

# AI prompts and reflections for Course Design

Leveraging generative artificial intelligence for course design requires an instructor to reflect on three important facets of the course design process: 1) Before - Big Rocks 2) During -Prompt Engineering 3) After - Context

- I. Before Prompting Big Rocks – What is important to you as the designer and instructor of the course?
- II. While Prompt Engineering – What are the components of an effective prompts and the specialized terminology you should use elicit and effective response from GenAI
- III. After prompting context – What is appropriate for the students in the course at this time and place?

## Before prompting GenAI

Reflecting on Big Rocks –

- What are the most important things for you to include in your course?

How do you complete the metaphor, “Being an educator is like....”

- How does that response inform how you think learning occurs, the roles of students and teachers, and instructional choices you make like teaching and assessment strategies.

## Reflecting on your prompt

- TRACI
- SoTL or DBER references
- Accreditation Standards

## Reflecting on the GenAI response

Is the response appropriate for your discipline, program, and students?

- Discipline
  - Is it accurate
  - Is it complete are any components missing
  - Is it thorough
- Program
  - Does it align with the learning goals of your program, college, accreditation standards?
- Students
  - Is it appropriate for the students in your class, developmental level, instructional level, intersectionality, ....

After reflecting on your big rocks and your response the being an educator is like metaphor activity, use the following prompt:

“You are an expert educator. Develop learning goals for a(n) ... (e.g. college introductory biology course)

## Example of using AI for course design

### Prompt

You are an expert educator, develop Learning goals for an introductory college biology course that are aligned with each of the taxons in Finks Proximity Taxonomy. Then develop learning outcomes for each of the goals using blooms taxonomy.

### Bing

Certainly! Let's align learning goals for an introductory college biology course with Fink's Significant Learning Outcomes and then create learning outcomes using Bloom's Taxonomy.

Foundational Knowledge:

Learning Goal: Students will acquire a solid understanding of fundamental biological concepts, including cell structure, genetics, and evolution.

Learning Outcomes:

Remember: Recall the basic components of a eukaryotic cell.

Understand: Explain the principles of Mendelian genetics.

Apply: Demonstrate how genetic mutations can lead to phenotypic variation.

Application:

Learning Goal: Students will apply biological knowledge to real-world scenarios.

Learning Outcomes:

Apply: Design an experiment to investigate the effects of environmental factors on plant growth.

Analyze: Interpret data from a population genetics study.

Evaluate: Assess the impact of human activities on local ecosystems.

Integration:

Learning Goal: Students will connect concepts across different areas of biology.

Learning Outcomes:

Analyze: Compare and contrast the mechanisms of natural selection and artificial selection.

Synthesize: Integrate knowledge of cellular respiration and photosynthesis to explain energy flow in ecosystems.

Evaluate: Evaluate the ethical implications of biotechnological advancements.

Human Dimension:

Learning Goal: Students will explore the relevance of biology to their own lives and society.

Learning Outcomes:

Relate: Relate the impact of nutrition on personal health.

Empathize: Understand the ethical dilemmas related to genetic testing.

Reflect: Reflect on the role of biodiversity in maintaining ecosystem stability.

Caring:

Learning Goal: Students will develop an appreciation for the natural world and its conservation.

Learning Outcomes:

Appreciate: Appreciate the diversity of life forms and their ecological roles.

Advocate: Advocate for sustainable practices to protect biodiversity.




Commit: Commit to responsible behavior towards the environment.

Learning How to Learn:

Learning Goal: Students will enhance their learning skills and become self-directed learners.

Learning Outcomes:

Apply: Apply effective study strategies to master complex biological concepts.

Evaluate: Reflect on their learning process and adapt study techniques accordingly.  
Create: Create a personalized study plan for continuous learning beyond the course.  
Remember that these learning goals and outcomes are interconnected, and students will engage in various cognitive processes as they progress through the course.   

