

# Report from the Generative Artificial Intelligence Across-the-Curriculum Task Force

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## Committee Charge

The committee was charged by the Associate Dean for UG education, Dr. Sharon Huang, as follows:

### Generative AI Tools Across the Curriculum Task Force

Fall 2023 – Spring 2024

Consider the problems and opportunities across our undergraduate curriculum afforded by the rise of generative AI tools. Specifically, address the following:

- Given the presence of generative AI tools, how do we teach courses such that students learn the subject matter and form a strong foundation in the knowledge and skills required to be successful in their careers?
  - In addition to the [proposed syllabus statements](#) circulated in August, 2023 and in addition to the [work](#) that the Academic Integrity Committee is doing in Fall 2023, what recommendations does the Task Force have for tools, policies, procedures, and/or best practices that would assist instructors?
- Given employers' expectations for not only strong subject matter knowledge but also knowledge of generative AI tools and their appropriate and ethical use, how do we incorporate generative AI tools into course assignments and the curriculum in a strategic and educationally sound manner?
  - What are others (at Penn State or elsewhere) doing to address this question?
  - What recommendations does the Task Force have for addressing this question across the college and within specific programs?
- Identify which courses can benefit from Generative AI
  - Criteria for evaluating courses in terms of GenAI use
- Draft modules (e.g. prompt engineering, text generation, image generation) and libraries that can be used and adapted by instructors of the courses

### Process

As the work of this Task Force overlaps with the work of the Academic Integrity Committee's recent charge and as the work of the Task Force directly impacts the curriculum in our undergraduate programs, I recommend that the Task Force collaborate with the following groups:

- Academic Integrity Committee
- Undergraduate Program Coordinators
- UAC

## Timeline

An interim report is expected from the Task Force by February 15, 2024. A final report will be produced by the end of the Spring semester. GenAI modules will be developed in the Spring'24 semester and in Summer'24 with the goal of having them available for instructor use in Fall'24. Faculty feedback and collaboration will be sought throughout the development process.

## Questions to Address

From this charge, we identified six questions/items to address:

1. How do we (i.e., IST) teach courses such that students learn the subject matter and form a strong foundation in the knowledge and skills required to be successful in their careers?
2. What recommendations does the Task Force have for tools, policies, procedures, and/or best practices that would assist instructors?
3. How do we incorporate generative AI tools into course assignments and the curriculum in a strategic and educationally sound manner?
4. What are *others* (at Penn State or elsewhere) doing to address this question?
5. Identify which courses can benefit from Generative AI
6. Draft modules (e.g., prompt engineering, text generation, image generation) and libraries that can be used and adapted by instructors of the courses.

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## Q1. How do we (i.e., IST) teach courses such that students learn the subject matter and form a strong foundation in the knowledge and skills required to be successful in their careers?

To address this question, we need to consider a) instructors' acknowledgement of the importance of GAI in their overall program, b) the appropriate use of GAI tools for a given set of learning objectives, and c) how to inform students' actions.

### Acknowledge of the Importance of GAI

Before implementation or exclusion of GenAI and its associated tools and/or concepts, instructors should understand the value of these concepts and how they align with and enhance program goals. Employers are asking that we teach students how and when to use GAI tools. They are also asking us to be sure that students know the subject matter of their majors. To quote an advisory board member, "IST should be leading in this space."

To this end, faculty in the College of IST—with leadership from Rosalie Ocker and Dave Fusco—created a [Generative AI Resources for IST Faculty Canvas course](#). In this course, instructors will find example class exercises using GAI, teaching resources, past workshop materials, recent articles, and a set of *AI Literacy Modules for Instructors*. Instructors without access should contact the [IST Learning Design team](#).

### Know Where the Value of GAI Lies in the Course's Learning Objectives

Depending on where a course occurs in the curriculum, instructors may want to allow more or less GAI tool use. Section 5 of this report presents recommendations for where GAI tools should be taught explicitly in each College of IST major. In addition, each instructor will need to make their own decisions about the specific assignments in their course.

The following questions may help guide instructors as they consider where to include and exclude GAI tools:

- What is the value of GAI tool use for each course objective?
  - Where are the efficiencies afforded by GAI tools useful?
  - Where are the creative ideas generated by GAI tools useful?
- Which objectives need to be met *without* GAI (to learn the basics), and which should be met *with* GAI (to know on-the-job expectations)?
- What is the impact of the decision on students' ability to succeed in follow-on courses in the major?

The answers to some of these questions may be addressed best by the Program Coordinator and/or the group of faculty who teach the course, along with those who teach the courses that follow afterward. We recommend discussing the matter with colleagues.

## Appeal to Students' Self-interest

Many students have not thought through the negative impacts of using GAI to completely replace learning. Even those who might more judiciously use GAI to *supplement* learning may not have a good sense of where to draw the line so that they ensure adequate learning outcomes in their program of study. Take time to address the following with students:

- The importance of knowing the subject matter in order to succeed in follow-on courses
- The importance of knowing when to use and when not to use GAI tools for the sake of learning
- The benefits and pitfalls of efficiencies gained by GAI tools
- The benefits and pitfalls of using GAI tools for creativity
- The importance of understanding the limits of GAI tools, how to prompt, and what to check

By addressing these points directly, instructors can garner trust from students, and students may be more likely to see course policies as relevant. For more information on how to appeal to students, see the faculty guides on the [Generative Artificial Intelligence and Teaching webpage](#).

## Appeal to Students' Sense of Integrity

In our courses, we teach more than the subject matter. We teach students. Part of their education is about learning the values that help make our society humane, collaborative, productive, inventive, and truthful. Discussions about integrity should occur on the first day of class *and* throughout the semester. Consider addressing three perspectives on integrity:

- Integrity of character – do not misrepresent oneself, what is known, and how that knowledge was produced; be true to you
- Academic integrity – do not violate course and University policies set up to facilitate authentic learning in a manner that is fair to each student; participate in the course within the guidelines set by the instructor
- Integrity of the college degree – do not de-value what a Penn State degree means; engage in learning and apply the knowledge through the processes defined by the University's faculty

## Appeal to Students' Motivation to Get Internships and Jobs

The long-term goal of securing a job at the end of an expensive degree program may outweigh all other goals. Appealing to motivation for internships and full-time jobs may be the most persuasive argument for some students. Include the following in discussions about a) the negative consequence of not knowing the subject matter when interviewing for internships and jobs and b) the positive consequence of understanding how to use GAI tools appropriately when interviewing for internships and jobs:

- How will you answer the following types of interview questions if you don't know the subject matter?
  - Use this paper and pen to write code that will do X.

- Take a minute to read this brief scenario about problem A. Then look at the recommendation that GAI produced for resolving problem A. What is wrong with this recommendation?
- How will you answer the following types of interview questions if you don't know how to appropriately use GAI tools?
  - You're in situation Y with N days to produce a solution. How do you make appropriate and ethical use of GAI on the job? Specifically, in which steps of your work would you turn to GAI, and what would you do with the output?
  - You generated a report with data from GAI tools that suggests your company do Z. The results are flawed, but you don't realize this until after your supervisor shares the report senior leadership. What should you have done? What do you do now?



## Q2. What recommendations does the Task Force have for tools, policies, procedures, and/or best practices that would assist instructors?

### Tools

At the time of writing this report (spring semester, 2024), Penn State is investigating and approving AI tools. What do we know so far?

