

BASIC PROMPT ENGINEERING WITH CHATGPT: AN INTRODUCTION

MODULE 2: Prompt formulation and refinement

OVERVIEW

In this module, we dive into two critical aspects of prompt engineering: prompt formulation and refinement. A well-crafted prompt is the key to unlocking the full potential of language models like ChatGPT, and in this module, you will learn the techniques and best practices for designing effective prompts that lead to desired outputs.

In this module, we will begin by exploring the fundamentals of prompt formulation, including how to structure your prompts, set the right context, and ask clear, concise questions. As we delve into these principles, you will learn how to harness the power of large language models to generate accurate and useful responses. You will also discover the importance of iterative refinement, a process that involves fine-tuning and tweaking your prompts to improve their performance and achieve the desired results.

We will also explore the role of creativity and experimentation in prompt engineering, encouraging you to explore diverse approaches and strategies. By understanding the significance of feedback loops, you'll be able to make informed decisions about when and how to adjust your prompts. By the end of Module 2, you will have gained valuable insights into prompt formulation and refinement, enabling you to create impactful and effective prompts for a wide range of applications.

This is a long module. In fact it's the longest module in the course! While you may be able to finish it in as little as 5 – 6 hours it may take you up to 8 hours to complete.

LEARNING OBJECTIVES

By the end of this module you will be able to:

- 2.1. Describe what prompt formulation and prompt refinement are
- 2.2. Apply ambiguity reduction in formulating prompts
- 2.3. Apply constraint-based prompting to specific tasks
- 2.4. Demonstrate comparative prompt formulation

FLOW

OVERVIEW

Intro blurb (above)

Intro video:

- Now that we have a basic understanding of LLMs we'll get into the mechanics of effective prompt engineering
- Important to understand that we are approaching this from the perspective of using a language-based interface to get the most out of ChatGPT
- This is the power of AI bots like ChatGPT – rather than coding in languages like Python and others, anyone can “code” through human like conversations.
- In this way, prompt engineering is like developing the skills to work with colleagues and team members ... except that ChatGPT has access to more information and is more adept at using this than most individuals. Limitatons notwithstanding, it's like a colleague, team mate, advisor, mentor, and consultant on steroids.
- In this module you'll be exploring concepts such as ambiguity reduction, constraint-based prompting, and comparative prompt engineering. You'll also have the opportunity to learn through experimentation.

ADDITIONAL INFORMATION:

In this module, we will pay especial attention to three key techniques in prompt engineering: Ambiguity Reduction, Constraint-based Prompting, and Comparative Prompt Engineering. These methods can help improve the effectiveness of prompts, leading to more accurate, relevant, and useful responses from language models like ChatGPT.

1. **Ambiguity Reduction:** Ambiguity in prompts can lead to unclear or vague responses from language models. By reducing ambiguity, you can guide the model towards generating more specific and relevant outputs. You will explore strategies for crafting clear and concise prompts, setting the right context, and specifying the desired response format to minimize ambiguity and improve the overall quality of generated text.
2. **Constraint-based Prompting:** This technique involves adding constraints or conditions to your prompts, helping the language model focus on specific aspects or requirements when generating a response. You will explore various types of constraints, such as limiting response length, specifying response structure, or providing explicit instructions. By understanding how to incorporate constraints effectively, you can create prompts that generate more focused and tailored outputs.
3. **Comparative Prompt Engineering:** This method involves formulating prompts that ask the large language model to compare or rank options rather than generating a standalone

response. Comparative prompts can help improve the quality and reliability of model outputs by leveraging the model's (apparently emergent) ability to reason about the relative merits of different choices. You will explore best practices for crafting comparative prompts as well as the benefits and potential challenges associated with this approach.

By learning about Ambiguity Reduction, Constraint-based Prompting, and Comparative Prompt Engineering, you will gain valuable insights into the art of prompt engineering. These techniques will empower you to create more effective prompts that elicit accurate, relevant, and useful responses from language models across various tasks and domains.

EXERCISE: Prompt Exploration (10 points)

This exercise is designed to allow you to play around with how the way a prompt is crafted can affect the output of ChatGPT. You are encouraged to experiment and play with ChatGPT in this exercise.

- Open a chat session with ChatGPT, making sure that you are in GPT-4 mode.
- Choose one or more of the following topics, or select your own:
 - Explain how blockchain works
 - Develop the outline for an essay
 - Explore the meaning of life
 - Create a new recipe
 - Develop a pitch for a new business
 - Create a marketing campaign for a personal care product
- Using the topic as your starting point, create a single prompt that asks ChatGPT to complete a specific task.
- Using new chat sessions, try at least 10 different iterations of the prompt and explore how the response changes.
- Confirm that you have completed the exercise below

You should spend no more than an hour on this exercise.

You will be given full points for completing this exercise. Points may be removed at a future date if it appears that you did not spend as much time and effort as expected on the exercise.