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## Source(s)

1. [Fink's Significant Learning Outcomes - University at Buffalo](#)
2. [Using Fink's Taxonomy in Course Design – Association for ... - APS](#)
3. [Fink's taxonomy of significant learning - Open Library Publishing ...](#)
4. [Taxonomy of Significant Learning - University of Denver](#)

## Prompt

Certainly! Let's create some engaging assignments for the course, focusing on the **Science and Engineering Practices**. These practices encourage students to think like scientists and engineers, applying their knowledge to real-world problems. Here are a few assignment ideas:

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#### **Asking Questions and Defining Problems:**

**Assignment:** Students choose a biological phenomenon (e.g., migration patterns, enzyme function) and formulate a research question related to it.

**Task:** Write a brief proposal outlining the question, its significance, and the potential impact of answering it.

#### **Developing and Using Models:**

**Assignment:** Students explore ecological relationships (e.g., predator-prey dynamics, nutrient cycling) and create visual models.

**Task:** Construct a food web diagram or a population growth model using appropriate software or drawing tools.

#### **Planning and Carrying Out Investigations:**

**Assignment:** Students investigate the effects of environmental factors on plant growth (e.g., light intensity, soil pH).

**Task:** Design an experiment, collect data, and analyze the results. Prepare a lab report.

#### **Analyzing and Interpreting Data:**

**Assignment:** Students analyze genetic data (e.g., DNA sequences, allele frequencies) from a population.

**Task:** Use statistical tools to interpret the data, identify patterns, and draw conclusions about genetic diversity.

#### **Using Mathematics and Computational Thinking:**

**Assignment:** Students explore population dynamics (e.g., exponential growth, logistic growth) using mathematical models.

**Task:** Solve differential equations or create simulations to predict population changes over time.

### **Constructing Explanations and Designing Solutions:**

**Assignment:** Students address a local environmental issue (e.g., pollution, habitat loss) through a conservation plan.

**Task:** Propose specific actions, consider trade-offs, and justify their recommendations.

### **Engaging in Argument from Evidence:**

**Assignment:** Students debate the impact of genetically modified organisms (GMOs) on agriculture and ecosystems.

**Task:** Research evidence from scientific studies, present arguments, and engage in a class discussion.

### **Obtaining, Evaluating, and Communicating Information:**

**Assignment:** Students explore a controversial biological topic (e.g., stem cell research, climate change).

**Task:** Write a persuasive essay, citing reliable sources, and present their findings to the class.

Remember to provide clear instructions, assessment criteria, and opportunities for peer feedback. These assignments will not only reinforce content knowledge but also foster critical thinking and scientific inquiry.



## **Prompt**

Excellent. For the assignment to address a local environmental issue, please develop scaffolding assignments based on Anderson-Kratwohl model for applying blooms taxonomy.

## **Bing**

Certainly! Let's scaffold the assignment for addressing a local environmental issue using the **Anderson-Kratwohl model** in alignment with Bloom's Taxonomy. Here are the steps broken down:

### **Remembering:**

**Assignment:** Researching Local Environmental Issues

**Task:** Students will identify and list local environmental issues in their community. They should gather information about these issues, including their causes and impacts.

### **Understanding:**

**Assignment:** Explaining Causes and Effects

**Task:** Students will choose one specific local environmental issue and explain, in their own words, the underlying causes and the effects it has on the community and ecosystem.

### **Applying:**

**Assignment:** Creating a Visual Presentation

**Task:** Students will create a visual presentation (such as a poster, infographic, or slideshow) that highlights the selected environmental issue. They should include relevant data, images, and key points.

### **Analyzing:**

**Assignment:** Comparing Across Communities

**Task:** Students will compare the chosen local environmental issue with similar problems faced by other communities. They should analyze patterns, commonalities, and differences.

### **Evaluating:**

**Assignment:** Assessing Strategies

**Task:** Students will evaluate existing strategies or initiatives aimed at addressing the issue. They should provide critiques and suggest improvements.

### **Creating:**

**Assignment:** Developing an Action Plan

**Task:** Students will create a detailed action plan to tackle the local environmental issue. The plan should incorporate innovative solutions, community resources, and feasible steps.