- Penn State provides access to Bing Copilot for all students, staff, and faculty.
- Penn State offers M365 Copilot for faculty, staff, and students at a cost of \$30/person/month. Who will pay (individuals, departments, colleges) is still undetermined.
- The University does not recommend using AI tools to definitively identify students who have improperly used GenAI tools on their assignments. AI tracking tools are not sophisticated enough yet. There are too many false positives, placing undue stress on students.
- The College of IST's Learning Design team is testing, and will continue to test, AI tools for use in College of IST courses. The team is available to discuss tools that instructors want to investigate for their courses—and to explore and test those to which the team has access.
- The following tools are currently under consideration in IST:
  - Kritik peer review of writing tool
  - ChatGPT Team
  - M365 Copilot
  - Adobe Firefly
  - Adobe Firefly in Adobe Illustrator
  - Adobe Firefly in Adobe Express

### Tool Approvals

Penn State requires that tools mandated by instructors for instruction must be evaluated against the criteria of accessibility, security, and privacy of student data. Approved tools are listed on the *Reviewed Courseware List* on the [Courseware website](#). Instructors can search for the name of the tool that they are interested in and discover whether it has been approved for use. To request a tool that has not already been approved, instructors should visit: <https://sites.psu.edu/coursewarepsu/#request>.

### Canvas Integration for Tools

To investigate whether an approved tool includes a Canvas integration, instructors can search for tools on the [Learning Tool Integrations](#) site under the heading *Current Learning Tools at Penn State*. Tools that have been or are in the process of being assessed are tracked according to the following [five categories](#):

- Approved and Integrated into Canvas
- Approved and Pending Integration into Canvas
- Integration Review Initiated
- Canvas Integration Not Available
- Canvas Integration Not Authorized

Instructors who want to request a Canvas integration for a tool, whether already approved for use or not yet approved for use, should use the *Request a Learning Tool* button on the [Learning Tool Integration](#) website.

## Assigning Tools for Students to Use

Instructors can request that students use and experiment with generative AI tools, but unless these tools are listed as approved courseware, instructors should not *require* students to use them. Instructors should provide an alternate means of completing the assignment for students who choose not to use tools not approved by Penn State due to lack of accessibility or privacy or security concerns.

## Policies, Guidelines, and Procedures

A Penn State Joint Standing Committee on AI and Instruction and another University committee on AI policies are working on drafting policies, guidelines, and procedures for Penn State. When those groups are finished with their work, the College of IST can follow their recommendations. Until that time, we offer recommendations on course-level policies, three general guidelines for all College instructors to follow, and a set of suggested procedures surrounding the management of this information.

## Recommended Course-Level Policies

We recommend continuing to share the sample course policies that were drafted in summer 2023 for College of IST courses: [Document from August 2023](#). The sample policies fall into three categories:

- Permissive: GenAI tools are permitted for all course assignments
- Context-Specific: GenAI tools are permitted for specific components of assignments or to a select subset of course assignments
- Restrictive: GenAI tools are not permitted for any course assignments

The document provides corresponding syllabus statements and sample directions to be added to all assignment descriptions. This document should be reviewed annually to ensure that the categories and the examples are still relevant and to update with any additionally necessary information.

## Guidelines for Instructors

As we wait for the University committees to complete their work, we refer the College of IST to a good example of system-wide principles and guidelines: the Russell Group's [Principles on the Use of](#)

[Generative AI Tools in Education](#). The Russell Group is a consortium of 24 UK universities. The university members refer to the *Principles* document and supplement with their own local policies and procedures.

Given the examples of the universities reviewed in our benchmarking research, and given the current context at Penn State, we recommend that the College of IST adopt the following guidelines, to be reviewed again once the University offers its guidance.

- Guideline 1: Using GAI Tools in College of IST Courses
  - Use tools approved by Penn State due to privacy, security, and accessibility concerns
  - If using tools that have not been approved, prepare alternate assignments for students who cannot use the tools due to lack of accessibility or due to privacy or security concerns.
  - Check whether a tool of interest is approved at the *Reviewed Courseware List* on the [Courseware website](#).
- Guideline 2: Ensuring Student Privacy
  - If uploading student data to AI tools (e.g., uploading student work and asking ChatGPT to provide feedback), strip identifying student information.
- Guideline 3: Using Tools to Detect Improper AI Tool Use
  - Use PSU-approved detection tools; e.g., TurnItIn
  - Inform students on the syllabus if you will use tools to detect AI tool use and explain, on the syllabus, the procedure for doing this—including the removal of the student’s name prior to uploading student data to the tool.
  - Do not rely on AI tools, alone, to identify students’ improper use of GenAI tools.
- Guideline 4: Reporting Suspected Academic Integrity Violations
  - If an instructor suspects improper GAI tool use on course assignments, follow [existing Academic Integrity procedures](#).

## **Suggested Procedures Surrounding Management of AI Guidelines and Course Policies**

Guidelines and policies will quickly be out of date given the rapid changes in the AI landscape. The following suggested procedures address the importance of regularly updating information, designating a single source of truth, and communicating broadly.

- Dating documentation: Add two dates to each document: a) date written and b) date by which we commit to reviewing it again.
- Filing documentation: File documents in a central College location (e.g., Dean’s Office electronic filing system, AD Office electronic filing system)

- Sharing documentation: Link documents to key online locations that faculty frequent (e.g., College of IST GenAI Canvas course, the College's Teaching site, College of IST faculty-staff [Resource Hub](#))
- Managing documentation: Designate a person or committee responsible for maintaining the documents and following through on revision deadlines. Include at least one (preferably two) faculty members in work groups assigned to write/revise documents.

## Best Practices

Many universities are in the process of tackling the use of GAI in their curricula. We include the best practices of two universities that are at the forefront of this endeavor: Arizona State University and Cornell University.

**Arizona State University (ASU)** has developed comprehensive policies and guidelines for the use of generative AI (GenAI). These guidelines were formulated during a series of discussions titled "Digital Trust in AI" and involve contributions from various university departments including Cybersecurity, AI Acceleration, and the Office of General Council. The guidelines focus on (1) Ensuring responsible use of GenAI while (2) Upholding digital trust and privacy standards. ASU's resources for teaching with GenAI emphasize principled innovation and the ethical integration in education. ASU's hosts their policy and resources on their Artificial Intelligence page: <https://ai.asu.edu/policy-and-resources> .

**Cornell University's** [\*Generative Artificial Intelligence for Education and Pedagogy Report, July 2023\*](#), includes eight recommendations for faculty (p. 9):

1. Faculty should be explicit in identifying expectations regarding the use of GAI tools in each course, and potentially for individual assignments. Cornell resources such as the Center for Teaching Innovation may be helpful in identifying standardized language and clear examples.
2. Faculty are encouraged to identify well-defined learning outcomes to provide rationales for how and when GAI can/cannot be used in a particular course.
3. When GAI is permitted, faculty should be clear about student expectations in terms of documentation and attribution, what work is expected to be produced by the student themselves, and how the student is expected to validate or verify output from GAI.
4. Faculty members are encouraged to engage in ongoing conversations about the importance of academic integrity, including the fact that basic academic integrity principles remain important and still apply regardless of the existence of GAI tools. (See "Communicating Why Academic Integrity Matters").
5. Integrating critique of current practices and uses of GAI, including ethical issues, into all stages of learning is vital.

6. We currently discourage the use of automatic detection algorithms for academic integrity violations using GAI, given their unreliability and current inability to provide definitive evidence of violations.
7. While faculty may use GAI as a tool for developing teaching materials, we encourage them to adhere to the same standards of attribution that they require of their students.
8. We do not recommend the use of GAI for student assessment.

GAI Task Force members offer seven best practices for College of IST instructors, based on a synthesis of ideas from ASU, Cornell, and other universities reviewed in our benchmarking research. Instructors should do the following:

### **On the Syllabus and Course Assignments**

- Add a GAI course policy on the course syllabus (see [Document from August 2023](#)).
- Add a GAI statement of what is allowed/disallowed on each assignment (see [Document from August 2023](#)).

### **During the First Week of Classes**

- Discuss GAI in first week of classes (see recommended points to cover in section Q1 of this report).
- Enlist course assistants (LA, IA, or TA) to talk about GAI and integrity.
- Assign the College of IST Canvas Academic Integrity quiz, which briefly addresses GAI (contact [ISTLearningDesign@psu.edu](mailto:ISTLearningDesign@psu.edu) for directions on how to add the quiz to your Canvas course).

