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An Approach to Integrate GenAI Literacy into an Embedded Engineering Communication Program

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Abstract

The development and implementation of Generative AI (GenAI) has led many instructors in civil and environmental engineering (CEE), as well as in technical communication (TC), to consider updating their curriculum, pedagogy, and policies. One approach to help students gain strategic knowledge about GenAI could be an interdisciplinary collaboration involving CEE and TC instructors co-teaching CEE courses and applying GenAI literacy instruction borrowed from TC to the engineering curriculum. A pedagogical team at a highly ranked public research university is exploring this question: "How can instructors help students develop skills as well as strategic knowledge to use GenAI efficiently, productively, and ethically during their studies as well as after graduation?" Our pedagogical team has started with objectives for GenAI literacy urged by the Modern Language Association (MLA)–Conference on College Composition and Communication (CCCC) Task Force on Writing and AI (a source widely known among TC instructors). Students can become literate users of GenAI when they (1) "have a basic understanding of how GenAI technologies work," (2) "understand the policies and frameworks for the ethical use of GenAI outlined by [their] instructors and institutions," (3) "know how to prompt GenAI to produce useful outputs," (4) "evaluate the relevance, usefulness, and accuracy of GenAI outputs," (5) "monitor [their] own learning as [they] use GenAI tools," (6) "recognize that GenAI is fundamentally different from human communication," and (7) "understand the potential harms of GenAI, both those inherent to the technology and those that arise from misuse." Using the MLA-CCCC Task Force objectives—widely supported in the research literature—for a set of courses that vertically build through the civil engineering and environmental engineering curriculum, we developed new course activities and assignments focused on GenAI literacy. This paper explores ways in which GenAI literacy instruction works in two civil and environmental engineering courses: a 1000-level Exploring CEE introductory course and a 2000-level Civil and Environmental Engineering Systems course. Each course is co-taught by CEE instructors and a TC instructor. While GenAI literacy instruction is not the focus of either course, the embedded GenAI literacy instruction meets our pedagogical and programmatic needs. Our paper provides instructors with interdisciplinary approaches for implementing curriculum, pedagogy, and policy to effectively teach GenAI literacy in engineering courses.

Keywords: GenAI, GenAI Literacy, GenAI Literacy Instruction, interdisciplinary collaborations, civil engineering, environmental engineering, technical communication, engineering communication

Introduction

The challenges of Generative AI (hereafter GenAI) literacy instruction are increasingly important and contentious in higher education, as demonstrated by frequent articles in *Inside Higher Ed* and the *Chronicle of Higher Education* as well as virtually every disciplinary journal. Engineering and engineering communication are no exceptions, affected by issues ranging from economics to ethics. In our classes, we are especially aware that our students regularly

use GenAI but usually without guidance and without much sense of available guidelines to help them navigate the complexities. In short, GenAI is here to stay, and we need to help students work with it productively and professionally.

This article describes a well-established CEE program's initial steps to integrate GenAI into first- and second-year CEE courses via a range of carefully selected pedagogical approaches and materials:

- Lectures
- Videos to watch
- Articles to read
- Interactive classroom activities
- Engineering communication best practices
- Process activities: brainstorming, editing
- Formal reports and oral/visual presentations
- GenAI ethics/policy statements

This paper offers a preliminary study focusing on a qualitative description of our curricular framework, innovative pedagogy, and policy. Our research question is "How can instructors help students begin to develop skills as well as strategic knowledge to use GenAI efficiently, productively, and ethically during their studies as well as after graduation?"

Rationale

In the summer of 2025, our pedagogical team started integrating GenAI literacy instruction into a well-established engineering communication program embedded in one of the top CEE programs at a highly ranked public research university. The history of this engineering communication program has been documented; see, for example, [1] and [2]. Prior to August 2025, CEE students exposed to the embedded engineering communication program did not receive GenAI literacy instruction. The intervention during academic year 2025-2026 ensures our students have the necessary workplace skills and strategies.

This paper describes the first-year and the second-year courses of four vertically integrated "spine" courses that were introduced in the School of Civil and Environmental Engineering starting in academic year 2024-2025 (see Fig. 1) [2].

