

Developing Engineering Students' Critical Eye

Course Subject:	Bioengineering
Student Level:	2nd and 3rd year
Number of Students:	50 per section
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What Students Did

As part of their homework, students analyzed problem solutions that were generated by ChatGPT, and reflected on what they agreed and disagreed with in the problem-solving process as well as the answer.

Purpose

The purpose of the activity was to develop students' ability to critically analyze provided solutions to identify errors as well as strengths and weaknesses in the problem-solving process. This is an important skill for professional engineers, as they read research studies and work together in groups, and must be able to effectively compare and contrast various solutions and approaches, identify mistakes and inefficiencies, and learn from others.

Assessment

This was one question within each set of homework questions. Overall, homework makes up a small portion of the course grade. Scores are based on the level of effort demonstrated.

Faculty Reflections

Initially, students were taking more of a cursory look at the provided solutions and just indicating that it was either correct or incorrect, with no explanation. I demonstrated how to dig deeper and showed them what a response should look like. They are doing much better with it now.

As a by-product of this process, students have learned that ChatGPT is not the most reliable source for many engineering problems. Generally, when given problems that don't map to "cookie cutter problems," the AI makes bad assumptions about how to convert the complicated problem into a simpler one, and it tends to ignore important information. While there are some specialized generative AI tools for solving engineering problems, some of those are subscription-based, and I have not experimented with them yet.

Step-by-Step Directions

Step 1	<p>The instructor pastes old homework problems from previous years into ChatGPT and prompts the AI to generate a solution and step-by-step problem-solving process, with certain parameters.</p> <p>NOTE: The problems typically have one correct answer, but can be solved in different ways.</p>
Step 2	<p>In the homework, students are given a set of practice problems and one ChatGPT-generated solution. All homework items in the set are connected to the same course concepts.</p>
Step 3	<p>In addition to solving the practice problems, students analyze the provided solution and approach that were generated by ChatGPT, and explain what they agree with and disagree with, or what they like or dislike, and why.</p>

Related Materials

- [Example Problem Sets](#) with ChatGPT-generated solution