### **Throughout the Semester**

- Discuss GAI prior to each assignment.
- For assignments that allow GAI, teach students how to get the best results (see IST 301 course assignments on prompt engineering in section Q6 of this report; visit the GAI for College of IST Instructors Canvas course for more examples).

### Q3. How do we incorporate generative AI tools into course assignments and the curriculum in a strategic and educationally sound manner?

#### GAI Literacy

Our goal is to prepare students for success in a generative AI-infused workforce. We view generative AI (GAI) tools through the lens of *building GAI literacy*. GAI literacy refers to possessing the key skills and abilities required for success in the digital world through GAI-driven technologies (Ng et al., 2021). GAI literacy expands on the concept of digital literacy, which emerged in the 1970s with the rising prevalence of computer applications across businesses (Leahy & Dolan, 2010).

#### Bloom's Taxonomy and GAI Literacy

Bloom's Taxonomy is an approach to categorize the levels of reasoning skills and ordered thinking required across different learning contexts. There are six levels in the taxonomy, each requiring a higher level of complexity and ordered thinking. The levels are successive, so that one level must be mastered before the next level can be reached (Bloom, 1956; Huitt, 2011). (See Figure 1)

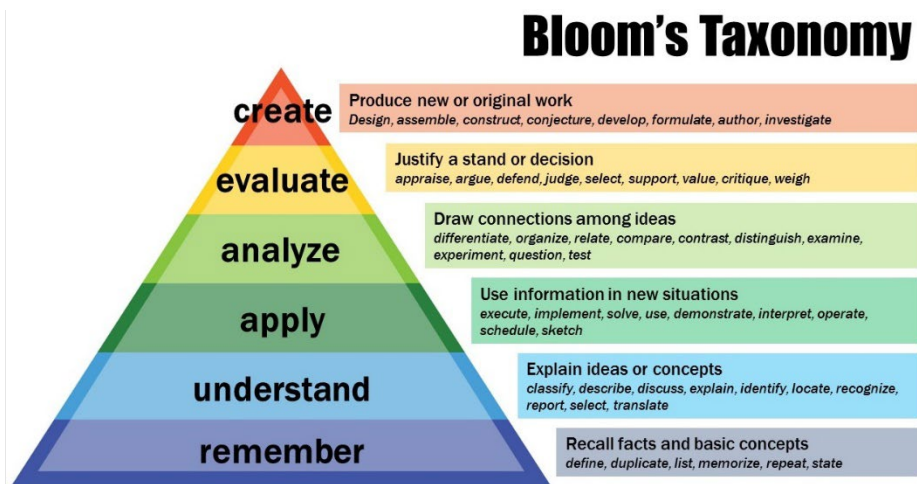


Figure 1. Bloom's Taxonomy

(<https://blogs.jccc.edu/outcomesassessment/2018/02/13/down-dirty-with-blooms-taxonomy>)

Building on prior research (Ng et al., 2021 and Southwood et al., 2023), we relate three aspects of GAI literacy (i.e., know and understand, use, and evaluate and create GAI) to levels of Bloom's Taxonomy. "Know and understand GAI" relates to the bottom two levels; "use and apply GAI" relates to the apply level; "evaluate and create GAI" relates to the top three levels to analyze, evaluate and create AI (see Fig. 2).

1. **Know and Understand GAI** (*Bloom's remember and understand levels*):
  - Basic understanding of LLM concepts and GAI
2. **Use and Apply GAI** (*Bloom's apply level*):
  - Ability to utilize GAI tools and platforms
3. **Evaluate and Create GAI** (*Bloom's evaluate and create levels*):
  - Capability to assess the quality and reliability of GAI results
  - Capability to create GAI models (e.g. LLM)
  - Understand the moral and ethical implications of GAI, making informed decisions about GAI use, considering fairness, transparency, accountability, and societal impacts.



**Figure 2. GAI Literacy and Competencies**

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## Q4. What are others (at Penn State or elsewhere) doing to address this question?

In Fall 2023, the committee reviewed several institutions that, at that time, were noted for their work in generative AI use in instruction. ChatGPT generated a top-ten list of universities. To that list, we added additional institutions that have been in the news for their pioneering *AI in instruction* endeavors and collaborations initiated between October 2023 and January 2024 (see Appendix A for a list of universities). Committee members divided the work, so that each person researched two to four institutions using the same information gathering template (see Appendix B). A summary of key findings follows (see Appendix C for details).

- Institutions do not appear to have incorporated into their required general education curriculum the topic and practice of using Generative Artificial Intelligence (GAI) tools.
- A few programs *within* institutions have incorporated into their curriculum the topic and practice of using Generative Artificial Intelligence (GAI) tools, but none appear to require these courses:
  - Stanford's online Executive Education Program [Course](#)
  - MIT's Professional Education Program [Course](#)
  - MIT's Management Executive Education Program [Course](#)
  - Arizona State University [Arts and Humanities courses](#)
- Almost all universities have general guidance for students, most often on a webpage, but also in library workshops, library guides, and course modules.
  - Some of the guidance includes instruction on prompt engineering, for example, in the University of Michigan-Flint *Generative AI Prompt Literacy* [self-paced course](#).
  - Other notable resources include Purdue Global's [webpages](#) with extensive information on prompt engineering.
- All universities have general guidance for instructors, most often on a webpage, but also in workshops, library guides, newsletters, blogs, and community groups.
  - Some of the guidance includes instruction for faculty on how to re-design assignments, for example, on the MIT Teaching and Learning Lab [webpages](#).
  - Other guidance addresses prompt engineering, for example, on the Purdue Global AI Task Force faculty resources [page](#).
  - Other notable resources include the Penn State Commonwealth Campus' *Generative AI and Teaching* [guide](#), addressing classroom conversations about AI, learning challenges with AI, academic integrity, and AI literacy.



- Most institutions have undertaken significant steps at the enterprise level to address issues, establish guidelines, set up task forces and committees, and/or establish communities of practice. Notable efforts include:
    - Russell Group’s<sup>1</sup> consortium-level *Principles on the Use of Generative AI Tools in Education* [document](#)
    - University of Florida’s Jane Southworth et al.’s *Developing a Model for AI Across the Curriculum* [article](#), summarizing the University’s efforts
    - Arizona State University’s *Generative AI Community of Practice*, explained on their [website](#), and the University’s [collaboration with OpenAI](#)
    - University of Michigan’s [custom GenAI services](#), including U-M GPT, U-M Maizey, and U-M GPT Toolkit
    - Purdue Global’s AI Task Force efforts, including faculty resources, student resources, detecting resources, prompt engineering resources, and more presented on their [webpage](#)
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<sup>1</sup> The Russell Group is a consortium of British universities, including University of Oxford, Cambridge University, London School of Economics, University College London, and twenty others.

## Q5. By major, identify which courses can benefit from GAI

Using the model in Figure 1 as a foundation, which synthesizes Bloom’s taxonomy with respect to GAI literacy, committee members worked with faculty to assess where and how GAI concepts could be included in courses. We present findings organized by major.

### ETI Major

Question: Are there applications where genAI can be applied in this course?

Method: Asked key instructors for each 300- and 400- level course to address this question. For the most part, new ETI courses were assessed by a single instructor. However, for the more established courses (e.g., IST 420, IST 421), more than one instructor contributed.

Result: Table 1 shows the results of GAI applied to the ETI major.