Exploring Civil and Environmental Engineering is an introductory course for first-year engineering students within the School of Civil and Environmental Engineering [4]. The purpose of the course is to help students learn more about the CEE field and begin developing their professional identity. The course also introduces students to the professional skills and strategies that will be developed during the spine sequence of courses including teamwork, communication, and story-driven learning. The course is designed to be highly interactive for the students. The class meets one hour a week in a standard lecture format with the full class, and two hours a week in smaller studio sessions with no more than 36 students each. The two-credit semester-long course is organized into four modules with each module consisting of Learn, Do, and Reflect components. Each module covers one of the four major cross-cutting research areas that have been adopted within the school: Smart Cities, Resilient Infrastructure, Healthy Communities, and Sustainable Systems. Each three-week module is structured the same way: the

students are introduced to the topic in the first week, including activities during the studio sessions; students work in groups on a project that is designed to include open-ended questions as part of problem-based-learning relevant to the module topic; and students either present their projects or engage in a story-driven learning activity as well as completing a self-reflection exercise at the end of the module.

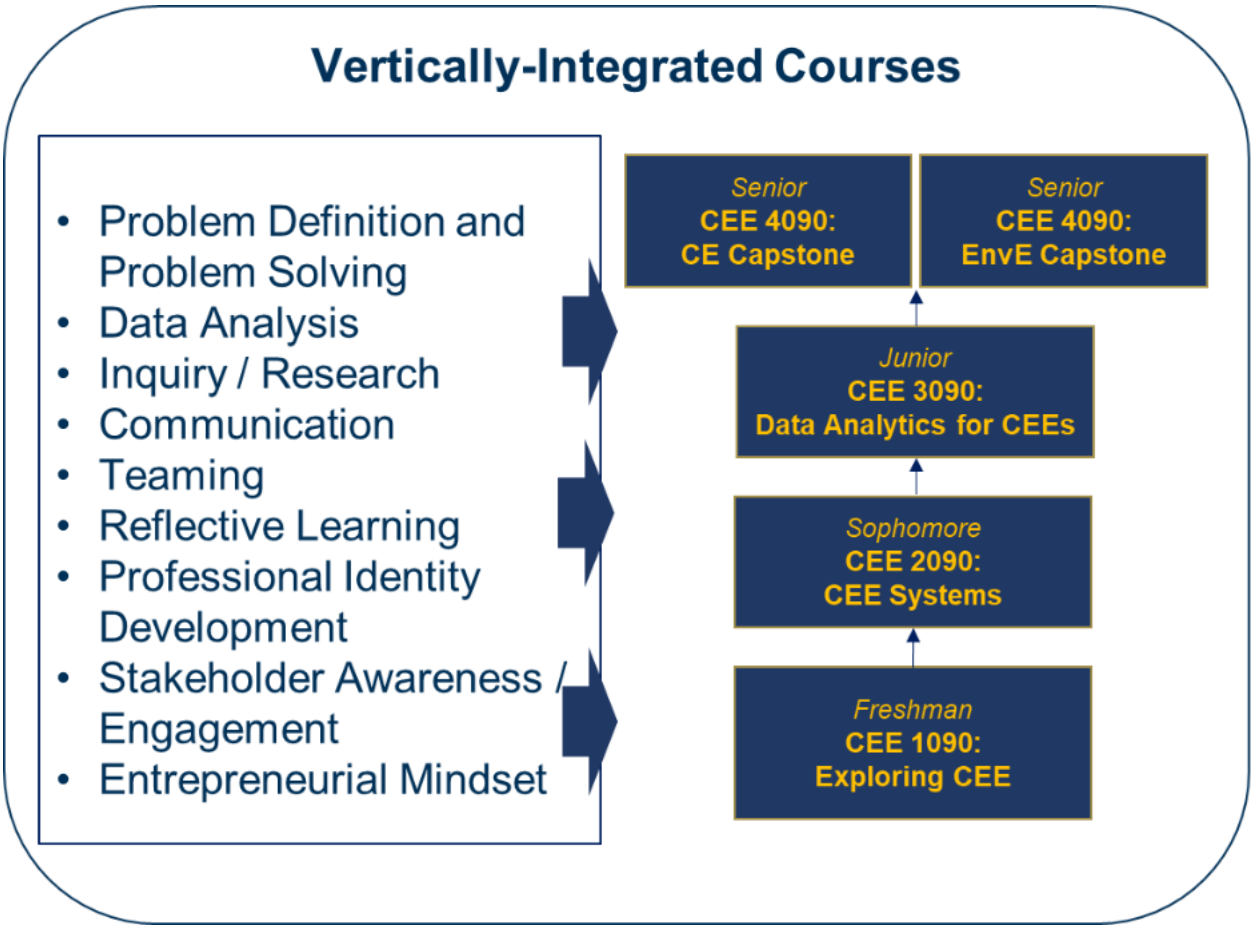

Fig. 1. The model of vertically-integrated spine courses within the School of Civil and Environmental Engineering [3].

The second-year course, Civil and Environmental Engineering Systems was created, introduced, and required in the curriculum as part of a broader curriculum revision emphasizing civil engineering systems, technical communication, sustainability, and computer-aided analysis and design [5]. The overarching objective is to introduce students to systems and sustainability principles and applications in civil engineering. This 3-credit CEE Systems course meets for 75 minutes twice a week to guide students through systems thinking, planning, design, and evaluation to create highly performing and sustainable facilities. The CEE core topics include engineering sustainable systems, systems analysis, sustainability planning and assessment models, environmental impact assessment, applying math optimization (calculus, linter and integer programming, multiple criteria decision making), engineering economic and project evaluation, and integrated systems assessment with sustainable design recommendations.

Simultaneously, the students receive instruction and develop their professional skills and strategies in engineering communication (written, oral, visual, electronic, and non-verbal media/modalities), teaming (psychological safety, team composition and charter, and team effectiveness and accountability), and basic research. The students complete a team-based semester-long project in which they practice and develop these skills and strategies.

Why a technical communication perspective about GenAI?

All CEE spine courses, including the two described in this paper, are co-taught by a CEE instructor and an engineering communication instructor with expertise in technical communication. This collaboration allows us to use a technical communication perspective when exploring GenAI literacy instruction.