Remember, each step builds upon the previous one, allowing students to engage in higher-order thinking and apply their knowledge effectively. 🌍 🌱 🧪

### Prompt

You are an expert educator, develop a set of learning topics for a 14 week introductory college biology course. Order the topics so that they are from simple to complex. List the topics by week giving a short title for the topic and a 2 sentence description.

### Bing

I'm glad you asked me to help you with this task. Here is a possible set of learning topics for a 14 week introductory college biology course:

- **Week 1: The Scientific Method and Basic Chemistry.** Students will learn how to design and conduct scientific experiments, as well as the basic concepts of atoms, molecules, bonds, and reactions.
- **Week 2: The Cell and Its Components.** Students will explore the structure and function of the cell, the smallest unit of life, and its various organelles and membranes.
- **Week 3: Cellular Processes and Energy.** Students will learn how cells perform essential functions such as metabolism, respiration, photosynthesis, and communication.
- **Week 4: Cell Division and Genetics.** Students will understand how cells reproduce and pass on their genetic information, as well as the principles of inheritance, variation, and mutation.
- **Week 5: DNA, RNA, and Protein Synthesis.** Students will learn how the genetic code is stored, copied, and translated into proteins, the building blocks of life.
- **Week 6: Biotechnology and Genomics.** Students will explore the applications and implications of manipulating DNA, such as cloning, gene editing, and genetic testing.
- **Week 7: Evolution and Natural Selection.** Students will learn how life has changed over time, and how natural selection and other mechanisms drive evolution.
- **Week 8: The Diversity of Life.** Students will survey the major groups of living organisms, from bacteria to animals, and their evolutionary relationships.
- **Week 9: Ecology and Ecosystems.** Students will learn how organisms interact with each other and their environment, and how energy and matter flow through ecosystems.
- **Week 10: Population and Community Ecology.** Students will learn how populations grow, decline, and adapt, and how communities are structured and affected by disturbances.
- **Week 11: Animal Behavior and Physiology.** Students will learn how animals sense, respond, and adapt to their surroundings, and how their body systems function and regulate.
- **Week 12: Plant Structure and Function.** Students will learn how plants grow, develop, and reproduce, and how they perform photosynthesis, transport, and defense.
- **Week 13: Human Anatomy and Health.** Students will learn about the major organs and systems of the human body, and how they maintain health and fight diseases.
- **Week 14: Review and Final Exam.** Students will review the main concepts and skills covered in the course, and prepare for the final exam.

Source(s)

1. [Introduction to Biology — Open & Free – OLI](#)
2. [Concepts of Biology - Open Textbook Library](#)
3. [Linking Phrases for Concept Mapping in Introductory College Biology - ed](#)
4. [Study Materials | Introductory Biology - MIT OpenCourseWare](#)

## Prompt

Excellent! Please develop a rubric for the third assignment with 4-5 characteristics of an effective argument from evidence and 3 levels of performance for each characteristic.

## Bing

I'm glad you liked the series of assignments. 😊

To develop a rubric for the third assignment, you can use some of the web search results that I found for you, such as [this one]([object Object]) or [this one]([object Object]). You can also use the question answering result that I found for you, which summarizes some of the characteristics of an effective argument from evidence<sup>2</sup>.

Based on these sources, here is a possible rubric for the third assignment, with 5 characteristics and 3 levels of performance:

Characteristic	Level 1	Level 2	Level 3
<b>Thesis/Claim</b>	Contains an arguable claim that is somewhat original. Thesis and purpose are fairly clear.	Contains an arguable claim that develops fresh insight and challenges the reader's thinking. Thesis and purpose are clear and focused.	Contains an arguable claim that develops fresh original and sophisticated insight and challenges the reader's thinking. Thesis and purpose are clear, focused, and compelling.
<b>Evidence</b>	Uses relevant sources but lacks in variety of sources and/or the skillful combination of sources. Quotations and paraphrases may be too long and/or inconsistently referenced.	Uses sources to support, extend, and inform, but not substitute writer's own development of ideas. Source material is announced by a signal phrase and ended with in-text citations.	Uses sources to support, extend, and inform, but not substitute writer's own development of ideas. Skillfully combines source material with writer's own analysis and synthesis. Source material is smoothly integrated and consistently referenced.
<b>Explanation</b>	Offers solid but less original reasoning. Assumptions are not always recognized or made explicit. Details are relevant, but may lack originality or convincing interpretation.	Offers sound and original reasoning. Assumptions are made explicit. Details are relevant, original, and convincingly interpreted.	Offers sound, original, and insightful reasoning. Assumptions are critically examined and justified. Details are relevant, original, and persuasively interpreted.
<b>Counterargument</b>	Author acknowledges the opposing view, but does not present sound counterpoint.	Author acknowledges the opposing view and argues it logically.	Author acknowledges the opposing view and refutes it effectively.
<b>Organization</b>	Progression of ideas in essay makes sense and moves the reader easily through the text. Strong transitions exist throughout and add to the essay's coherence.	Progression of ideas in essay is logical and compelling. Transitions are smooth and enhance the flow of the essay.	Progression of ideas in essay is logical, compelling, and sophisticated. Transitions are seamless and create a coherent and elegant essay.

I hope this rubric helps you with your course assessment. If you have any questions or feedback, please let me know. 😊

Source(s)

1. [Argument Essay Grading Rubric - Saint Paul College](#)

2. [AP Scoring Rubric for Argument Essay \(6 points\)](#)
3. [Argument Essay Grading Rubric - Saint Paul College](#)
4. [Argumentative essay rubric - Yale University](#)
5. [DCA - Argumentative Essay Rubric - Army War College](#)

## Using AI to Create Course Assessment Items

Generative AI can be a powerful tool for creating assessments. Things to consider before creating your assessments:

- What do you need to know *before* you can write an AI prompt?
- What information should you include in your prompt to get your desired output?
- What do high-quality results look like?

### Before Writing Your Prompt

Consider the *content* for your assessment items:

- What is the subject area?
- What are the learning goals for the course?
- What are the specific learning objectives you are trying to assess?

Think about your students:

- What is their current level of understanding of the subject matter?
- What is the depth of knowledge expected for the learning objective you are assessing?
- How can they best demonstrate their understanding?

### Writing Your Prompt

Use the TRACI model:

- Task:
  - Clarify the type of assessment you would like Copilot to return (e.g., short-answer, multiple-choice, essay, etc.)
- Role:
  - Identify the level of course (introductory, intermediate, advanced)
  - Indicate the subject area, course title, course description
- Audience:
  - Identify the knowledge level of the students
  - Highlight where in the course the assessment should fall (early in the semester? late?)
- Create:
  - Provide information on the length of the assessment item and other formatting details
- Intent:
  - Include the learning objective, learning goal, or specific competency to be measured by the assessment item

### Evaluating the Response

How does the assessment item compare to a high-quality question you have used in the past? You can continue the chat/conversation with Copilot to refine:

- What is good about the item? What needs to be revised?
- What feedback would you give if a peer or colleague had written the item?
- How can you succinctly ask for revisions?

Consider the content of the item:

- Course and content
  - Does the item fully address the desired learning outcome or objective?
- Course progression
  - Is the format, content, and depth of knowledge represented by the assessment item in line with where the students are expected to be at this point in the semester?
- Students
  - Is the language suitable for the student audience?

## Examples of Using AI in Assessment Item Writing

### Prompt #1

You are an expert educator, teaching an introductory veterinary science course for first-year college students. The course description is as follows: “Students will learn about the causes, symptoms, and treatment of common diseases with special emphasis on developing preventative health management plans and breeding programs. Topics include veterinary pharmacology, radiology imaging techniques, principles of surgery, safe laboratory skills, and the concepts of ethics and professionalism in the workplace. Students will develop skills in inquiry and statistical methods. Throughout the course, learners will utilize principles of technology to manage information systems, and research issues affecting the industry.”

