# Using ChatGPT in the Calculus Classroom

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1943

**Monterrey**

Guadalajara, Jalisco in Mexico,
Since 1991

**Guadalajara**

# Campus Guadalajara



Image generated by Gemini (Google AI), 2026.

## *Context*

2019

MODELO EDUCATIVO TEC21

**Blocks**: Physics, Mathematics, and Computing

**Subjects**: only cover topics from a single discipline

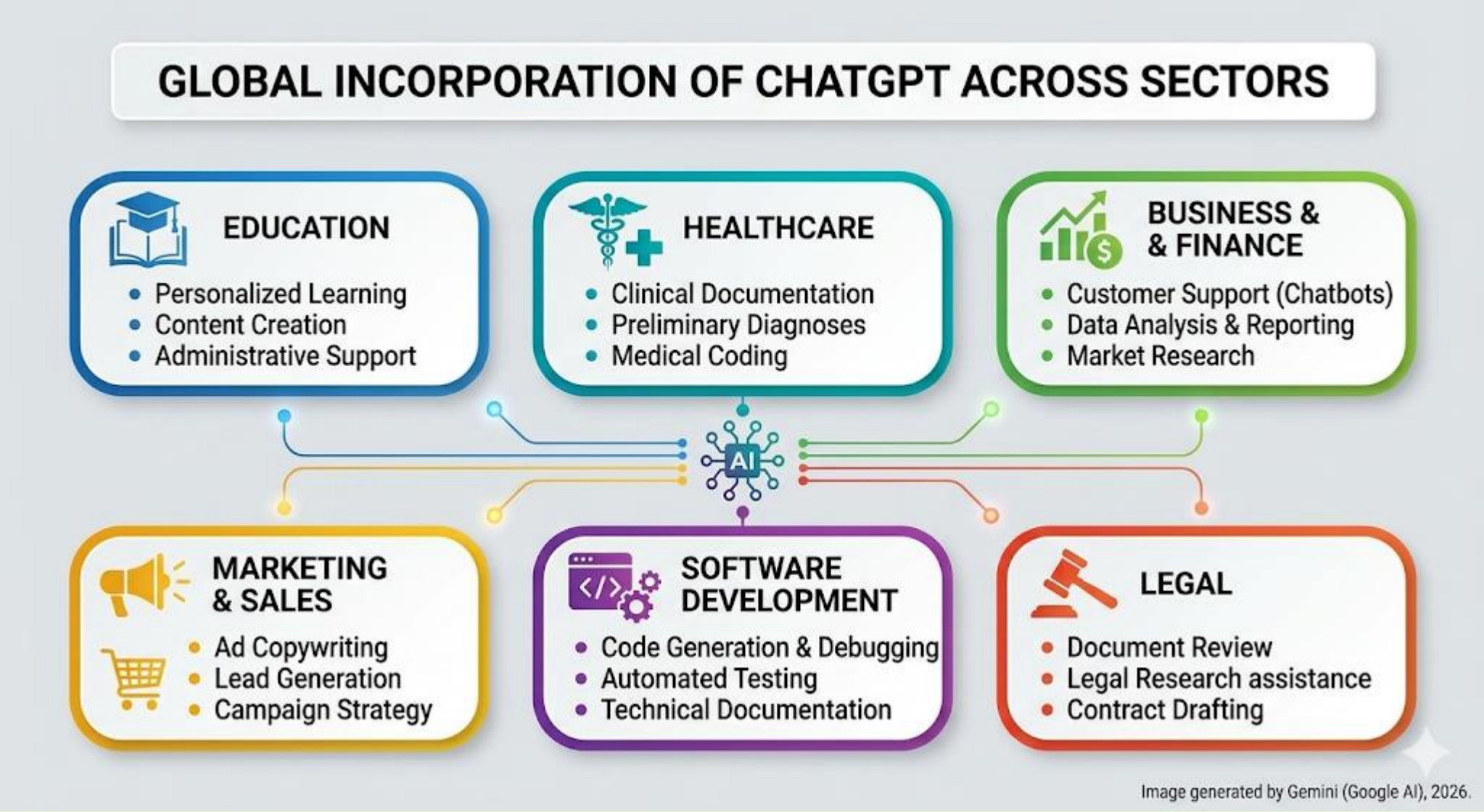
## *Context*

Engineering students

| First semester | | | | |
|---|---|---|---|---|
| Period 1<br>5 weeks | TEC<br>Week | Period 2<br>5 weeks | TEC<br>Week | Period 3<br>5 weeks |
| | | **Differential Calculus** | | **Integral Calculus** |