**Table 1. GAI applied to courses in ETI Major**

Course	Use of GenAI
ETI 300W Cloud	1) Assistance in building solutions 2) Error help on code and implementation 3) New technologies assistance
IST 301 Info & Orgs	1) teaching genAI “literacy” including prompt engineering and text-to-image conversion 2) writing 3) idea generation 4) creative problem solving  e.g. group project – incorporates all the above
IST 302 Project Mgt	1) Incorporate genAI tools into project management a. The PMI (Project Management Institute) has some project management genAI tools. <ul style="list-style-type: none"><li>• <a href="https://www.pmi.org/learning/thought-leadership/ai-impact/shaping-the-future-of-project-management-with-ai">https://www.pmi.org/learning/thought-leadership/ai-impact/shaping-the-future-of-project-management-with-ai</a></li><li>• <a href="https://www.techrepublic.com/article/ai-project-management-tools/">https://www.techrepublic.com/article/ai-project-management-tools/</a></li></ul>
IST 420 Fund. Of Integration	1) API integration with ChatGPT and other LLMs 2) UML modeling  <a href="https://diagrammingai.com/">https://diagrammingai.com/</a>  <a href="https://chatuml.com/edit/new">https://chatuml.com/edit/new</a>
IST 421	1) Strategic assistance in developing solutions 2) Writing assistance such as project documentation and other deliverables

Advanced Integration (Capstone)	
ETI 435 Analytics	<ol style="list-style-type: none"> <li>1) Use GenAI to help explain how analytics can be used in organizations as a source of competitive advantage.</li> <li>2) Use GenAI to help explain how analytics can be used as source of competitive advantage in different domains including government, healthcare, financial services, sports, retail, etc.</li> <li>3) Use GenAI to identify strategies that an organization leverage analytics for improved organization performance.</li> <li>4) Gen AI can be used to identify best practices analytics use cases in healthcare, manufacturing, HR, financial services, etc. For example, in healthcare ChatGPT was able to provide seven (7) best practices use cases, e.g., 'Patient Experience and Satisfaction Analytics'.</li> <li>5) GenAI can be used to identify technologies for analytics and learn more about each technology.</li> <li>6) Use GenAI to learn about the best practices in analytics governance.</li> <li>7) Project: Student can use GenAI to do research to enable them to address the requirements/questions in the different sections of the project. Project groups will provide details of how they used GenAI in the project.</li> <li>8) A possible use of LLM for data analysis</li> <li>9) Model training with data</li> <li>10) Cloud storage and model training</li> </ol>
ETI 461 DB Admin	<ol style="list-style-type: none"> <li>1) While the class covers fundamental concepts, students can use GenAI to enhance their understanding in the following ways:</li> <li>2) Given a hands-on activity, and once students grasp the concept and objectives of the activity, students can use GenAI to obtain finer details of the activities, the framework, approaches or protocols to the activities.</li> <li>3) They can identify faster and more efficiently online resources they may need to enhance their knowledge of the concepts.</li> <li>4) Given limited class time and diverse sets of classes each student is taking each term, it helps to locate better examples for a given topic or activity in this course.</li> <li>5) Obtain help with some of the activities that involve writing and essays. GenAI can also provide timely and fast feedback to the students if they supply their own writings.</li> <li>6) GenAI can assist the students to analyze existing code they have written: a bug-finding mission. GenAI is also capable of writing snippets of code. Given a set of code, GenAI can optimize it for better execution time or memory allocation.</li> <li>7) GenAI can assist in top-down design of the course project.</li> </ol>

	8) Storage of data needed for model analysis 9) On-demand data needs for LLM integration 10) GPU/CPU resources needed for mid-level API calls (on-demand)
ETI 463 Distributed DB	1) Use GenAI to identify distributed database issues and challenges which are the heart of this course and are the focus of the topics in the course. 2) GenAI can be used to help explain the distributed query optimization problem, distributed concurrency control schemes, distributed database reliability and data replication issues. 3) Make GenAI integral to the course project. Given a distributed database project brief, use GenAI as a collaborator to help compile queries according to the 80/20 rule, fragment the database, and then allocate the fragments. Project groups will provide details of how they used GenAI in the project. 4) Integration of cloud-based storage and LLM model builds 5) Data integrity with LLM-derived data and consistency with original, raw data 6) On-demand model-based data analysis; cloud resources needed

## HCDD Major

Some thoughts on incorporating AI into the HCDD UX and HCDD programming (design & development) courses including criteria for assessing student knowledge of AI and contributions when AI is employed as a collaborator on assignments.

This paper was used for general orientation:

<https://www.sciencedirect.com/science/article/pii/S2666920X23000061?via%3Dihub>

Course	Use of AI
HCDD 113 – Foundations	<p>None. Focus on providing students with the foundations of HCDD, design thinking as a framework, and methods for use in each stage of the design thinking process.</p> <p>Update 2/12: Though I still believe that ensuring students develop essential ‘bootstrapping’ knowledge and skills, incorporating AI at this early stage may be inevitable.</p> <p>One idea is to introduce AI as part of the discussion on allocation of functions and hierarchical task analysis. This could take the form of a reflexive exercise where students conduct an AoF/HTA on one of their own activities (eg completing an assignment) where the actors are themselves, ‘conventional’ technology such</p>

	<p>as the WWW, and AI. Who should do what and why? Perhaps expand the discussion of distribute cognition to add depth to this.</p> <p>That said, this may be too much to cram into an already crowded course.</p> <p>How to create an assignment that excludes AI? How to ensure this, how to assess this?</p>
HCDD 264 – Design Practice	<p>Similar to HCDD 113. Also focused on providing students with the ‘bootstrapping’ knowledge needed to make effective use of GenAI. Suggest very late in the course introduce GenAI as a design tool and do one activity/assignment using it to assist with the work.</p> <p>Update 2/12: Introduce the idea of AI as collaborator in design activities. Continue the focus from 113 on AI as an actor in allocation of functions and stress the importance of the student’s value-add in the design process.</p> <p>This course should also introduce ethical considerations when incorporating AI into the functionality of an interactive technology.</p>
HCDD 364W – Studying Users	<p>Start to introduce GenAI as a collaborator on UX projects. In particular make use of GenAI to help: identify appropriate methods to answer well-designed research questions (prompt engineering); design data collection instruments both qualitative and quantitative; and to select appropriate data analysis methods including statistics based on the kinds of data collected.</p> <p>A potentially interesting and important role of GenAI might be to use data collected to identify implications for design and re-design prescriptions.</p> <p>Update 2/12: Instead of introducing the idea of AI as collaborator, continue development of this idea as introduced in 264. Rather than as a design collaborator, the focus here will be on AI as a collaborator in the development of a user and/or stakeholder study.</p>
HCDD 440 - Capstone	<p>Make GenAI integral to the course. Given a design brief, use GenAI as a collaborator to assemble a UX research and prototype development project. Students/groups should present and explicitly describe how they used GenAI on the project (rubber ducking).</p>

	<p>Include an assignment/activity where students explain why an organization should hire them instead of just using ChatGPT or other GenAI.</p> <p>Update 2/12: Include activities to revisit all of the concepts presented in courses coming earlier in the curriculum.</p> <p>Is there an emerging literature in industry/HR on how to account for AI in the hiring process especially in technical-type interviews?</p>
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### Generative AI as an HCDD Competency

The table below includes first-draft notes on the criteria that might be used to evaluate AI knowledge and use to the extent these are included in course content and activities.

Course	Criteria to Evaluate Student Use of AI
HCDD 113 – Foundations	Can students explain, with reference to allocation of functions/hierarchical task analysis/distributed cognition, how and why an activity might be distributed among the different actors including AI.
HCDD 264 – Design Practice	<p>If AI is a collaborator in the design process consider starting first with methods to assess human contributions in these activities. Can methods to assess team members' contributions be adapted to student/AI contributions? Similarly, what strategies exist to evaluate contributions in pair programming assignments (Hahn, Mentz &amp; Meyer, 2009)?</p> <p>See ChatGPT's thoughts on this in Appendix A below* (OpenAI, 2024).</p> <p>Can students explain the ethical considerations when incorporating AI into the functionality of the technologies they design?</p>
HCDD 364W – Studying Users	Somewhat like criteria used in 264 ie how to assess the human (student) contributions when AI is employed as a collaborator?
HCDD 440 - Capstone	Because this is a capstone course, it should revisit and exercise all the criteria applied in courses coming earlier in the curriculum.