EXERCISE: Ambiguity Reduction (20 point)

This exercise is designed to help you better-understand how to reduce ambiguity in prompts. It starts by exploring how to clarify a series of ambiguous prompts to increase the quality, specificity and usefulness of ChatGPT outputs. Following this you will spend some time working

with ChatGPT to better-understand how to reduce ambiguity. The exercise it finishes with a short ChatGPT-administered quiz.

Ambiguity in prompts can lead to unclear or vague responses from language models. By reducing ambiguity, you can guide the model towards generating more specific and relevant outputs. You will explore strategies for crafting clear and concise prompts, setting the right context, and specifying the desired response format to minimize ambiguity and improve the overall quality of generated text.

The whole exercise should take no longer than 1 – 2 hours.

Basic ambiguity reduction (5 points)

- Open a session with ChatGPT in GPT-4 mode
- Select one of the following prompts:
 - Design a green solution
 - Write a story about time
 - Explain the importance of balance
 - Discuss the impact of development
 - Describe a breakthrough
- Decide what specific outcome you would like to see from ChatGPT in relation to this prompt – do not tell ChatGPT! For instance, you may be interested in a sustainable solution to growing crops or cooling houses, or you may want to explore the importance of work-life balance – use your imagination here.
- Submit the prompt you chose above as it's written to ChatGPT
- Repeatedly refine the prompt in the same session until you get a response that aligns with the outcome you would like to see.
- If ChatGPT aligns perfectly with you first time round, congratulations! However, please play this out as if it hadn't by thinking of another outcome – the aim is to have a conversation with ChatGPT that leads to a refined prompt.
- Post documentation of your session with ChatGPT below.

You will be given full points for completing this exercise. Points may be removed at a future date if it appears that you did not spend as much time and effort as expected on the exercise.

Advanced ambiguity reduction (5 points)

- Open a new session with ChatGPT using GPT-4
- Explain to ChatGPT that you are in a course on prompt engineering and that you are studying ambiguity reduction. Have a conversation with ChatGPT about what ambiguity reduction is, examples of ambiguity reduction, what makes a prompt ambiguous, and

how ambiguity can be reduced. Use this session to learn as much as possible about ambiguity reduction. Remember, ChatGPT is not always reliable, so think about how you will evaluate the responses you get to ensure that they are reasonable.

There is no submission needed for this exercise – just acknowledge when you have finished it. However, you will need to complete it in order to successfully complete the next exercise.

Ambiguity Reduction Quiz (10 points)

- Open a new session with ChatGPT, ensuring you are in GPT-4 mode, and cut and paste the following prompt: “Hi ChatGPT. My name is [add your full name] and I am in a class where we are learning about ambiguity when crafting prompts. Please ask me five questions about ambiguity reduction. After each question, please wait for my answer before asking the next one. When you have all five of my answers, please provide an assessment of how good they are, and give me a grade from A to C.”
- You can repeat the quiz as many times as you like, and even ask ChatGPT to clarify points that you don’t understand.
- When you have achieved an “A” in a clean session with ChatGPT, confirm this below, and submit documentation of the session. Note that you will get 100% on completion, but we will be checking responses and marking any down that do not fulfill the brief.

EXERCISE: Constraint-based prompting (30 point)

This exercise is designed to help you understand and use constraint-based prompting.

Constraint based prompting involves adding constraints or conditions to your prompts, helping the language model focus on specific aspects or requirements when generating a response. You will explore various types of constraints, such as limiting response length, specifying response structure, or providing explicit instructions. By understanding how to incorporate constraints effectively, you can create prompts that generate more focused and tailored outputs.

The exercise is split into three parts: First you will explore the nature and purpose of constraint based prompting with ChatGPT. Next you will carry out an exercise called “Creative Expansion and Reduction” that helps you develop your constraint-based prompting skills. Thirdly you will develop your own example of a constrained prompt based on the previous exercises. And finally you’ll write a brief reflection on what you have learned about constraint-based prompting.

This exercise should take no longer than 1 – 2 hours.

Exploring constraint-based prompting (5 points)

- Open a new session with ChatGPT using GPT-4

- Explain to ChatGPT that you are in a course on prompt engineering and that you are studying constraint-based prompting using ChatGPT. Have a conversation with ChatGPT about what constraint-based prompting is and explore examples of constraint-based prompts. Use this session to learn as much as possible about constraint-based prompting. Remember, ChatGPT is not always reliable, so think about how you will evaluate the responses you get to ensure that they are reasonable.
- Spend around an hour on this.
- Confirm below when you have completed the exercise.

You will be given full points for completing this exercise. Points may be removed at a future date if it appears that you did not spend as much time and effort as expected on the exercise.

Creative Expansion and Reduction (10 points)

This is an exercise in developing and expanding your understanding of constraint-based prompting. It was developed by ChatGPT!