Technical communication is an academic discipline with its own Ph.D., M.A., M.S., B.A., B.S., and certificate programs, journals, conferences, professional societies, textbooks, and professional positions in industry, nonprofits, government agencies, and academia. Technical communication instructors developed their focus about GenAI very early: they started to notice major changes in their students' work the day after ChatGPT was released in November 2022, and they responded to those changes. One of the first GenAI-focused technical communication conferences took place in March 2023: technical communication colleagues shared opinions about moving forward in this new environment. The technical communication community has been in the forefront of GenAI literacy instruction since then, including publication of GenAI-focused textbooks, special issues of journals, conferences, and webinars. The embedded nature of our engineering communication program allows us to bring that technical communication corpus of knowledge about GenAI literacy instruction to our spine courses.

Why these objectives?

To employ a technical communication perspective about GenAI literacy, we used the objectives for GenAI literacy urged by the Modern Language Association (MLA)–Conference on College Composition and Communication (CCCC) Task Force on Writing and AI. According to the Task Force, students can become literate users of GenAI when they (1) "have a basic understanding of how GenAI technologies work," (2) "understand the policies and frameworks for the ethical use of GenAI outlined by [their] instructors and institutions," (3) "know how to prompt GenAI to produce useful outputs," (4) "evaluate the relevance, usefulness, and accuracy of GenAI outputs," (5) "monitor [their] own learning as [they] use GenAI tools," (6) "recognize that GenAI is fundamentally different from human communication," and (7) "understand the potential harms of GenAI, both those inherent to the technology and those that arise from misuse" [6].

Using the MLA-CCCC Task Force objectives appealed to us because this source has a strong foundation and is widely known among technical communication instructors. Founded in 1883, MLA is one of the oldest professional organizations in the humanities and is "a leading advocate for the humanities" that "promotes the study, teaching, and understanding of languages, literatures, and culture" [7]. CCCC is [arguably] the largest professional organization for college communication and writing instructors and "is committed to supporting the agency, power, and

potential of diverse communicators inside and outside of postsecondary classrooms" [8]. MLA and CCCC formed a joint committee in 2023 "to develop resources, guidelines, and professional standards around the use of AI and writing" [9], which could be adapted by colleagues in any discipline. More specifically, this task force was created to "address a number of member needs related to Writing and AI (Large Language Models, ChatGPT, LaMBA, etc.):

- Taking stock of the current state of the issue and identifying implications for teachers, students, organizations, and scholars
- Creating community for members to share resources
- Creating resources that will synthesize, set professional standards, and make recommendations/provide guidance to members
- Supporting and mapping out promising directions of scholarly interest for learning more about the issue" [9].