The table below includes thoughts on the role of generative AI in the HCDD/IST programming course sequence:

Course	Use of GenAI
--------	--------------

IST 140 – Intro to App Dev.	None (though maybe some use for generating visualizations for common algorithms) – python’s turtle graphics could be good for this.
IST 240 – Programming Languages	Cover several languages in the class ranging from imperative to declarative and functional. Projects can involve porting projects from one language to another (these projects can range in size and complexity – will be constrained by the number of dependencies);
IST 242 – Intermediate OO App Dev	Assuming MVC is in the course, use LLMs as a native code generator/editor for view/UI code. If used in a more general capacity, could be utilized for writing tests or generating visualization code for linear collections and data structures
HCDD 261 – App Design Studio I	This is a project-based course; the idea would be to use LLMs as an assistant to specify and prototype an application over a portion of the semester. As part of their final deliverable, students should document in what capacity the LLM was used (writing tests, helping produce valid UML, etc)
HCDD 311 – Advanced OO Design	Utilize classes, records, and interfaces + sealed hierarchies to better model/represent objects within a given domain. Weaving LLMs into the projects: <ul style="list-style-type: none"> <li>- Give partial/incomplete/suboptimal specs and let the students explore using the LLM to critique and improve the base design.</li> <li>- Final project should weave in non-linear data structures (trees, graphs) covered in the course as well other APIs to build and parse files written in a domain specific language and integrate them into editors (VSCode, SublimeText, etc)</li> </ul>
HCDD 412 – The Eng. of Complex Software Systems	This course primarily studies larger systems and software development processes. Covers: design patterns, risk management, time/cost estimation techniques, design by contract, verification, and validation <ul style="list-style-type: none"> <li>- A potential use of an LLM would be in generating contracts that could potentially be used to do automated verification of a software component</li> <li>- Tools could be leveraged to do formal verification - Dafny (a C# like language from Microsoft Research) includes preconditions and postconditions as part of the language; would be interesting to see how well an LLM is able to translate English specifications into precise formulae</li> <li>- Alternatively: how well precise formulae can be down-translated into executable code that satisfies the spec; Dafny’s verifier would check/verify this.</li> </ul>

## DS/AI Major

DS 120 - Scripting for Data Sciences  
DS 200 - Introduction to Data Sciences  
DS 220 - Data Management for Data Science  
DS 300 - Privacy and Security for Data Sciences  
DS 305 - Algorithmic Methods and Tools  
DS 320 - Data Integration  
DS 330 - Visual Analytics for Data Sciences  
DS 340W - Applied Data Sciences  
DS 402 - Emerging Trends in the Data Sciences  
DS 410 - Programming Models for Big Data  
DS 435 - Ethical Issues in Data Science Practice  
DS 440 - Data Sciences Capstone Course  
DS 442 - Artificial Intelligence  
A-I 574 - Natural Language Processing  
A-I 801 - Foundation of Artificial Intelligence  
A-I 804 - Ethics of Artificial Intelligence  
A-I 879 - Machine Vision

Should cover Gen AI as course content

Introduce Gen AI tools/applications that could be helpful

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**Applications that are generally helpful for DS/AI courses:**

**Coding assistance:**

[GitHub Copilot · Your AI pair programmer](#)

**Synthetic data platform**

[Gretel.ai — The synthetic data platform for developers](#)

**Tools for generating diagrams and charts to illustrate concepts:**

[Chatmind: AI-Native Mind Mapping Online by Xmind](#)

**RATH and VisGPT:** [Kanaries: GPT powered visual analytics](#)

DS 330 - Visual Analytics for Data Sciences

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## Cyber

The use of GenAI in the cybersecurity curriculum mirrors other degrees in that the use of GenAI can progress across Bloom's Taxonomy curve as students advance, beginning with



“knowledge” of GenAI and prompt engineering in the first year, to “applied” skills in the senior year. This is illustrated in Section b in the following SRA discussion.

In addition, the use of GenAI as a *study* and *writing partner* is appropriate at all levels of education. Safeguards are needed to ensure the GenAI tool is a writing *support* tool, and not the original or sole author (e.g., both original student-written draft must accompany submission of the final GenAI improvement).

The use of GenAI in specific cyber assignments mirrors other experiential degrees such as HCDD. There is a risk that students will circumvent learning by outsourcing questions and responses to GenAI tools. It is important that students are aware that doing so diminishes their ultimate employment opportunities if they cannot provide more value than that of the GenAI tool itself. In addition, the style of the assignments must be modified to align with GenAI learning. For example, having students use GenAI to generate and solve a similar but different problem would be an example.

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## SRA

Ed Glantz reviewed SRA undergraduate GenAI opportunities by, **(a)** surveying SRA faculty, **(b)** having GenAI conduct a general 4-year review, and **(c)** having GenAI conduct a specific analysis of each SRA course description and level in the degree, The results follow.

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**(a) SRA Faculty Review:** A group of 4 SRA undergraduate faculty were contacted for work they are doing on the use of GenAI. The result was minimal, as GenAI is still perceived by those contacted with reluctance for two reasons: 1. The risk of GenAI to facilitate “cheating,” and 2. The limited “likelihood” SRA alumni—going into government intelligence analysis—will be permitted to use GenAI. I will defer a response to these objections but note for now that in my opinion all faculty have a responsibility to actively research and experiment with GenAI despite current teaching objections.

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**(b) GenAI General Review:** Below is an outline of “general” undergraduate teaching and learning suggestions for integrating Generative AI (GenAI) across the four years of undergraduate study, aligned with Bloom's taxonomy levels:

### ### 1xx: Remember/Knowledge (First Year)

- **\*\*Introduction to GenAI tools\*\*:** Provide workshops or seminars that introduce students to various GenAI platforms and their capabilities.

- **Basic search tasks**: Use GenAI to help students find and compile information on specific topics to enhance their research skills.
- **Flashcard creation**: Encourage students to use GenAI to generate flashcards for studying key concepts and terminology.
- **Quiz generation**: Have students use GenAI to create quizzes for each other, helping them review and remember course content.

### **### 2xx: Understand/Comprehension (Second Year)**

- **Summarization of texts**: Assign students to use GenAI to summarize research papers or book chapters to ensure they grasp the core ideas.
- **Explanation of concepts**: Use GenAI to generate explanations of complex concepts, and have students critique and improve these explanations.
- **Translation tasks**: For language courses, utilize GenAI tools to translate texts and compare with manual translations to deepen understanding of language nuances.
- **Discussion facilitation**: Incorporate GenAI into classroom discussions by generating prompts or questions that students can discuss to explore topics more deeply.

### **### 3xx: Apply/Application (Third Year)**

- **Problem-solving sessions**: Integrate GenAI into problem sets where students use the technology to propose solutions to theoretical or real-world problems.
- **Project collaboration**: Use GenAI as a collaborator in group projects, where students consult the AI to optimize project workflows, design, or content.
- **Role-playing exercises**: In courses like law, business, or medicine, have students use GenAI to simulate conversations with clients, patients, or other stakeholders.
- **Interactive simulations**: Employ GenAI to create dynamic simulations in fields like economics, physics, or environmental science to apply theoretical knowledge.

### **### 4xx: Analyze/Analysis (Fourth Year)**

- **Data analysis projects**: Guide students in using GenAI to analyze large datasets, identify patterns, and make predictions, requiring critical evaluation of the output.
- **Ethical considerations debates**: Facilitate debates on the ethical use of AI in society, focusing on issues like privacy, bias, and automation.
- **Literature reviews**: For thesis or capstone projects, use GenAI to assist in conducting comprehensive literature reviews, critically analyzing sources and gaps in research.
- **Case studies analysis**: Assign complex case studies for students to analyze using GenAI, comparing AI-driven insights with traditional analysis methods.

By progressively increasing the complexity and involvement of GenAI in the learning process, students can develop a sophisticated understanding and skill set that prepares them for both academic and professional uses of AI technology.

