

ENST 283: Artificial Intelligence for Environmental Good

Terp Young Scholars Intensive Summer Syllabus

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Location	Tydings (TYD) 0102
Time	Monday-Friday, 9:30 AM-12:30 PM, 7/13 to 7/31 (3 weeks)
Identity	A generative AI course taught through environmental science and ecological engineering applications.

Theme: How can we use generative AI as a thinking partner to learn, investigate, create, critique, and design better solutions for environmental science and ecological engineering?

Motto: Partner with AI. Ground it in reality. Design for environmental good.

Course Description

ENST 283 introduces students to generative artificial intelligence as a tool for learning, investigation, creativity, critique, communication, and design. Students will develop practical skills in prompting, multimodal AI use, image generation, image interpretation, AI-assisted data analysis, systems thinking, and science communication.

Environmental science and ecological engineering provide the applied context for the course. Campus green infrastructure, field observations, photos, and simple temperature measurements serve as real-world material for testing what AI can and cannot do. The course emphasizes responsible AI use, human judgment, verification, collaboration, and useful environmental problem solving.

Learning Outcomes

- Evaluate environmental applications and limitations of generative AI through reflective analysis, peer discussion, and critique of AI-generated responses, including hallucination, bias, overconfidence, missing local context, and ethical responsibility.
- Use generative AI as a learning and thinking partner through effective prompting, follow-up questioning, role-based dialogue, iterative refinement, and responsible verification.
- Use multimodal AI tools available through ChatGPT, TerpAI, and other large language models to generate images, interpret environmental photos, organize field observations, analyze simple data, and communicate scientific ideas.
- Apply AI-assisted design thinking to investigate environmental problems and develop, critique, and revise nature-based or ecological engineering solutions.
- Complete structured exercises with peer review and instructor feedback to develop practical understanding of the strengths and limitations of generative AI as an intellectual assistant.
- Create professional reports and oral presentations that synthesize how AI can support environmental science, ecological engineering, and nature-based design.
- Work in teams to co-develop and present an AI-assisted environmental analysis and design, while also explaining how human observation, measurement, judgment, creativity, and values remain essential.

Course Format

This summer version is an intensive, active-learning course. The intellectual center of the course is AI fluency. Environmental science and ecological engineering serve as the application domain and reality-check laboratory. Students will learn AI by using it, testing it, critiquing it, and applying it to real environmental situations.

Typical Monday-Thursday class rhythm:

- 5 minutes: handwritten journal response to an AI or environmental prompt. These are photographed and awarded completion points; selected entries receive content feedback.
- 20-30 minutes: short lesson, instructor modeling, or demonstration of an AI skill, feature, limitation.
- 20-30 minutes: individual ChatGPT exploration or AI-assisted work related to the day's skill.
- 20-30 minutes: think-pair-share, peer comparison, or informal report-out.
- On Thursdays, protected project work time for Friday assignments.

Fridays are synthesis and communication days. Students present, demonstrate, or explain what they have learned through three major assignments. There is no final exam.

Field Work and Real-World Grounding

Although this is primarily an AI course, students need real-world material to test AI against. The class will use the campus as a living environmental laboratory. Field activities may include a green infrastructure tour, photo documentation, surface and temperature measurements, qualitative comfort observations, and comparisons among pavement, shade, vegetation, rain gardens, wetlands, green roofs, and green walls.

Its purpose of collecting field data is to help students ask better AI questions, detect AI limitations, interpret evidence, and understand why human observation and measurement still matter.

Learning Materials and Technology Expectations

- Laptop or tablet for in-class AI work.
- Access to ChatGPT (**MUST HAVE**)
- Smartphone or camera for environmental photos, when available.
- Sketch book (unlined) for handwritten daily journal responses, brainstorming, and note taking.

Artificial Intelligence Disclosure and Use Policy

This course embraces the use of artificial intelligence tools such as ChatGPT, TerpAI, and other large language models. AI use is not cheating in this course; it is the central subject of study. Used well, AI can help students ask better questions, learn more deeply, analyze information, create visuals, improve communication, and design useful environmental solutions.

Students are expected to use AI openly, thoughtfully, and critically. However, students must show how they used AI, what they changed or questioned, and where human judgment shaped the final product.

Students should:

- Treat AI as a conversational thinking partner that can be helpful and wrong, not as a search engine or unquestioned authority.

- Document important prompts, outputs, revisions, and critiques when they support an assignment.
- Avoid submitting AI-generated work without personal interpretation, revision, or reflection.
- Check important claims, data, images, and sources before using them.
- Protect privacy by not entering sensitive personal information about themselves or others into AI tools.
- Include the “Personal AI Disclosure Statement” below in major submissions.

Personal AI Disclosure Statement to be included with all Major Submissions:

I used [name of AI tool] to help with [describe the tasks e.g., brainstorming / data interpretation / image generation / outlining / revision / critique]. I reviewed and revised the output by [describe process for checking against observations / measurements / class concepts / my own judgment]. The final interpretation and conclusions are my responsibility.

Assessment and Grading Structure

Assessment	Points	Effort Type	Assessment Focus
Daily handwritten AI/environment journals	72	Individual	Completion, reflection, and occasional content feedback
In-class AI skill activities and informal report-outs	48	Individual and peer-supported	Engagement with prompting, critique, multimodal tools, and discussion
Major Assignment 1: Individual AI Learning Reflection	50	Individual	Prompting, AI as learning partner, responsible critique
Major Assignment 2: Individual Multimodal AI Investigation	60	Individual	Image, data, diagram, and explanation skills with AI critique
Major Assignment 3: Team AI-Assisted Environmental Design Pitch	50	Team-based	AI-supported design thinking, ideation, critique, and communication
Individual final reflection on AI, teamwork, and human judgment	20	Individual	Metacognitive reflection and contribution accountability
Total	300		

Major Assignments

Major Assignment 1: Individual AI Learning Reflection

Students demonstrate how they used AI as a learning partner to investigate an environmental question inspired by the campus tour or another environmental application. The emphasis is on prompting, follow-up questioning, critique, and responsible AI use.