Curriculum

Table 1 presents the MLA-CCCC Task Force objectives that we applied to our CEE spine courses. Six objectives have been introduced in the first-year course and then developed in the second-year course. The only objective that has been introduced in the second-year course is connected with students monitoring their own learning as they use GenAI tools. We made that decision because the greater number of graded assignments in CEE 2090 allows students to track their GenAI Acknowledgement statements. The GenAI literacy components are currently under development in the third-year course. Our current plan is to assume that all MLA-CCCC Task Force objectives will have been introduced and developed prior to the fourth-year course. Table 1 also indicates whether students accomplish a particular objective via an in-class GenAI-specific activity or via one or more course projects.

Table 1: GenAI Literacy Objectives in CEE Spine Courses

Objective	**CEE 1090**	**CEE 2090**	**CEE 3090**	**CEE 4090**
Objective 1: Students have a basic understanding of how GenAI technologies work.	I GenAI activity	D Course project(s)	TBD	A
Objective 2: Students understand the policies and frameworks for the ethical use of GenAI outlined by their instructors and institutions.	I GenAI activity	D GenAI activity	TBD	A
Objective 3: Students know how to prompt GenAI to produce useful outputs.	I Course project(s)	D GenAI activity	TBD	A
Objective 4: Students evaluate the relevance, usefulness, and accuracy of GenAI outputs.	I Course project(s)	D Course project(s)	TBD	A
Objective 5: Students monitor their own learning as they use GenAI tools.	N/A	I GenAI activity	TBD	A

Objective 6: Students recognize that GenAI is fundamentally different from human communication.	I GenAI activity	D Course project(s)	TBD	A
Objective 7: Students understand the potential harms of GenAI, both those inherent to the technology and those that arise from misuse.	I GenAI activity	D Course project(s)	TBD	A

Note: I=Introduced; D=Developed/Practiced; A=Assumed.

Pedagogy

The main characteristics of the embedded engineering communication program are multimodal (focused on WOVEN: Written, Oral, Visual, Electronic, and Nonverbal Communication [10]), interactive, research-based, and GenAI-focused [11]. These characteristics shape the pedagogy used in the two courses discussed in this paper. Because the engineering communication program is multimodal, various WOVEN materials and activities are used to discuss GenAI. For example, students attended lectures, watched videos, read articles, and created formal reports and presentations. The interactive nature of the program allows active learning such as Write-Pair-Share, Read-Teach-Report, a Gallery Walk, interactive lectures, and working on projects. All activities discussed in this article were GenAI-focused and based on successful practices from technical communication pedagogical research.

In the first-year course, two 1-hour sessions and a course project are used to achieve the objectives listed in Table 1. The objectives are discussed in this paper in the order we introduced them in our courses, which is different from the order presented by the MLA-CCCC Task Force.

Objective 1: Students have a basic understanding of how GenAI technologies work.

In the first 1-hour session, students watch two videos ([12] and [13]) in class about ways in which GenAI technologies work. In a Write-Pair-Share activity, students discuss the videos in a CEE context: the students are first given three minutes to write their answer to the question "What did you observe that might be useful to you in CEE?"; next, they have five minutes to share with a neighbor what they have written; and finally, the instructor asks each pair to report the main points of each discussion back to the rest of the class. This activity engages students and increases their curiosity in GenAI. The instructor noted that some students had difficulty focusing solely on GenAI and felt more comfortable discussing AI more broadly.

Objective 6: Students recognize that GenAI is fundamentally different from human communication.

