# Coursework and GenAI: A Practical Guide for Students

# Use Module

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| **Remember! If you have any questions or doubts about whether you should use GenAI in your assignments or other academic work, always contact your course instructor or graduate supervisor for clarification.** |

## Recommended Tools at UofT

When choosing an AI tool or platform, consider using those recommended by UofT. These tools provide several advantages to non-approved tools, including:

* Guardrails that prioritize security, privacy and vendor/provider accountability
* Protection of user data in the U of T account's Microsoft Copilot to ensure that information from users' prompts is not collected for training purposes.
* Ease of use/access due to institutional support, configuration for teaching and learning context
* Equitable access for all without user subscription fees
* Greater predictability of services provided

Read more about [AI tools within and beyond U of T’s protected environment](https://teaching.utoronto.ca/teaching-uoft-genai/genai-tools/).

UofT recommended tools undergo review processes to ensure your privacy and security of data. The [University of Toronto's guidelines on using artificial intelligence](https://security.utoronto.ca/governance/guidelines/use-ai-intelligently/) site emphasizes the importance of recognizing the potential for incorrect results and misinformation generated by AI systems. They advise users to verify AI-generated content carefully and be aware of privacy and information security risks associated with sharing data with AI systems.

## Copyright and Citation

Understanding copyright considerations and the importance of citing sources is essential to maintain academic integrity and respect for intellectual property. Proper citation not only enhances the credibility of academic work but also ensures legal compliance and promotes ethical use of AI tools. These considerations include all media formats, including image and audio resources.

UofT libraries have two excellent resources on these topics:

 **Generative AI tools and Copyright guidance**

The [University of Toronto Libraries page on generative AI tools and copyright](https://onesearch.library.utoronto.ca/copyright/generative-ai-tools-and-copyright-considerations)t considerations discusses the evolving impact of generative AI on teaching, learning, and research. It highlights the legal uncertainties surrounding the use of copyright-protected content in AI model training and the complexities of authorship and ownership of AI-generated works. The page also provides guidance on using library-licensed e-resources and openly licensed materials with generative AI tools.

**Citing Artificial Intelligence (AI) Generative Tools (including ChatGPT)**

The [University of Toronto Libraries page on citing AI](https://guides.library.utoronto.ca/c.php?g=251103&p=5296636) offers resources on how to appropriately cite AI-generated content in various citation styles (MLA, APA, and Chicago), noting that citation rules are still evolving and may vary by professor. For detailed guidance, students are encouraged to refer to specific university resources and confirm expectations with their instructors.

## Example Use Cases for Learning

Before exploring example use cases for teaching and learning, consider reviewing the issues of using AI responsibly and AI’s potential for errors from the *Evaluate* module.

The following are general examples that can be customized for various learning contexts and disciplines. Several examples are provided but are not an exhaustive list.

1. **Ideation and Brainstorming:** Generative AI can help you generate ideas for projects, essays, and assignments. By providing prompts and suggestions, AI can stimulate creativity and help with exploring different perspectives and approaches.

Examples:

* Literature and Creative Writing: In a creative writing course, students could use AI to generate unique story ideas or explore different narrative styles.
* Business and Economics: In business courses students could use AI to brainstorm innovative business strategies or analyze market trends.
* Engineering: In a mechanical engineering course, AI could suggest improvements to a design or generate ideas for new projects based on current technological trends.
* Medicine and Health Sciences: In a medical research course, students could use AI to explore new approaches to treating a disease.
1. **Personalized Learning**: AI can tailor learning experiences to individual needs, preferences, and learning styles. Some platforms can adjust the difficulty of tasks based on your skill level, providing personalized feedback and recommendations.

Examples:

* Computer Science: If you are struggling with a specific concept or function, the platform can provide additional practice and resources on that topic, gradually increasing the complexity as you improve.
* Language Learning: If a student has difficulty with verb conjugations, the platform can offer targeted exercises and feedback.
* Psychology: If a student is interested in clinical psychology, the platform can provide more case studies and research articles related to mental health disorders and treatments.
* Business : If a student is interested in entrepreneurship, the platform can offer scenarios related to startup management and innovation.
1. **Coding and Programming Assistance:** Tools like Copilot can assist you with coding tasks by suggesting code snippets, debugging, and offering solutions to programming problems. If permitted by your instructor, this can support development of coding skills.