1. **Open a ChatGPT session.** Make sure you are in GPT-4 mode.
2. **Select a source text:** Choose a passage from a favorite book, article, or any other written work. This will be the base text for the exercise. Keep this to less than 300 – 500 words.
3. **Apply the first constraint - Summary:** Ask ChatGPT to generate a summary of the selected text. You should craft a prompt that guides the AI model to provide a concise summary of the source text. Consider using a word limit.
4. **Apply the second constraint - Expansion:** Next, you should ask ChatGPT to generate an expanded version of the source text by crafting a prompt that encourages ChatGPT to provide additional details, context, or explanations. You may consider also using a word limit here. Pay attention to how closely ChatGPT sticks to the constraints.
5. **Apply the third constraint - Change of perspective:** In this step, you will ask ChatGPT to rewrite the source text from a different perspective. They should create a prompt that guides ChatGPT to rewrite the text from a first-person, second-person, or third-person point of view, depending on the original perspective.
6. **Apply the fourth constraint - Genre or voice transformation:** You should now craft a prompt that guides ChatGPT to transform the source text into a different genre (such as sci-fi, fantasy, or mystery) or voice (such as a historic or fictional character). This will help you understand how constraints can be used to generate diverse outputs.

7. **Submit documentation of your session:** Submit documentation of your session with ChatGPT below.

You will be given full points for completing this exercise. Points may be removed at a future date if it appears that you did not spend as much time and effort as expected on the exercise.

Constraint-based prompt formulation (5 points)

1. Open a ChatGPT session. Make sure you are in GPT-4 mode.
2. Demonstrate your understanding of constraint-based prompt formulation by crafting a prompt that demonstrates the effective use of constraints in determining the output. Be creative in your use of constraints.
3. Submit documentation of your session with ChatGPT below.

You will be given full points for completing this exercise. Points may be removed at a future date if it appears that you did not spend as much time and effort as expected on the exercise.

Reflection (10 points)

Write a brief (200 – 300 words) reflection on what you have learned about constraint-based prompting in this module.

Reflections will get 10 points unless it is clear that little effort has been made or ChatGPT has been used.

EXERCISE: Comparative prompt formulation (30 point)

This exercise is designed to help you understand and use comparative prompt engineering. You will be given a task and asked to explore how you can formulate prompts that lead to ChatGPT providing and ranking multiple options. This exercise will encourage you to experiment with question formats, context, and instructions. You will be asked to comment on the strategies that led to the most effective prompts and any insights gained during the process.

This exercise should take no longer than 1 – 2 hours.

Comparing options and analyses (15 points)

1. **Open a ChatGPT session.** Make sure you are in GPT-4 mode.
2. **Choose a topic.** Select a topic that is relevant to your field of study or an area of interest. Make sure it has at least two distinct options or aspects that can be compared.
3. **Formulate a traditional prompt:** Create a traditional prompt related to your chosen topic, and ask ChatGPT to provide an answer or suggestion. For instance, “Which renewable energy source is better: solar or wind?” or “Who is the better writer, Jane Austin or George Elliot?” (These are just examples – use your own prompt)
4. **Transform into a comparative prompt:** Modify your prompt from above to focus on comparing and ranking the options or aspects based on specific criteria. For instance, “Compare and rank solar and wind energy sources based on their efficiency, environmental impact, and cost-effectiveness.” Or “Compare Jane Austen and George Elliot based on their style and social relevance.” (These are just examples – use your own prompt)
5. **Evaluate the responses:** Assess the generated responses, considering the following points: a) Which prompt generated a more informative and useful response? b) How did the comparative prompt help guide ChatGPT's reasoning and focus on the specific criteria? c) Were there any limitations or challenges associated with the comparative prompt?
6. **Iterate and refine:** Based on your evaluation, refine your comparative prompt if necessary and test it again with ChatGPT. Repeat this process until you are satisfied with the response quality.
7. **Submit documentation of your session:** Submit documentation of your session with ChatGPT below.

You will be given full points for completing this exercise. Points may be removed at a future date if it appears that you did not spend as much time and effort as expected on the exercise.

Ranking options and explainability (15 points)

1. **Open a ChatGPT session.** Make sure you are in GPT-4 mode.

2. **Choose a topic.** Select a topic that is relevant to your field of study or an area of interest. Make sure it has at least three or four distinct options or aspects that can be compared. This can be the same as the topic in the previous assignment.
3. **Formulate a ranking prompt.** Create a prompt that asks ChatGPT to rank aspects of your topic against a specific criteria. For instance “List in order of potential habitability the planets of the solar system” or “Rank the sustainability of various forms of transportation from most to least” (these are just examples).
4. **Explainability.** Ask ChatGPT to explain the reasoning behind the ranking. If you disagree with it, ask for further clarification.
5. **Submit documentation of your session:** Submit documentation of your session with ChatGPT below.

You will be given full points for completing this exercise. Points may be removed at a future date if it appears that you did not spend as much time and effort as expected on the exercise.

ASSIGNMENT: Reflection (10 point)

Write a 300 – 500 word reflection on what your key takeaways are from this module and what you have learned with respect to prompt formulation and refinement. Do not use ChatGPT to write your response!