- A question about an environmental feature or issue.
- A short example of an AI conversation.
- A revised prompt that improved the conversation.
- One useful AI-generated insight.
- One AI limitation, mistake, uncertainty, or missing context.
- One personal rule for responsible AI use.

Major Assignment 2: Individual Multimodal AI Investigation

Students use AI across multiple modes to interpret an environmental photo, field observation, simple dataset, diagram, or visual explanation. The emphasis is on multimodal AI capability and critical interpretation, not on producing a full scientific study.

- One environmental photo, observation, or dataset.
- One AI-generated or AI-assisted explanation.
- One AI-assisted graph, table, diagram, caption, or visual.
- One critique of what AI did well.
- One critique of what AI missed, overstated, or could not know.
- One human interpretation based on observation, measurement, or judgment.

Major Assignment 3: Team AI-Assisted Environmental Design Pitch

Teams use AI to support a design thinking process for an environmental science or ecological engineering challenge. The default application area is green infrastructure, but teams may choose another environmental design direction if it connects to course observations, measurements, or AI investigations.

- A clear problem definition developed with AI assistance.
- Evidence from observation, measurement, class activity, or research.
- A record of AI-assisted ideation and refinement.
- An AI-generated or AI-supported visual, diagram, or communication element.
- A role-based or stakeholder-based AI critique of the proposed design.
- A final team design decision and explanation of human judgment.
- A separate individual reflection explaining each student's role, contribution, and learning.

Schedule for Learning

The course is organized around three AI capability arcs. Environmental science and ecological engineering are used throughout as the application context.

Day	AI Focus	Environmental Application	In-Class Emphasis	Product or Checkpoint
WEEK 1				
Week 1 Monday	AI as learning partner; asking initial questions	Campus green infrastructure tour as shared reality-check	Course launch, AI expectations, field tour, social icebreaker	Observation notes and first AI questions
Week 1 Tuesday	Prompt engineering and conversational prompting	Turning field observations into better environmental questions	Prompt models, follow-up questions, role prompting	Prompt sequence and pair-share
Week 1 Wednesday	AI limitations: hallucination, bias, overconfidence	Testing AI explanations of campus systems	Critique, verification, local context, responsibility	AI critique notes
Week 1 Thursday	AI, energy, data centers, and environmental	AI's environmental footprint and heat-	Mini-lesson plus protected work time	Draft of Assignment 1

	tradeoffs	related concepts	for Assignment 1	
Week 1 Friday	Communicating responsible AI use	Environmental question as application context	Individual presentations or stories	Major Assignment 1
WEEK 2				
Week 2 Monday	AI-assisted measurement planning and data collection	Surface temperature, air temperature, shade, and green infrastructure	Field measurements, photos, notes, data organization	Field dataset and photos
Week 2 Tuesday	AI-assisted data interpretation	Patterns, graphs, claims, and uncertainty	Using AI to interpret small datasets and avoid overclaiming	Cautious claim and graph idea
Week 2 Wednesday	Multimodal AI: image-to-text and text-to-image	Environmental photos, captions, and visual explanations	Image interpretation, generated visuals, captions, limits	Annotated image or visual concept
Week 2 Thursday	AI-assisted systems diagrams and science communication	Turning evidence into explanation	Systems diagrams, scientific storytelling, protected work time	Draft of Assignment 2
Week 2 Friday	Multimodal AI synthesis	Field evidence as application material	Individual presentations or demonstrations	Major Assignment 2
WEEK 3				
Week 3 Monday	AI-assisted problem definition	Choosing an environmental design challenge	Teams form, problem statements, stakeholders, constraints	Team problem statement
Week 3 Tuesday	AI-assisted ideation and prototyping	Generating ecological engineering or environmental solutions	Divergent ideas, prototype options, design criteria	Solution options and selected direction
Week 3 Wednesday	AI as critic and role-play reviewer	Testing designs from stakeholder perspectives	Role-based critique, tradeoffs, redesign	Revised design concept
Week 3 Thursday	AI-assisted presentation and storytelling	Team pitch development with instructor feedback	Protected project work time, feedback conferences, rehearsal	Draft final pitch
Week 3 Friday	Human judgment plus AI-supported design	Environmental design solution	Team presentations & personal reflection	Major Assignment 3 and final reflection

Workload and Out-of-Class Time

This course is designed to be intensive during class time while remaining respectful of students' out-of-class schedules. Major assignments are started in class, especially on Thursdays, so students can receive instructor feedback before presenting on Fridays. Outside work should usually involve light polishing, rehearsal, or brief reflection rather than multiple hours of new work.

Field Safety and July Heat

Outdoor activities will be adjusted for weather and heat. Students should bring water, wear comfortable shoes, and follow instructor guidance. Field work will emphasize short observation periods, shade when possible, and safe movement around campus. Bug spray is recommended, but optional.

Collaboration and Teamwork

Assignments 1 and 2 are individual so each student can demonstrate personal AI fluency and critical thinking. Assignment 3 is team-based because design thinking benefits from collaboration. Each student will also submit an individual reflection documenting their role, contributions, use of AI, and learning.