A Read-Teach-Report activity in the first 1-hour session addresses this outcome. Within triads, each student quickly reads one of three short texts ([14], [15], or [16]), each of which focuses on a perspective about GenAI that the MLA-CCCC Task Force identified as a subtopic for this objective: (1) "Students can explain differences between text produced by a GenAI tool and

authentic human communication. (2) Students recognize that while GenAI is a useful aid in writing, written communication happens only between human writers and readers. (3) Students can evaluate whether the output from a GenAI prompt used as part of their writing process or product might result in miscommunication" [6]. Each student then teaches the key ideas in their text to the others in their triad, keeping in mind the others have not read that text. All students in the triad are then given five minutes to discuss the ways in which GenAI is fundamentally different from human communication and select a presenter to report their main finding to the class. This activity encourages students to distinguish human communication and GenAI. The instructor observed that some students were surprised to learn the differences between GenAI and human communication.

Objective 7: Students understand the potential harms of GenAI, both those inherent to the technology and those that arise from misuse.

In the second 1-hour session, a Gallery Walk activity addresses this outcome. First, each student is assigned to a 5-student team responsible for one of five research topics the MLA-CCCC Task Force identified as subtopics for this objective:

- How does the growth of GenAI technologies impact the environment?
- How does the growth of GenAI technologies impact labor?
- What are some biases in language, culture, gender, ethnicity, and other social biases GenAI outputs?
- What are some privacy, intellectual property, and data security risks of GenAI?
- What are the implications of bypassing human feedback and communication in writing processes? [6]

Within each team, students choose the following roles: investigators (two per team), artists (two per team), or reporter/presenter (one per team). They then spend 30 minutes using GenAI and non-GenAI online sources to investigate their team's topic, create a visual representation of their findings on a giant post-it, and prepare a brief presentation using the post-it as a visual. Students display their post-its on the classroom walls to create "a gallery," and each presenter spends five minutes presenting their team's findings using the post-it as a visual and an outline. This activity encourages students to articulate the potential harms of GenAI. The instructor reported that this was the most popular GenAI-related assignment that semester.

Objective 2: Students understand the policies and frameworks for the ethical use of GenAI outlined by their instructors and institutions.

In a second 1-hour session, a brief 7-minute lecture about three expectations (i.e., responsibility, transparency, and intellectual property) regarding the use of GenAI addresses this objective. The instructor explains that the entire university community is expected to use GenAI "responsibly, transparently, and with appropriate sources" [17]. The instructor then demonstrates that the GenAI policy used in this class agrees with institutional expectations (see "Policy" below). This activity encourages students to recognize and use institutional and course GenAI policies. According to the instructor, the students found this discussion helpful because it made institutional expectations regarding GenAI use transparent.

Objective 3: Students know how to prompt GenAI to produce useful outputs.

A project using GenAI helps students accomplish this objective. While brainstorming, generating text, revising, and editing are often listed as major stages of any writing process, in this course, we focus on using GenAI only for the first stage—brainstorming—by using the GenAI tools responsibly, transparently, and with appropriate documentation. For the Healthy Communities project, students have to identify an example in which the built environment has had a substantial negative impact on the health of a particular community and develop a narrative around what could have been done differently to reduce the harms to the communities. Students are encouraged to utilize GenAI as a tool to assist with the initial brainstorming when developing the project idea and to help with developing the project scope. This activity encourages students to consider using GenAI ethically for brainstorming. The Healthy Communities project was graded by Teaching Assistants.

Objective 4: Students evaluate the relevance, usefulness, and accuracy of GenAI outputs.

During the Resilient Infrastructure module, students are tasked with using GenAI to research information about storm drainage and corresponding flow in rivers. This activity has students use GenAI to research the methods for estimating drainage basins and develop figures for showing average flow rates in rivers. They discover that while GenAI is useful for providing good descriptions of the methodology, it fails to provide accurate figures. They have to seek instructions to make the figures and then create them for their presentation. The Resilient Infrastructure assignments were graded by Teaching Assistants.

In the second-year course, a 10-minute lecture, a 10-minute workshop, a 20-minute workshop, a Gen-AI Acknowledgement, and course projects are used to achieve the objectives listed in Table 1. As Table 1 demonstrates, all objectives except one are developed in this course because they have already been introduced in the first-year course. As stated previously, the only new objective introduced in the second-year course is “Objective 5. Students monitor their own learning as they use GenAI tools.” In the second-year course, the approach is different than in the first-year course: only three objectives in the second-year course are addressed with specific GenAI activities. The other four objectives are addressed in the students’ course projects; specifically, objectives 1, 4, 6, and 7 are developed in this second-year course as students made decisions about their projects.