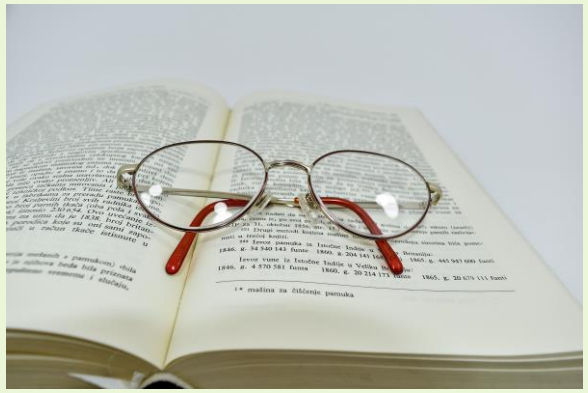
This study describes a pedagogical experience with freshman engineering students. An activity was implemented using ChatGPT or equivalent AI tools. We examined student perspectives and the specific ways in which they engage with these Large Language Models (LLMs)


Image generated by Gemini (Google AI), 2026.


GLOBAL INCORPORATION OF CHATGPT ACROSS SECTORS
EDUCATION
Personalized Learning
Content Creation
Administrative Support
HEALTHCARE
Clinical Documentation
Preliminary Diagnoses
Medical Coding
BUSINESS & & FINANCE
Customer Support (Chatbots)
Data Analysis & Reporting
Market Research
AI
MARKETING & SALES
Ad Copywriting
Lead Generation
Campaign Strategy
SOFTWARE DEVELOPMENT
Code Generation & Debugging
Automated Testing
Technical Documentation
LEGAL
Document Review
Legal Research assistance
Contract Drafting
Image generated by Gemini (Google AI), 2026.