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(C) **GenAI Specific SRA Analysis:** Each SRA course description and level was provided to GenAI to provide specific examples of how GenAI could be used to improve teaching and learning and is included here by reference, *available upon request*. Two course instances are shared below:

### **SRA 111**

#### **PROMPT along with course description, learning objectives, and level:**

How could generative artificial intelligence be used to support student learning in a first-year undergraduate course in *Introduction to Security and Risk Analysis*

**Response:** Generative artificial intelligence, like GPT-4, can significantly enhance student learning in an introductory course on Security and Risk Analysis in various ways:

1. **\*\*Personalized Learning\*\*:** AI can tailor educational content based on individual student's learning styles and progress, offering a more personalized experience.
2. **\*\*Interactive Simulations\*\*:** AI can create realistic simulations or scenarios for students to navigate, providing practical experience in risk assessment and decision-making.
3. **\*\*Automated Feedback and Assessment\*\*:** AI can provide instant feedback on assignments and assessments, allowing students to learn from their mistakes in real-time.
4. **\*\*Supplementing Instruction\*\*:** AI can serve as a supplementary tutor, answering students' queries outside of classroom hours, providing detailed explanations on complex topics.
5. **\*\*Research and Data Analysis\*\*:** AI can assist students in conducting research by analyzing large datasets, identifying trends, and summarizing findings, which is crucial in risk analysis.
6. **\*\*Scenario Generation and Role Play\*\*:** AI can generate hypothetical security scenarios for role[1]playing exercises, helping students understand different perspectives in security and risk management.
7. **\*\*Enhancing Collaboration\*\*:** AI tools can facilitate collaborative projects, allowing students to work together effectively, even remotely.
8. **\*\*Up-to-date Content Delivery\*\*:** AI can ensure that the course content remains current, integrating the latest developments and research in the field of security and risk analysis.
9. **\*\*Language Translation and Accessibility\*\*:** For international or differently-abled students, AI can provide real-time translation and accessibility features, making learning more inclusive.
10. **\*\*Encouraging Critical Thinking\*\*:** Through interactive problem-solving activities designed by AI, students can develop critical thinking and analytical skills.

In summary, generative AI can revolutionize the learning experience in an Introduction to Security and Risk Analysis course by offering personalized, interactive, and up-to-date educational experiences.

### **SRA 311(W)**

#### **PROMPT along with course description, learning objectives, and level:**

How could generative artificial intelligence be used to support student learning in a third-year undergraduate course in ***Risk Analysis in a Security Context***.

**Response:** Generative artificial intelligence can greatly enhance student learning in a third-year undergraduate course on Risk Analysis in a Security Context. Here are some ways it can be applied:

1. **\*\*Customized Learning Experiences\*\*:** AI can adapt course content and difficulty based on individual student performance, providing a personalized learning journey that addresses specific educational needs.
2. **\*\*Simulation of Security Scenarios\*\*:** AI can create realistic simulations of security risks, allowing students to apply risk analysis theories in virtual environments. This hands-on experience is invaluable for understanding the complexities of real-world security challenges.
3. **\*\*Automated Feedback and Grading\*\*:** AI can offer immediate and detailed feedback on assignments, enabling students to understand their mistakes and learn more effectively. It can also handle routine grading, freeing up instructors to focus on more complex evaluation and personalized teaching.
4. **\*\*24/7 Question and Answer Support\*\*:** AI-powered chatbots or virtual assistants can provide students with round-the-clock support, offering explanations, resources, and guidance on complex topics.
5. **\*\*Data Analysis and Pattern Recognition\*\*:** AI can assist students in analyzing large datasets, identifying patterns and anomalies, and applying these insights to risk analysis in security contexts.
6. **\*\*Interactive Case Studies\*\*:** AI can generate and guide students through interactive case studies, allowing them to explore different risk scenarios and decision-making outcomes.
7. **\*\*Enhancing Collaboration\*\*:** AI tools can facilitate group projects and collaborative research, helping students to work together more effectively, even remotely.
8. **\*\*Up-to-Date Content and Examples\*\*:** AI can integrate the latest news, research, and developments in security risk analysis into course materials, ensuring that students are learning with the most current information.
9. **\*\*Development of Critical Thinking\*\*:** Through AI-created problem-solving activities, students can develop critical thinking and analytical skills, key for risk analysis in security.
10. **\*\*Accessibility Features\*\*:** AI can provide translation services and accessibility features, making the course more inclusive for students from diverse backgrounds or with different learning needs.

By integrating generative AI into a Risk Analysis in a Security Context course, students can benefit from a more interactive, tailored, and practical learning experience, preparing them better for real-world applications in their future careers

Q6. Draft assignments/modules (e.g., prompt engineering, text generation, image generation) and libraries that can be used and adapted by instructors of the courses.

## ETI Major

Sample assignments for the ETI major are presented in this section. The assignments are tagged with the GAI literacy and competencies addressed from Figure 2 and replicated below.



### ETI 300W Development and Documentation of Enterprise Web

#### GenAI Homework Example, Spring 2024 Dave Fusco

##### AWS - API Intro Lab [GAI Literacy Tag: Use & Apply]

This is an example of incorporating GAI into an existing assignment. The highlighted sections indicate where the assignment was modified to include GAI.

#### Instructions: Complete the following API tasks

##### I. Retrieving course data through the publicly available Canvas API

1.
  1. In a Browser (Chrome), log into Canvas
  2. In a new tab, in the same browser, open this API

<https://psu.instructure.com/api/v1/courses>

Using GenAI, discover why this API call works or does not work by having a tab already logged in (versus not being logged in).

Complete the following:

1. Take a screen shot of this opened API (this new tab and its results)
2. What format is this data in? (answer this question)

Using GenAI, determine the format that this data is in.

3. Convert this data into a 'tree format' that is more easily readable
  1. Take a screen shot of this newly formatted data

Using GenAI, determine why I'm asking for a 'tree format' and what that means exactly. Why do we need to convert this to a 'better looking' format?

## II. Using Postman, complete the following:

Install from <https://www.postman.com/>

1.
  1. From the sites below, choose **five** APIs to test using Postman (or find your own API that's interesting)
  2. Use 'GET' as your method for the API call
  3. Use open (no auth key needed), but, of course, feel free to use authorized APIs
  4. Take a screen shot of each of the return answers that the Postman call produces (e.g. the 'response' window in the bottom half of the Postman app)

Using GenAI, answer the following questions:

1. What is the purpose of Postman?
2. Why are we using 'GET' as the HTTP method?
3. What is the difference between what Postman displays and your Browser? What about the use of 'Inspect' on your browser and how it differs from Postman?

## Server-Side Call (condensed from original assignment)

### III. Using a server-side script (PHP, Node.js, etc.) of your choice:

- 1.

1. Create **one (or two for extra, extra credit)** server-side call to an API and display the results from your AWS web server (instance); it is your choice of what stack/platform you want to use
2. Take a screen shot of:
  1. Your server-side script making the API call
  2. The results being displayed either: a. in your browser or b. at your shell

Using GenAI, have it provide you with examples of using PHP, NodeJS, or any other server-side scripting language to make a remote API call.

Using GenAI, have it explain the user of curl. How does it differ from making a call in Postman and your browser?

Using GenAI, have it explain the difference of port numbers of services like apache, nginx, and NodeJS. Why do you have to change your inbound rules on AWS for different services?

*Resources for **Node.js** API calls:*

*Reminders:*

1. server.js is the file you edited before in your MEAN stack (/home/ubuntu/mean)
2. You can make a copy of this file:

\$ cp server.js server.org (or whatever you want to call it)

1. You can run this file by typing 'node server.js' from your shell (\$)

This is the output from my MEAN server, using the first link below (as an **example**)  
HTTP – the Standard Library

**ubuntu@ip-172-31-85-53:~/mean\$** node server.js

Could the stem of our Milky Way bloom into an auroral flower? No, not really, even though it may appear that way in today's featured all-sky image. On the left, the central plane of our home galaxy extends from the horizon past the middle of the sky. On the right, an auroral oval also extends from the sky's center -- but is dominated by bright green-glowing oxygen. The two are not physically connected, because the aurora is relatively nearby, with the higher red parts occurring in Earth's atmosphere only about 1000 kilometers high. In contrast, an average distance to the stars and nebulas we see in the Milky Way more like 1000 light-years away - 10 trillion times further. The featured image composite was taken in early October across a small

lake in Abisko, northern Sweden. As our Sun's magnetic field evolves into the active part of its 11-year cycle, auroras near both of Earth's poles are sure to become more frequent.