Objective 2: Students understand the policies and frameworks for the ethical use of GenAI outlined by their instructors and institutions.

A brief 10-minute lecture about both the GenAI policy and the GenAI Acknowledgement used in this course helps address this objective (see “Policy” below). This activity encourages students to recognize and use institutional and course GenAI policies, which are akin to those they will encounter in the workplace. The instructor noted that the students found this discussion helpful because it made the current institutional expectations regarding GenAI use transparent.

Objective 3: Students know how to prompt GenAI to produce useful outputs.

As discussed above, in the first-year course, we focus on using GenAI to aid in the first major stage of the writing process: brainstorming. In the second-year course, we continue to focus on GenAI to aid in brainstorming but add GenAI to a near-end stage: editing. We made this choice to send a message to students that using GenAI as one of the tools for brainstorming ideas and editing a draft of text that has already been written with proper citations could be considered ethical while text generation and revision should be done by a human without GenAI. This activity reminds students that some activities benefit from GenAI tools while other activities benefit from human thinking, not GenAI assemblages.

In a 10-minute "Using GenAI to Brainstorm" workshop, an engineering communication instructor discusses using GenAI ethically for brainstorming. More specifically, the instructor demonstrates ways in which GenAI can be used to find inspiration, generate ideas, talk through an assignment, and identify key writers and positions on a subject. Students track the process. This activity encourages students to use GenAI ethically for initial brainstorming. In the future, this important part of students' process may be reinforced by the work they do with professional tutors in the university's writing and communication center and the workshop about basic resources given by a university librarian.

In a 15-minute "Using GenAI to Edit Engineering Communication Documents" workshop, the engineering communication instructor explains four major stages of the writing process, discusses the appropriateness of using GenAI ethically for brainstorming and editing, explains ways of accessing the institute-approved GenAI tool students could use in this class (Microsoft Copilot for Work via students' university accounts), and leads two in-class activities focused on editing.

- First, the students were encouraged to chat with Copilot and use the following prompts:
    - How can you help me edit texts?
    - How can you help me edit audio?
    - How can you help me edit pictures/visuals?
    - How can you help me edit websites?
    - How can you help me edit video?

  These prompts were chosen to increase the students' awareness of ways of using an institute-approved GenAI tool to edit various multimodal artifacts as the questions address all WOVEN modalities: Written (texts), Oral (audio), Visual (pictures/visual), Electronic (websites), and Nonverbal (video). This activity encourages students to think of different ways of using GenAI tools to edit different artifacts.
- Second, students participate in an in-class activity to practice using an institute-approved GenAI tool to edit texts. Students receive the following instructions:

  Use several texts you have written recently. Try using the following prompts:
    - Check my grammar in "..."
    - Check my punctuation in "..."
    - Check my transitions in "..."

  Ask Copilot, "What did you change?" to track the changes. Feel free to disagree. Look for patterns.

This activity encourages students to practice using GenAI tools for editing. The instructor noted that many students did not know ways of accessing the institute-approved GenAI tool.

Objective 5: Students monitor their own learning as they use GenAI tools.

Students are required to submit a GenAI Acknowledgement at the end of every assignment. This statement helps students monitor their engagement with GenAI (e.g., brainstorming, editing, citation checks) and distinguish their own work from that done by GenAI. (See "Policy" below.) According to the instructor, many students ignored the GenAI Acknowledgements during the first semester in which the GenAI component of the course was taught. This led to stricter enforcement of GenAI Acknowledgements in the second semester.

Policy

For us, *policy* refers to the rules students need to follow in their courses, including their choices of use and their acknowledgement of that use. We currently use different GenAI policies in the first-year and second-year courses because we are still exploring the best ways to help students understand their responsibilities and the requirements of each course, and the expectations of their profession. The first-year course uses the GenAI Policy presented in Fig. 2. The second-year course uses the GenAI Policy presented in Fig. 3. As we work on revising the policy statements, we particularly want to emphasize individual responsibility, transparency, and accuracy in documentation. Furthermore, we need to model for our students the standard practice of citing all paraphrased and quoted materials on materials such as course syllabi, assignment sheets, websites, course handouts, and lecture slides.