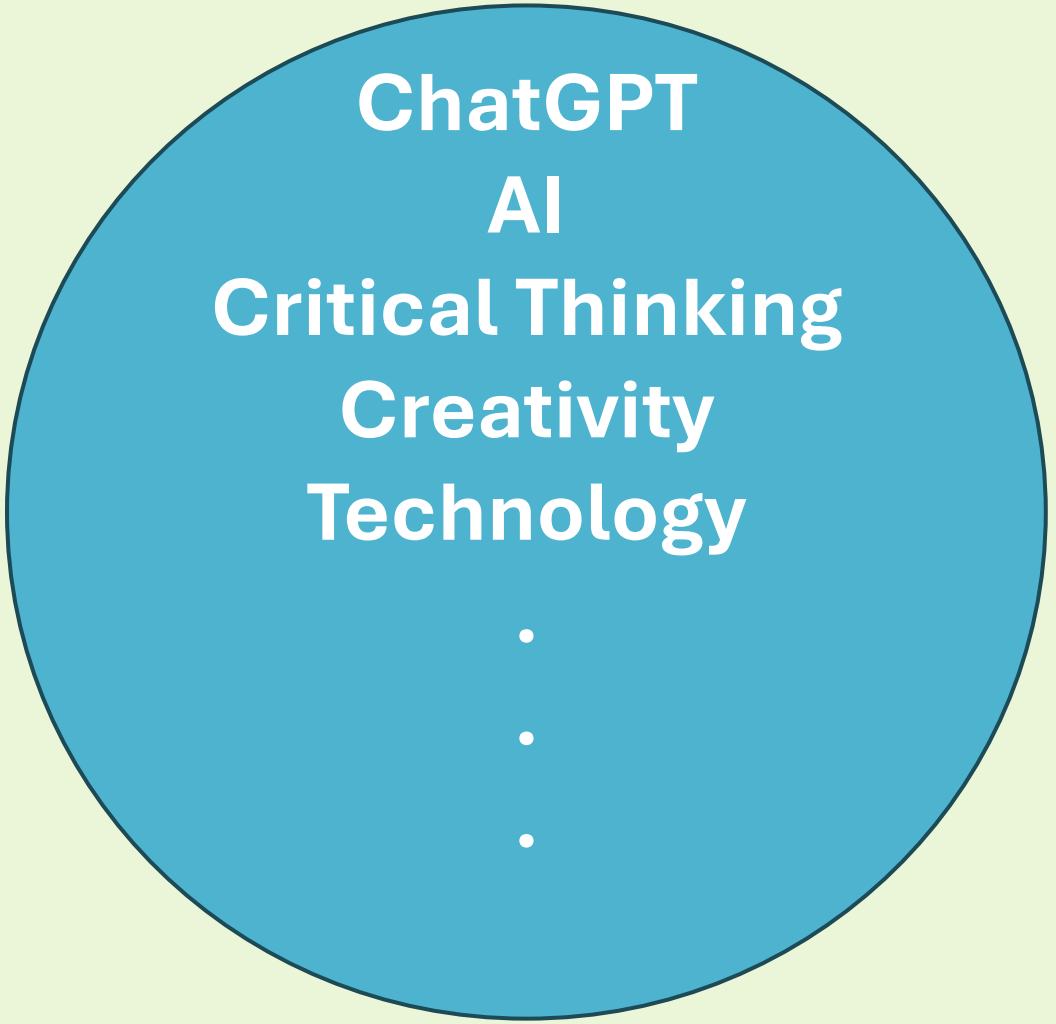

In the classroom, the use of ChatGPT has sparked both interest and debate.

**How teachers can utilize ChatGTP:**



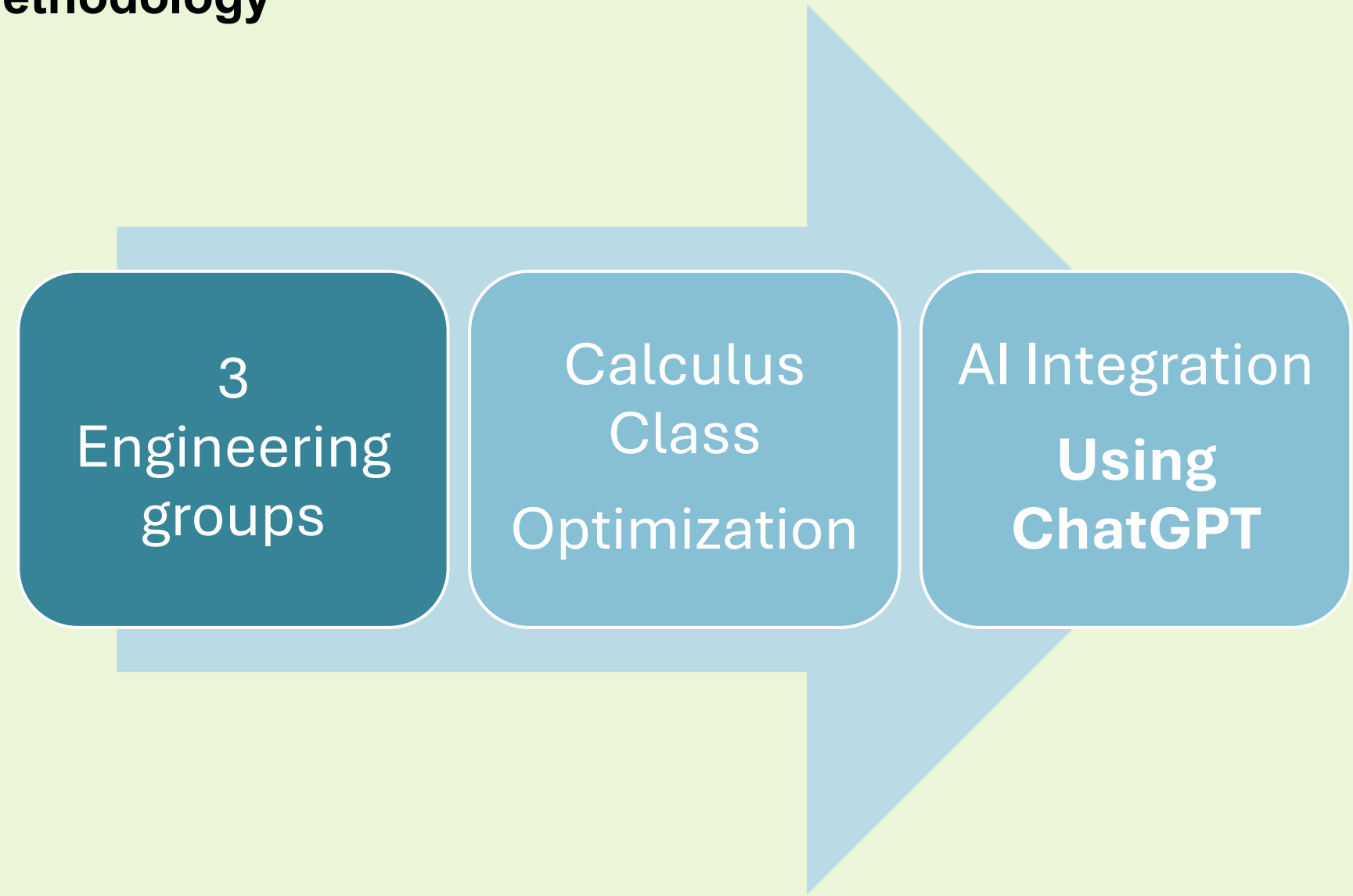
- Discovering resources to use in class
- Designing innovative learning activities
- Planning complete lesson structures
- Translating academic content
- Creating ad hoc visual materials
- Assisting with programming and code development
- Providing tutoring or guidance on specific topics
- Generating sets of exercises on specific subjects—in this case, particularly in Mathematics