<https://blog.logrocket.com/5-ways-to-make-http-requests-in-node-js/>

<https://medium.com/@madelinecorman/making-http-requests-in-node-js-16fe74af0a79>

## IST 301 Information & Organization

A series of new assignments were created by Rosalie Ocker to teach prompt engineering and text-to-image conversion. The semester project was changed to focus on GAI use in organizations. These assignments can be found on the Generative AI Resources Canvas site <https://psu.instructure.com/courses/2287008> under the Exercises module.

▼ Exercises			✓ ▼ + ⋮
⋮	📄 ChatGPT Jumpstart with Practice Problem created by R. Ocker 50 pts	✓	⋮
⋮	📎 ChatGPTJumpstart.pptx	🔄 ✓	⋮
⋮	📄 Image-to-text AI conversion created by R. Ocker Jul 9, 2023   0 pts	✓	⋮
⋮	📄 Brochure created by R. Ocker Jul 9, 2023   22 pts	✓	⋮
⋮	📄 Prompts and Reflection created by R. Ocker Jul 9, 2023   28 pts	✓	⋮
⋮	📄 More practice on prompt engineering created by R. Ocker Nov 14, 2023   52 pts	✓	⋮
⋮	🎯 Quiz on C.R.E.A.T.E. framework created by R. Ocker Nov 9, 2023   5 pts	✓	⋮
⋮	📄 Group Project: Strategic Integration of Generative AI Technology in a Fortune 100 Company created by R. Ocker	✓	⋮

### GAI literacy and competencies addressed in ETI assignments:

- ChatGPT Jumpstart –  
Part I: know & understand GAI  
Part II: use and apply GAI
- Image-to-text AI conversion  
Part I: know & understand GAI  
Part II: use & apply GAI



- CREATE framework -- know & understand GAI
- Group Project: use & apply, evaluate

## HCDD Major

Below are three example assignments using generative AI tools in HCDD **UX-focused courses**.

### Assignment 1: HCDD 264 – Design Practice

Read: <https://www.nngroup.com/articles/customer-journey-mapping/>

Then read: <https://www.nngroup.com/articles/ai-roles-ux/>

Use ChatGPT-4, Microsoft Copilot, Google Gemini, or other generative AI tool to assist in creating a customer journey map for your project domain and technology. *Important:* the map must be specific to your domain, you will not receive credit for generic maps.

At the top of your submission, include the text of your prompt, ie the question you asked the GenAI tool.

Below that, include the tool's response to your prompt.

Based on the results from above, write a critique of the tool's customer journey map.

As part of this critique, answer the following questions:

1. Is the response appropriate and accurate with respect to your prompt? Briefly explain how your prompt could be improved to provide a *more* appropriate and accurate response.
2. Identify three components of the tool's response that could benefit from your human insight. Expand on these three components with your insights.

### Assignment 2: HCDD 264 – Design Practice

Based on the results of your prototype guided walkthrough evaluations, use ChatGPT-4, Microsoft Copilot, Google Gemini, or other generative AI tool to help identify implications for design from these evaluation results. Identify three substantive evaluation results and use each of these as the basis for a GenAI tool prompt. Report on the tool's response to each of these and provide a critique. Are the tool's suggestions useful? Why or why not? The why or why not part is important.

### Assignment 3: HCDD 440 – HCDD Capstone Course

Consider a scenario in which you are being interviewed for a position you really want in a company where you would really like to work. The final question in the interview is this: why should we hire you for this position when we can just use ChaptGPT or another GenAI technology?

Below are two example assignments that involve generative AI **programming-focused courses**.

## In Class Activity 4: IST 242 – Intermediate Object-Oriented Application Development

### In-Class Partner Activity - Hello Gui

Published Edit

In this activity, you will use the Model View Controller (MVC) architectural pattern to build a very simple application with a button that updates some text. You'll also practice some basic input validation from a textfield.

Arrange your project using the package structure discussed in class:

```
src/  
  controller/ ...  
  model/ ...  
  view/ ...  
  App.java
```

This is the model class you'll need:

```
public class Message {  
    private String msg;  
    public Message() { this.msg = "Hi Everyone!"; }  
  
    public void setMsg(String newMsg) { this.msg = newMsg; }  
    public String getMsg() { return msg; }  
    public void reverseMsg() {  
        this.msg = new StringBuilder(msg).reverse().toString();  
    }  
    @Override public String toString() { return msg; }  
}
```

Here is the basic view mockup that you can drop into gemini, gpt, etc.

Here's an example prompt -- green below (then give it the hello world gui img below):

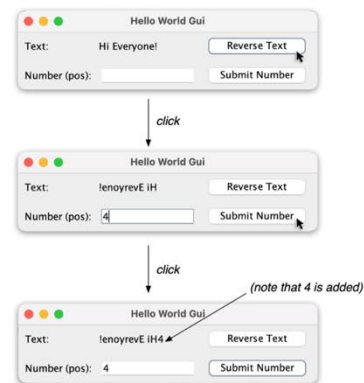
*Please refactor this code so that the elements show up on the resultant window. Do not generate any event listeners, and DO NOT MAKE THE PUBLIC FIELDS PRIVATE! I attached an image hereto for reference.*

```
public class HelloWorldGui extends JFrame {  
    public JButton reverseTextButton;  
    public JButton submitNumberButton;  
    public JTextField numberTextField;  
    public JLabel textLabel;  
    public HelloWorldGui() {  
    }  
}
```

<<Past the image below into the prompt as well>>



Here is a picture illustrating how the UI should look and operate:



Handin:

Export your project to a .zip file and submit the zip on canvas. You can do this through IntelliJ by going to File > Export > Export to Zip File. Double check that you've submitted what you intended to submit.

## In class activity 1: HCDD 311 – Object-Oriented Design and Software Applications

The following are samples of materials given to students HCDD 311 (*these samples were from a section taught by Syed Billah, Fall 2023*)

### M01- L00: Make a Calculator Using an AI tool


Due Aug 23, 2023 by 11:59pm Points 10

#### Learning Goal

How to use AI coding tool to boost programming productivity

#### Activity

Create a calculator app using an AI tool during the class. Accompanying video instructions:

<https://youtu.be/0CJZTqzGRvU> 



(There is a correction at timestamp 10:00: "subclass of errors" will be replaced with "super class of all exceptions.")

#### Instructions and Prompts

Steps: Create a project in IntelliJ, name it "CalculatorAI". Then use the following prompts in ChatGPT, copy and past the code as appropriate.

Prompt 1. How to print "Hello World" in java [explanation: this class is only for warm up].

Prompt 2. Write a class in Java for calculator [explanation: this class contains the library functions].

Prompt 3. Write a UI for the above class [explanation: this class contains the command line interface].

Prompt 4. Make the UI graphical [explanation: this is the part of my trial and error phase].

Prompt 5. Make the UI graphical using Swing, keep the code in one file [explanation: this class contains the graphical user interface (GUI) of the calculator].

Show your App to the instructor or TA to get the full credit.

## Prompting tips for generating suitable unit tests:

### [Prompts] M03-L02-Writing Deterministic Unit Test with AI Tools

Prompt 1.

I have two java classes: Media and Book. I'll provide more details one-by-one.

Prompt 2.

Here is the implementation of Media class. Keep it your context. **Do nothing:**  
[provide the source code for the Media class]

Prompt 3.

Here is the implementation of Book class. Keep it your context. **Do nothing:**  
[provide the source code for the Book class]

Prompt 4.