In this course, using generative AI tools in the work of the course (including assignments, discussions, ungraded work, etc.) is allowed only in instances specified by the instructor. As with any technology, generative AI tools need to be used critically and according to academic and professional expectations. Thus, in instances in which the instructor allows generative AI tool use, you are expected to adhere to these principles:

- Responsibility: You are responsible for the work you submit. In instances in which your instructor allows generative AI tool use, this means that any work you submit should be your own, with any AI assistance appropriately disclosed (see "Transparency" below) and any AI-generated content appropriately cited (see "Documentation" below). This also means you must ensure that any factual statements produced by a generative AI tool are true and that any references or citations produced by the AI tool are correct.
- Transparency: Any generative AI tools you use in the work of the course should be clearly acknowledged as indicated by the instructor. This work includes not only when you use content directly produced by a generative AI tool but also when you use a generative AI tool in the process of composition (for example, for brainstorming, outlining, or translation purposes).
- Documentation: You should cite any content generated by an AI tool as you would when quoting, paraphrasing, or summarizing ideas, text, images, or other content made by other people.

Using generative AI tools at times not allowed by the instructor will be considered an infraction of the Georgia Tech Honor Code subject to investigation by the Office of Student

Integrity. Likewise, using generative AI tools in the course without adhering to these principles will be considered an infraction of the Georgia Tech Honor Code subject to investigation by the Office of Student Integrity.

Fig. 2: GenAI policy for first-year course adapted from the Georgia Tech Writing and Communication Program [17].

We treat AI-based assistance, such as Microsoft Copilot or ChatGPT Edu, the same way we treat collaboration with other people: you are welcome to talk about your ideas and work with other people, both inside and outside the class, as well as with AI-based assistants. However, all work you submit must be your own. You should **never** include in your assignment anything that you did not write directly without proper citation (including quotation marks and in-line citation for direct quotes). Including anything you did not write in your assignment without proper citation will be treated as an academic misconduct case.

If you are unsure where the line is between collaborating with AI and copying AI, we recommend the following heuristic:

Never hit "Copy" within your conversation with an AI assistant. You can copy your own work into your own conversation, but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience, then let your assignment reflect your improved understanding. Deviating from this heuristic does not automatically qualify as academic misconduct; however, following this heuristic essentially guarantees your collaboration will not cross the line into misconduct.

Fig. 3: GenAI policy for second-year course adapted from the Georgia Tech School of Computer Science [18].

Because we want students to be able to monitor their own learning as they use GenAI tools in the second-year course, we provide instructions for the GenAI Acknowledgement that the students are asked to submit with every assignment in the second-year course (see Fig. 4). In the fall 2025, many students failed to include their GenAI Acknowledgments. In the spring 2026, we normalized the GenAI Acknowledgement by including the instructions on every assignment sheet in addition to stating them on the syllabus. We also enforced this requirement by making the GenAI Acknowledgement a prerequisite for any assignment to be graded.

For every assignment submission, you will include a GenAI Acknowledgement. Your acknowledgment will include the following:
1. Identification of the tool(s) you used;
2. An explanation of why you decided to use the tool(s);
3. A description of how you used the tool(s) to manage assignment requirements;
4. (If relevant) A description of your innovative uses of GenAI; and
5. A reflection on your experience using the tool(s), exploring what worked or didn't, and acknowledging the limitations of the tool(s) for the assignment, potential biases, etc.

If you opt not to use GenAI tools, when not required, please use the 'GenAI Acknowledgement' to highlight your non-GenAI approach and/or your reasons for deciding not to use certain tools.

Fig. 4: GenAI Acknowledgement instructions for second-year course adapted from Western Michigan University [19].

Conclusion

We are excited about our progress so far, hoping that other instructors will borrow and adapt our interdisciplinary approaches and materials. We invite you to adapt our curriculum, pedagogy, and policy to effectively teach GenAI literacy in your engineering courses.

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