Write a multiple-choice test item that assesses the following learning objective: “Apply concepts of body condition scoring to assess an animal's general health and nutrition status.” The question should have four answer choices with only one correct answer. Provide an explanation of why the correct answer is correct.

### Copilot

Here is a possible multiple-choice test item for your learning objective:

**Question:** A common body condition scoring (BCS) system for cattle uses a scale from 1 to 5, where 1 is very thin and 5 is very fat. What BCS score would you assign to a cow that has a prominent backbone, ribs, and hip bones, with no fat cover on the tail head or brisket?

**Answer choices:**

- A) 1
- B) 2
- C) 3
- D) 4

**Correct answer:** A) 1

**Explanation:** A cow with a BCS of 1 is very thin and undernourished. The cow in the question has a prominent backbone, ribs, and hip bones, with no fat cover on the tail head or brisket. This cow is likely



to have poor reproductive performance, low milk production, and increased susceptibility to diseases and parasites. A cow with a BCS of 2 is thin but should have some fat cover on the tail head and brisket. A cow with a BCS of 3 is moderate, with a smooth appearance and no visible bones. A cow with a BCS of 4 is fat, with a rounded appearance and fat deposits on the tail head, brisket, and udder. A cow with a BCS of 5 is very fat, with a patchy appearance and excessive fat deposits on the tail head, brisket, udder, and vulva.

### **Prompt #2 [same conversation thread]**

Can you create a fill-in-the-blank question related to the same learning objective? Use a different example for this question compared to the multiple-choice example.

#### **Copilot**

Sure, I can create a fill-in-the-blank question for you. Here is one possible question:

**Question:** A common body condition scoring (BCS) system for horses uses a scale from 1 to 9, where 1 is poor and 9 is extremely fat. A horse that has a flat back, a slight crease along the spine, and a moderate amount of fat over the ribs, withers, and neck should have a score of \_\_\_\_\_.

**Answer and Explanation:** The correct answer is **6**. A horse with a BCS of 6 is moderately fleshy and has a good body condition. It has a flat back, a slight crease along the spine, and a moderate amount of fat over the ribs, withers, and neck. A horse with a BCS of 5 is moderate, with a level back and a faint outline of the ribs. A horse with a BCS of 7 is fleshy, with a crease down the back and individual ribs difficult to feel.

### **Prompt #3 [same conversation thread]**

Now make a short-answer question based on the same learning objective. The students should be able to demonstrate a thorough understanding of the subject by providing 1-2 sentences in response to the assessment item.

#### **Copilot**

Okay, I can make a short-answer question for you. Here is one possible question:

**Question:** Explain why body condition scoring (BCS) is important for dogs and how it is related to their health and well-being. Include examples using a BCS system for dogs that uses a scale from 1 to 9, where 1 is emaciated and 9 is obese.

**Answer:** BCS can indicate if the dog is receiving adequate nutrition and exercise, and if they are at risk of developing health problems such as diabetes, arthritis, heart disease, or respiratory distress. A dog with a BCS of 1 is emaciated and may suffer from malnutrition, dehydration, organ failure, or infections. A dog with a BCS of 9 is obese and may have difficulty moving, breathing, or regulating its body temperature. A dog with a BCS of 4 or 5 is ideal, as it has a visible waist, a slight tuck in the abdomen, and ribs that can be felt but not seen.

## Prompt #4 [same conversation thread]

Now create an essay question for the final exam. The question should cover the learning objective used in the previous examples as well as at least one of the following objectives: "Obtain and interpret an animal's vitals." and "Recognize the preventative measures or treatments needed to maintain animal health." The question should allow students to demonstrate a thorough understanding of the concepts.

Include a 10-point scoring rubric for grading the student responses.

### Copilot

Here is a possible essay question for the final exam:

**Question:** You are a veterinary technician working at a local animal shelter. One of your tasks is to perform a routine health check on a newly arrived dog. The dog is a male Labrador retriever, about 2 years old, and weighs 35 kg. You use the body condition scoring (BCS) system to assess the dog's body fat and muscle mass, and you obtain and interpret the dog's vitals, such as temperature, pulse, respiration, and mucous membrane color. Based on your findings, you recognize the preventative measures or treatments needed to maintain the dog's health and well-being. Write a detailed report of your health check, explaining the steps you took, the results you obtained, and the recommendations you made. Use appropriate terminology and concepts from the course.