Now, generate a test class name 'QuizTest' with one JUnit test function named 'testTheQuiz' using the following specifications; use input, 'expected result', 'actual result' for each assertions; **do not print; always use assertEquals (...) function:**

Specifications

- \* 1. Create 2 books, have 3 copies for the first book and 1 copy for the second book
- \* 2. Call checkout on the first book with name = "Mark Twain"
- \* 3. Call checkout on the first book with name = "Charles Dickens"
- \* 4. Ensure that both of these return true (you can simply print the result)
- \* 5. Call checkin on the first book with name = "Mark Twain"
- \* 6. Call checkin on the first book with name = "Samuel Clemens"
- \* 7. Ensure that the first result is true and the second is false
- \* 8. Call checkout on the second book with name = "Mark Twain"
- \* 9. Call checkout on the second book with name = "Charles Dickens"
- \* 10. Ensure that the first result is true and the second is false
- \* 11. Call checkin on the second book with name = "Mark Twain"
- \* 12. Call checkout on the second book with name = "Charles Dickens"
- \* 13. Ensure that both of these return true

## Data Sciences Major

- DS 440 Data Science Capstone

Capstone projects centered around Generative AI.

Student work in teams to work on Generative AI projects. Example projects: GenAI-driven travel planner, GenAI-driven game; GenAI-driven video translation.

- SRA 472 Integration of Privacy and Security

## Generative Artificial Intelligence (AI) Usage

**Use of Generative AI is only permitted on assignments when the instructor has given explicit permission.** When using generative AI tools, you must show understanding of prompt engineering, engage in content generation checking, and appropriately reference the tool (e.g., ChatGPT, Midjourney) from which the content (e.g., text, image, ideas) was generated.

- For suggestions on how to properly cite and reference generative AI tools, please see the following webpages:
- <https://apastyle.apa.org/blog/how-to-cite-chatgpt>[Links to an external site.](#)
- <https://guides.libraries.psu.edu/apasquickguide/generativeAI>[Links to an external site.](#)
- <https://dal.ca.libguides.com/CitationStyleGuide/citing-ai>[Links to an external site.](#)
- For suggestions on how to write prompts that generate the most useful information, see this [YouTube video](#)[Links to an external site.](#).
- For a better understanding of how generative AI tools work and why checking is important, see this [YouTube video](#)[Links to an external site.](#).
- For the University's guidance regarding academic integrity violations for failing to provide attribution to work that is created with the assistance of generative technology, see the [Sanctioning Guidelines for Violations of Academic Integrity](#)[Links to an external site.](#) (look specifically at guidance about "submitting work created by generative technology without attribution").

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## Cyber

Ed Glantz experimented with GenAI in his residential **Cyber100** section Spring semester 2024. Specifically, he encouraged the use of GenAI as a **writing** and **study partner**, although the results were limited. He believes more active onboarding and training will be required (e.g., include early unit from LinkedIn Learning [Introduction to Prompt Engineering](#)).

In Cyber100 spring semester 2024, Glantz focused on results using GenAI as a study partner, rather than “how” to generate or apply prompt engineering. He provided “GenAI” responses to supplement weekly learning objectives (e.g., “ELI5 Firewalls,” “explain like I’m an expert on firewalls”).

In the meantime, his GenAI course policies are shown below. Please note the emphasis in yellow.

### GenAI Course Policies

Every course is "different" so please be careful and check with faculty when unsure of permission to use Generative Artificial Intelligence (GenAI) tool.

In this introductory course, students are encouraged to use GenAI as a "**study partner**." An example is linked below.

You are also permitted to use GenAI as a "**writing partner**" to improve your writing. This presumes you, (1) wrote the original draft to the best of your personal ability, (2) carefully reviewed the GenAI recommendation and corrected errors, (3) credited the use of GenAI as a writing partner in your response, and (4) included both the original draft with the GenAI enhanced revision.

#### Using GenAI as a “study partner”

The instructor posted [examples](#) of GenAI (e.g., Google Bard) responses to Module 1 Review questions in the Canvas Module 1 Review. He did not simply insert the questions and look for an answer, which would NOT have been helpful or informative! These results were more interesting and thought provoking.

CAUTION: In our course,

1. Simply typing questions, including short answer and essay questions, into a GenAI tool is an example of an academic integrity violation.
2. Worse, you would diminish your recruiting chances, since you did not elevate your learning beyond the more inexpensive GenAI tool.
3. **Since our quizzes and exams are based on the text material, we must use the course text material, and not the web or GenAI, as the “ultimate authority.”**

## SRA

Glantz also began promoting GenAI use in his EA876, a graduate version of SRA311(W).

Both the general study and writing partner GenAI opportunities appear in all levels of the curriculum, including graduate studies. In EA876, Ed Glantz again added GenAI responsibilities to his Syllabus:

### GenAI Course Policies

Every course is "different" so please be careful and check with faculty when unsure of permission to use Generative Artificial Intelligence (GenAI) tool.

In this course, students are encouraged to use GenAI as a "**study partner**." An example is linked below.

You are permitted to use GenAI as a "**writing partner**" to improve your writing. This presumes you, (1) wrote the original draft to the best of your personal ability, (2) carefully reviewed the GenAI recommendation and corrected errors, and (3) credited the use of GenAI as a writing partner in your response.

### Using GenAI as a “study partner”

I posted an example in Semester Project Part 3 asking GenAI (e.g., Google Bard) questions to help complete the IPO diagram. Note that I did not simply insert the questions and look for an answer, which would NOT have been helpful or informative! I found these results more interesting and thought provoking.

### CAUTION: In our course,

1. Simply typing questions, including short answer and essay questions, into a GenAI tool is an example of an academic integrity violation.
2. Worse, you would diminish your recruiting chances since you did not elevate your learning beyond the more inexpensive GenAI tool.
3. Since our quizzes and exams are based on course PPT and reading material, we must use these resources and not the web or GenAI, as the “**ultimate authority**.”

In addition, Glantz has encouraged students to use GenAI as both a **study** and **writing** partner. The only requirements are, (a) the first draft must be written by the student and included in the final submission, and (b) the GenAI tool must be cited in the final submission and credited specifically for its contribution. Glantz can compare work he has done in EA876, the graduate version of the undergraduate SRA311 introduction to risk analysis course. EA876 also emphasizes an advanced writing style targeting busy executives, like BLUF writing in SRA, and requires credible supporting resources.

It is too early to interpret preliminary results, however, Glantz suspects substantial effort will be required to enable students to harness and control even simple use of this powerful tool at any level, requiring a “*GenAI across the curriculum*” effort.

## Appendices

### Appendix A. List of Universities included in benchmarking GAI

Arizona State University – [information sheet](#)

University of California: Berkeley – [information sheet](#)

Carnegie Mellon University – [information sheet](#)

ETH Zurich – [information sheet](#)

University of Florida – [information sheet](#)

Massachusetts Institute of Technology – [information sheet](#)

University of Michigan – [information sheet](#)

Penn State University – [information sheet](#)

Purdue University – [information sheet](#)

Russell Group – [information sheet](#)

Stanford University – [information sheet](#)

University of Toronto – [information sheet](#)

University of Washington – [information sheet](#)

## Appendix B. Template used to gather information for university benchmarking

1. **Name of University:** [name]
  
2. **Does the University have an institution-wide GenAI-Across-the-Curriculum effort?**  
  
Yes  
  
No
  
3. **Does the University have examples of departmental GenAI-Across-the-Curriculum efforts?**  
  
*Yes (if so, provide link to example)*  
  
No
  
4. **Does the University have training for students**
  - Intro to GenAI  
Yes  
  
No
  - prompt-engineering training  
Yes  
  
No
  
5. **Does the University have training for faculty:**
  - Intro to GenAI  
Yes  
  
No
  - prompt-engineering training  
Yes  
  
No

**Notes/Comments:**



## Appendix C. Summary of key findings

[Benchmarking Summary of GAI by College of IST Oct23-Jan24.xlsx](#)

-----end of report-----