Examples:

* Computer Science: If you are working on a project involving machine learning, the platform can suggest algorithms and help optimize code for better performance.
* Data Science: If you are analyzing a large dataset, the platform can suggest efficient ways to clean and preprocess the data, as well as provide code for creating insightful visualizations.
* Psychology: If you are conducting a study on cognitive behavior, the platform can help with coding tasks related to data collection, analysis, and visualization, provided the source data is not confidential.
* Environmental Science: If you are working on a project to model the impact of pollution on a local ecosystem, the platform can suggest code for data analysis and simulation.
1. **Formative Assessment/Tutoring:** AI can automate the creation of self-quizzes and act like a tutor to provide feedback on a specific subject area, checking or growing your foundational knowledge.

Examples:

* Use to ask questions related to a midterm
* Ask for clarification on key concepts
1. **Research and Data Analysis:** Generative AI can assist with analysis of large datasets, identifying trends, and generating insights that can inform research projects.

Examples:

* Medicine and Health Sciences: Use AI to analyze electronic health records to identify patterns in patient outcomes, which can inform clinical practices and improve patient care.
* Biology: In a genetics course, use AI to analyze DNA sequences to identify mutations associated with specific diseases, aiding in the development of targeted therapies.
* Business and Management: Use AI to analyze sales data from various regions to identify factors driving consumer preferences, which can inform marketing strategies and business decisions.
* Engineering: Use AI to analyze data from stress tests on materials, identifying patterns that can inform the design of more durable structures.
1. **Editing and Proofreading:** AI-powered tools can help with editing and proofreading your written work. These tools can suggest improvements in grammar, style, and coherence for written content.

Examples:

* Social Sciences: In disciplines like psychology and sociology, students write research papers and essays. AI tools can help improve the clarity and coherence of their arguments, ensuring that their writing is well-organized and free of grammatical errors.
* Art and Design: Art and design students may need to write project proposals and artist statements. AI tools can help ensure that their writing is clear and persuasive, suggesting ways to improve the presentation of their ideas and ensuring that their writing is free of errors.
* Environmental Science: Environmental science students often write research papers and project reports. AI tools can help ensure that their writing is clear and well-structured, suggesting improvements in the presentation of data and ensuring that their terminology is used correctly.
* Engineering: Engineering students may need to write technical reports and project documentation. AI tools can help ensure that their writing is precise and free of jargon, making complex technical information more accessible and understandable.
1. **Image Generation and Analysis:** Gen AI can assist students as they explore image input and output features, including analyzing images or creating images based on text descriptions.

Examples:

* Art and Design AI: In a graphic design course, students can use AI to generate visual concepts for a project, exploring different styles and compositions.
* Biology: Students can use AI to analyze cell images to detect abnormalities, aiding in research on diseases and treatments.
* Environmental Science: In an environmental science course, students can use AI to track deforestation or monitor the health of coral reefs over time.
* Archaeology: Students can use AI to identify and classify artifacts, helping to uncover historical insights and patterns.

## Writing Effective Prompts

As you fine tune your prompt writing, consider reviewing what a large language model is and how it works from the *Understand* module [link to module page]. Generative AI tools are trained on large sets of data, and they create models based on these sources. When you give an AI tool a prompt, it uses the data model to generate a response. However, it is important to approach prompt-writing as an iterative process that may require critical thinking and several adaptations to hone results. The following are tips for effective prompt writing:

**Start with basic information:**

* Be clear and specific.
* Provide relevant context and background information.
* Provide examples.

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| 3 Ps (Persona, Purpose, Parameters)This framework for crafting prompts can be applied in any context. **Example: Psychology*** *Provide a Persona:* You are a psychology student.
* *Provide a Purpose:* You are developing a research paper on cognitive behavioral therapy (CBT) for your course.
* *Outline Your Parameters:* Write a prompt to generate a research paper outline. Start with a brief paper description. Include five research objectives, following Bloom’s taxonomy. List the main sections of your paper, ensuring they build on each other sequentially.

