New to AI Faculty Guide: A Brief Introduction to Generative Artificial Intelligence and What It Can Do for You

Created by Hastings Initiative Members
Last Updated 8/25/2025

What is Artificial Intelligence?

Artificial intelligence (AI) is a technology that can perform complex tasks such as learning, problem-solving, and decision making. Generative AI is a type of AI that creates content like text, images, audio, and more. Large Language Models (LLMs) are a type of generative AI that generates text. Examples of LLMs that you may have heard of include ChatGPT, Claude, and Gemini. Although AI, generative AI, and LLM are often used interchangeably, it is always good to be specific in your language. This guide will focus on generative AI.

When you ask a generative AI tool, like an LLM, a question or to perform a task, it processes your input (your prompt) and generates an output based on patterns it learned from the huge amounts of data it was trained on. It is important to understand that LLMs do not "know" things in the way humans do. Rather, they simply predict what text should come next based on statistical patterns in their training data. As such, the quality, quantity, and diversity of training data determines how well the LLM performs. This is why AI companies are constantly seeking more and better training data to improve their model's performance and capabilities.

Now that you have been introduced to the basics of generative AI, the following sections focus on potential practical applications of generative AI in your academic work. This guide includes important ethical considerations, examples of how you can use generative AI tools to support your teaching and research, provides tips for getting started, and shares resources for continued learning.

Critical Considerations:

It is important to consider not just how you can use AI, but *if* you should in a specific context considering the things below.

- **Environmental Impact**
  - Data centers built to handle the computational demands of generative AI require huge amounts of energy to run and fresh water to cool the systems[1]
  - Generating visual content requires significantly more energy than generating text[2]
  - *Consider whether it is necessary to use AI for a task*
- **Data Privacy**
  - Be mindful of what you share with AI

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[1] Shehabi, A., Smith, S.J., Hubbard, A., Newkirk, A., Lei, N., Siddik, M.A.B., Holecek, B., Koomey, J., Masanet, E., Sartor, D. *2024 United States Data Center Energy Usage Report,* 2024. https://eta-publications.lbl.gov/sites/default/files/2024-12/lbnl-2024-united-states-data-center-energy-usage-report.pdf?utm_source=substack&utm_medium=email.

[2] Luccioni, A. S., Jernite, Y., & Strubell, E. "Power Hungry Processing: Watts Driving the Cost of AI Deployment?" *ACM Conference on Fairness, Accountability, and Transparency (ACM FAccT '24), June 3–6, 2024.* https://doi.org/10.1145/3630106.3658542.

- ○ Often generative AI settings are by default not private, and the tool will likely learn from your prompts
  - ○ Different tools have different levels of data privacy and security
- **Bias from Outputs**
  - ○ Generative AI can perpetuate biases present in training data, which, for many LLMs, is all publicly available content on the internet
- **Hallucinations**
  - ○ LLMs are statistical models that predict the next word based on patterns in training data, which can lead to false information or citations that appear credible
  - ○ Always validate AI outputs, including information and sources, using reliable references
- **Transparency**
  - ○ Be open about your generative AI use with students, colleagues, and in your scholarly work
  - ○ Disclose your use of AI in course materials: read about the consequences of undisclosed AI use by professors in *The New York Times*[3] article "College Professors Are Using ChatGPT and Some Students Aren't Happy About It"
  - ○ Some citation styles, like MLA, APA, and Chicago, provide guidance on how to cite generative AI. If you have citation questions, reach out to Beth Hoppe at the library

What can Generative AI Do for You?
Teaching Applications:
Always carefully review and adapt AI-generated materials to ensure they meet your pedagogical needs and standards.

Note: The list of example generative AI tools is not comprehensive and may change rapidly.

Course Design and Preparation
LLMs can serve as thought partners to help make course planning more efficient.

Example Tools:
- Claude (AI chatbot/assistant)
- ChatGPT (AI chatbot/assistant)
- Gemini (AI chatbot/assistant)
- Perplexity (AI search engine)

Practical Applications:
- **Assignment Design**: Create assignment prompts and criteria for evaluation
- **Generate Case Studies and Examples:** Develop relevant examples to illustrate key concepts
- **Create Study Guides:** Generate review materials tailored to your content

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[3] You have access to *The New York Times* through the Bowdoin library.

- **Rubric Development:** Build and customize evaluation criteria
- **Simulate Student Questions:** Anticipate what students might ask to prepare better responses

Example Prompts:
- "Generate a realistic case study about [topic] that illustrates important ideas about [key concepts]."
- Upload reading materials: "I'm teaching [topic] to [course level] students. What questions might they ask about [specific concept or part in reading]? Include both clarifying questions and challenging questions."

Research and Content Curation
LLMs, as well as other AI-enhanced academic search engines, can act as your research assistant to find content.

Example Tools:
- Claude (AI chatbot/assistant)
- ChatGPT (AI chatbot/assistant)
- Gemini (AI chatbot/assistant)

Example Research Specific Tools:
- NotebookLM (AI research assistant)
- Perplexity (AI powered search engine)
- Undermind (AI research assistant)
- Semantic Scholar (AI academic search engine)
- Consensus (AI academic search engine)

Practical Applications:
- **Literature Discovery:** Find recent scholarly articles about a specific topic
- **Multimedia Resource Discovery:** Find videos, podcasts, websites, etc. to supplement readings

Example Prompts:
- Upload readings: "Suggest 3 multimedia resources (videos, podcast, websites) that could supplement these readings"

Supporting Diverse Learning Styles
LLMs can help you create multiple pathways to the same learning goals.