#### Scoring rubric:

- Introduction: 1 point
  - The introduction should provide some background information on the dog, such as its breed, age, sex, and history.
  - The introduction should state the purpose and scope of the health check.
- Body condition scoring: 2 points
  - The report should describe how the BCS system works and what it measures.
  - The report should state the BCS score assigned to the dog and justify it with evidence from visual and tactile assessment.
  - The report should explain the implications of the BCS score for the dog's health and nutritional status.
- Vitals: 3 points
  - The report should describe how to obtain and interpret the dog's vitals, such as temperature, pulse, respiration, and mucous membrane color.
  - The report should state the normal ranges and values for each vital sign and compare them with the dog's results.
  - The report should explain the significance of any deviations from the normal ranges and values and what they indicate about the dog's health condition.
- Preventative measures or treatments: 3 points
  - The report should identify the preventative measures or treatments needed to maintain the dog's health and well-being, based on the BCS score and the vitals results.
  - The report should explain the rationale and benefits of each measure or treatment and how they address the dog's specific needs and issues.
  - The report should provide clear and specific instructions on how to implement each measure or treatment and what to monitor for effectiveness and side effects.
- Conclusion: 1 point

- The conclusion should summarize the main findings and recommendations from the health check.
- The conclusion should emphasize the importance of regular health checks and BCS assessments for animals in shelters and in general.

## Make Your Project Accessible Assignment

### Overview

You have made so much progress on your projects, and they are looking amazing! I hope you have taken a break to bask in your achievements.

Now that you have generated the bulk of the materials for your project -- your images, your charts, your diagrams, etc. -- it is time to finalize your presentation of those materials to have the greatest impact on your audiences.

A key step in this process is ensuring that your multimedia project will be accessible for all possible members of your audience, including those who have disabilities that make it difficult to see, hear, or interact with digital content. For more information about designing for universal accessibility, see this [Overview of Universal Design for Learning](#) in the OSU Teaching and Learning Resource Center.

This step is helpful not only to make your work more inclusive but also because considering additional perspectives will sharpen your understanding of what you have done and may help you identify new ways to improve what you have done.

### Steps

- Log into Microsoft Copilot. (For information about how to do so, as well as a useful introduction to the tool, see [this tutorial](#) on the ASC ODE website.)
- For each image (of any kind) in your project:
  - Pro-tip: All microsoft documents are secretly .zip archives, so the simplest way to accomplish this (if your project is in the form of a microsoft document) is to copy the file, then change its file extension to .zip. Extract that archive to a folder, and all your images will be located in the {...} folder.
- Compose alt text for that image: a brief description identifying what it depicts and its role within your project.
- Compose a detailed description of that image: a longer description that provides a full rendering of the information the image provides.
  - For guidance on composing alt text and image descriptions, see the Perkins School for the Blind [How to Write Alt Text and Image Descriptions for the Visually Impaired](#)
- Upload or paste the image into Copilot and prompt it to generate alt text and a detailed description of the image. For guidance on prompt engineering, see Harvard's [Getting started with prompts for text-based Generative AI tools](#).
- Compare the version you composed with the text generated by Copilot and produce two final products:
  - A revised version that combines the best elements of your version and the text generated by Copilot
  - 2-3 sentences comparing and contrasting those versions and identifying the implications of those differences

As the next stage of this assignment, you will exchange your alt text and detailed description with a fellow student, then use that text to both draw and use AI to generate image versions, which you will use to assess the success of the text versions.

### Resources

- TLRC [Overview of Universal Design for Learning](#)
- Perkins School for the Blind [How to Write Alt Text and Image Descriptions for the Visually Impaired](#)
- [Copilot Tutorial](#)
- Harvard's [Getting started with prompts for text-based Generative AI tools](#)