**Example: Biology*** *Provide a Persona:* You are a biology student.
* *Provide a Purpose:* You are studying for an upcoming exam on human body systems and want to deepen your understanding of the circulatory system.
* *Outline Your Parameters:* Write a prompt that will help you generate a study guide. The study guide should include labeled diagrams, definitions of key components (e.g., heart, arteries, veins, capillaries), and a comparison chart showing how the circulatory system interacts with the respiratory and digestive systems. The guide should be concise, under 1000 words, and structured to support active recall and spaced repetition.
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Another option is the [CLEAR framework](https://guides.library.ualberta.ca/generative-ai/how-to-use%29) (**C**lear, **L**ogical, **E**xplicit, **A**daptive, **R**eflective), also useful for refining your prompts

### Limitations

If your prompts are still not providing you with the responses you are looking for, consider that there are limitations in large language models. To help you get the best results, keep these common challenges in mind and adjust your prompts accordingly:

**Ambiguity:** If a prompt is vague or unclear, the AI might struggle to generate a relevant or coherent response. Clear and specific prompts usually yield better results.

**Context:** AI models rely heavily on the context provided in the prompt. If the context is insufficient or missing, the AI might produce responses that are off-topic or irrelevant.

**Complexity:** Highly complex or multi-part prompts can confuse the AI, resulting in incomplete or fragmented responses. Breaking down complex queries into simpler parts can help.

**Technical Limitations:** AI models have limitations in understanding and generating certain types of content, such as highly technical or specialized information. Prompts requiring deep expertise might not always be accurately addressed.

**Length:** Extremely long prompts can overwhelm the AI, leading to less coherent responses. Keeping prompts concise and focused is generally more effective.

### Chain-of-Thought Reasoning

Chain-of-Thought Reasoning (CoT) prompts LLMs to break down complex problems into smaller, step-by-step reasoning tasks before providing a final answer. Instead of immediately giving an answer, first ask the chatbot to explain its reasoning clearly.

Consider using chain of thought reasoning to solve a problem, such as working through steps in math or logic, analyzing causes and effects, or explaining a process in stages.

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| Explore and reflect: Chain of Thought prompting To understand how prompting an LLM to “show its reasoning” improves the quality of its answers, especially for logic or math problems, follow these steps:1. Provide a logic puzzle to the model twice:
* Once with a direct question
* Once with a Chain-of-Thought instruction like “Think through this step-by-step.”

*Examples:*If there are 3 red balls and 2 green balls in a bag, and you pull out one ball without looking, what is the probability it is red? Give me the answer and no further reasoning. *If there are 3 red balls and 2 green balls in a bag, and you pull out one ball without looking, what is the probability it is red?* Solve this step by step. Work through each part of the problem before giving a final answer.Compare the answers and reflect on which is correct or more useful.  |

## Pause for Reflection

### How do prompts affect outputs?

If you have used GenAI as a support to your academic work, think of a recent time when you used the chatbot, consider the following about the prompts you submitted:

* What strategies did you find most effective when writing prompts?
* How did the clarity and specificity of your prompts affect the responses you received?
* How did the context and background information you provided influence the AI's responses?
* Reflect on a prompt that didn't yield the desired result. What could you change to improve it?

## Three Takeaways

1. Recommended AI tools at the University of Toronto prioritize security, privacy, and equitable access for all students.
2. Understanding copyright and proper citation is essential for maintaining academic integrity and respecting intellectual property.
3. GenAI can assist with a range of tasks, including ideation, personalized learning, coding, formative assessment, research, editing, and image generation across various academic disciplines.

# References [**Generative AI Tools and Copyright Considerations**](https://onesearch.library.utoronto.ca/copyright/generative-ai-tools-and-copyright-considerations) (University of Toronto Libraries)

[**Citing Artificial Intelligence Generative Tools**](https://guides.library.utoronto.ca/c.php?g=251103&p=5296636) (University of Toronto Libraries)

[**Use Artificial Intelligence Intelligently**](https://security.utoronto.ca/governance/guidelines/use-ai-intelligently/) (University of Toronto)

[**CLEAR (Clear, Logical, Explicit, Adaptive, Reflective) Framework -** To refine your prompts](https://guides.library.ualberta.ca/generative-ai/how-to-use) (University of Alberta)

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