Example Tools:
- Claude (AI chatbot/assistant)
- ChatGPT (AI chatbot/assistant)
- Gemini (AI chatbot/assistant)

Practical Applications:
- **Multiple Explanations:** Create different explanations of the same concept
- **Accessible Content:** Adapt materials for different learning needs and backgrounds

Example Prompts:
- "Explain [concept] in three different ways: [e.g. using real-world examples, using analogies]"
- "Explain [concept] for students with different preparation levels: one explanation for students new to [area], and one for students with some background in [area]"

Visual Content Creation
Generative AI can create custom content such as images, presentations, and videos.

Environmental Awareness Reminder: Visual content creation using generative AI is significantly more energy-intensive than text generation.

Example Image Creation Tools:
- [Adobe Firefly](#) (Bowdoin provides access through Adobe Creative Cloud)
- [DALL-E 3](#)
- [Canva Magic Studio](#) (images, presentations, even videos for Pro version)

Example Presentation Creation Tools:
- [Beautiful.ai](#) (AI presentation maker)
- [Gamma](#) (AI presentation, website, and social media post creator)
- [Plus AI](#) (AI presentation tool you use within Google Slides or PowerPoint)

Example Video Creation Tools:
- [Veo 3](#) (AI video generator)
- [Sora](#) (AI video generator, edit videos with Remix)
- [Runway](#) (AI video generator)

Practical Applications:
- **Course Material Illustrations:** Create custom content to illustrate concepts, events, scenes, etc.
- **Presentation Enhancement:** Generate slide designs, layouts and visuals

Example Prompts:
- "Create a slide template for a presentation about [topic] that includes [design elements]. The style should be [e.g. professional, minimalist, creative]"

Research Applications:
Generative AI Research tools can provide a starting point, but they are not replacements for your research expertise.

Privacy Note: There is no guarantee that papers you upload to generative AI tools will not be used to further train AI models. Review each tool's privacy policy and data handling practices before uploading sensitive material.

Literature Review and Finding Papers
Generative AI can help you find papers based on your research question or papers you upload.

Example Tools:
- [Perplexity](#) (AI search engine that includes source citations)
- [Connected Papers](#) (search for papers and create visuals to find similar research)
- [Undermind](#) (refine your research question and find academic sources)
- [Semantic Scholar](#) (AI academic search engine)
- [Consensus](#) (AI academic search engine)
- [Research Rabbit](#) (maps relationships between similar works)
- [Keenious](#) (recommends academic articles based on papers you upload)

Practical Applications:
- **Literature Searches:** Find relevant papers across databases
- **Gap Identification:** Discover under-researched areas
- **Interdisciplinary Connections:** Find research from adjacent fields to inform your work

Example Prompts:
- "Help me find recent scholarship on [topic] published in the last [time period]. Focus on work that examines [specific aspect]"

Document Analysis and Synthesis
AI-powered tools can help you analyze papers and synthesize information.

Example Tools:
- [Claude](#) (upload documents and synthesize information from multiple sources)
- [NotebookLM](#) (upload sources such as PDFs, websites, YouTube videos, etc. to summarize and synthesize information)
- [Scholarcy](#) (summarizes key points of articles)

Practical Applications:
- **Comparative Analysis:** compare multiple sources, identifying themes and contradictions
- **Content Summarization**: summaries of complex academic works to determine if the work is relevant

Example Prompts:
- Upload multiple papers: "Compare these sources on [topic]. Identify any areas of agreement, disagreement, and any gaps in the current scholarly conversation."

Getting Started

Experiment with different tools and see what works for you. Many of these tools have free versions and paid versions. It can be helpful to explore the free versions before deciding which would be useful to have a subscription.

Tips for Using Generative AI:
- **Be specific in your prompting**
  - Provide context about your audience, the purpose, etc.
  - Be specific about the format you want your results to take (bulleted list, paragraphs, etc.)
- **Iterate your prompts**—use your critical thinking to ask models to go deeper, or try another approach
- **Try different models** as each has different strengths
  - Use multiple tools for research as different tools have access to different databases
- **Break complex tasks into smaller steps**
- **Use AI to assess outputs**—try having one AI evaluate another AI's work, or ask an AI to critique its own response
- **Fact check**: AI can make things up (hallucinate)
  - Always verify sources and citations as these tools can make mistakes with academic sources in particular

Other Resources

Bowdoin Resources
- The Hastings Initiative's [AI Glossary: From Basic to Technical Terms](#)
- Bowdoin Library's [AI guide](#)
  - Provides basic information about AI like definitions in the Getting Started Tab and links to other readings and resources
- Bowdoin's [generative AI guide](#)
  - Basic overview of ethical considerations and institutional guidelines under Ethical Considerations and Guidelines page
- IT's [Guidelines and Starting Points for Use of Generative AI tools](#)
  - Overview list of Institutional Guidelines and Important Considerations when using these tools

External Resources
- [TextGenEd: Teaching with Text Generation Technologies](#)
  - Includes ideas about how faculty can design assignments that involve students using AI in different contexts
  - Examples of assignments also can be good for thinking more critically about why they're using AI in the assignment. Is "just for fun" a good reason considering the environmental impacts, for example?
- [Talking about Generative AI: A Guide for Educators 2.0](#)

- ○ Guidance for educators and administrators on generative AI and institutional policies, teaching, assessments, and more
- Georgetown's [AI Toolkit](#)
  - ○ Provides a guide for different ways to use AI and example prompts:
- Georgetown's [AI Research Resources](#)
  - ○ Provides an overview of various AI research tools to help select which is best for your use
- Harvard Graduate School of Education Creative Computing Lab's [Generative AI in Student-Directed Projects: Advice and Inspiration](#) guide
  - ○ Gives many examples of how generative AI can be implemented thought different phases of a project