA waiver. The consent must specify records to be disclosed, state the purpose of the disclosure and identify the party or class of parties to whom the disclosure must be made.

Intellectual Pluralism

The University community welcomes intellectual diversity and respects student rights. Students who have questions or concerns regarding the atmosphere in this class (including respect for diverse opinions) may contact the departmental chair or divisional director, the Office of Academic Integrity, or the MU Office of Institutional Equity.

Mental Health

The University of Missouri is committed to supporting student well-being through an integrated network of care, with a wide range of services to help students succeed. The MU Counseling Center offers professional mental health care, and can help you find the best approach to treatment based on your needs. Call to make an appointment at 573-882-6601. Any student in crisis may call or go to the MU Counseling Center between 8:00-5:00 M-F. After hours phone support is available at 573-882-6601.

Visit our website at https://wellbeing.missouri.edu/ to take an online mental health screening, find out about workshops and resources that can help you thrive, or learn how to support a friend.

Netiquette

Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Our differences,

some of which are outlined in the University's nondiscrimination statement, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambiance.

Religious Holidays & Accommodations

Many religious faiths are represented in the student body. The University of Missouri does not restrict student free exercise of religion, unless 1) the restriction is in the form of a rule of general applicability and does not discriminate against religion or among religions; and 2) it can be demonstrated that the application of the restriction is essential to furthering a compelling university interest, and is not unduly restrictive considering the relevant circumstance. The policy of the University attempts to strike a reasonable balance between accommodating the religious practice of students and meeting academic needs and standards.

Consult IDE's Guide to Religions for the form that can be used to notify an instructor of an absence associated with religious practice. Students are expected to notify their instructor(s) by completing and submitting this form in a manner that is consistent with the procedure outlined in the university's policy on student religious accommodation. Providing false information regarding sincerely held religious practice is a violation of the university's Standard of Conduct and will not be tolerated.

Nondiscrimination Policy (Prohibited Discrimination)

The University of Missouri prohibits discrimination on the basis of race, color, national origin, ancestry, religion, sex,* sexual orientation, gender identity, gender expression, age, disability, veteran status, and any other status protected by applicable state or federal law. Discrimination includes any form of unequal treatment such as denial of opportunities, harassment, and violence.

*Including sex/gender and pregnancy discrimination; sexual assault; sexual harassment; dating/domestic violence; stalking; statutory rape; and incest. Retaliation for making or supporting a report of discrimination or harassment is also prohibited.

If you experience discrimination or sexual violence, you are encouraged (but not required) to report the incident to the MU Office of Institutional Equity. Learn more about your rights and options at equity.missouri.edu or call 573-882-3880. You also may make an anonymous report online.

If you are a survivor, or someone concerned about a survivor, and need immediate information on what to do, visit RSVP.missouri.edu. Both the Office of Institutional Equity and the RSVP Center can provide assistance to students who need help with academics, housing, or other issues.

In the event that you choose to write or speak about having experienced any of these forms of prohibited discrimination or harassment, Mizzou policies require that, as your instructor, I share this information with the MU Office of Institutional Equity. They will contact you to offer information about resources, as well as your rights and options as a member of our campus community.

Students with Disabilities

The goal of the University of Missouri is to ensure an inclusive learning environment for all students. The University of Missouri Disability Center provides services and accommodations for students to participate fully in the learning experience and to experience equitable evaluation of their performance. Students (including online students) with a documented disability can contact the Disability Center to establish an Accommodation Plan. Documented disabilities include *hearing, vision, mobility, learning and attention, psychological health, and physical health*. Students' accommodations are implemented with the input of students to maximize the learning experiences. The MU Disability Center keeps information about a student's disability confidential.

Please notify me of your eligibility for accommodations as soon as possible. Additionally, if there are aspects of the course that present as barriers, such as inaccessible course content (e.g., learning assessments, PowerPoints, non-captioned videos, images, tables, PDFs) or if you need an immediate accommodation due to an injury, please contact me or the Disability Center as soon as possible.