# Education



This study shows an experience in the classroom. The main goal is for students to analyze different questions (prompts) in ChatGPT. We want to see how a better question changes the quality of the answer. With this activity, students learn to think critically, evaluate information, and improve how they learn.

# Methodology



## Phase 1: Individual Assignment

**Give me an optimization problem about Civil Engineering.**

- **Step 1: Textbook Problem**
  - Choose one optimization exercise.
  - Goal: Review the basic topics.
- **Step 2: ChatGPT Problem**
  - Prompt: *"Give me a problem about [Hobby/Major]"*.
  - Goal: Personalize math and interests.

***Second Phase: In-Class Collaborative Activity***

The Prompt Evolution

**Promt 2**

**Teamwork:** Students share and select the best ChatGPT problems. They ask for a problem with only two variables.

**Analysis:** They identify characteristics and discuss improvements.

**Promt 3**

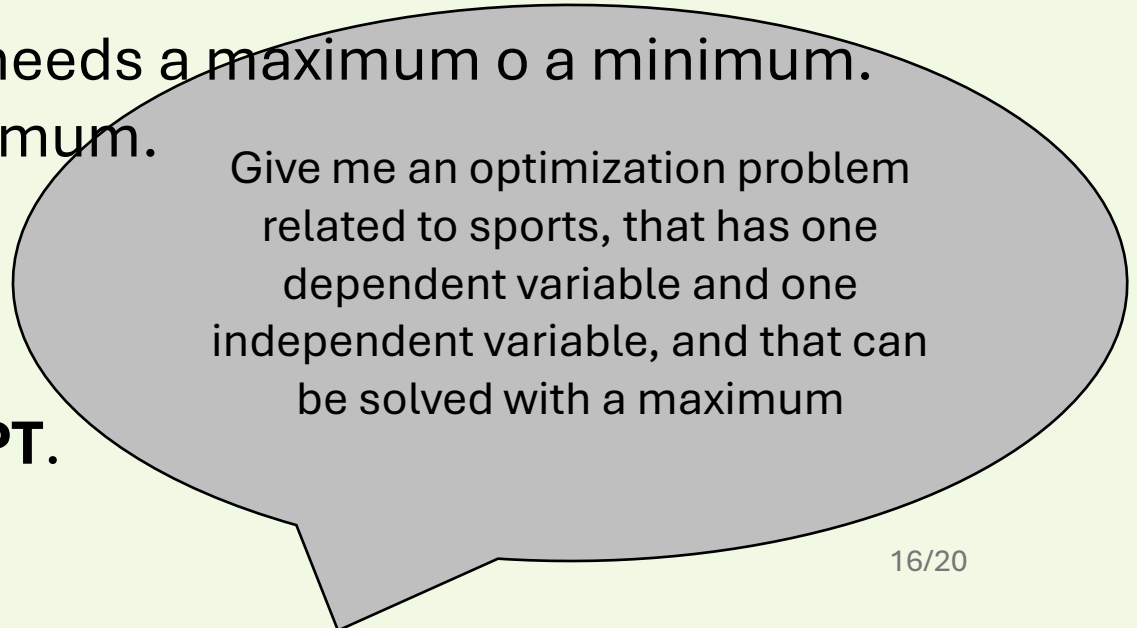
**Detailed:** We asked for a clear problem that needs a maximum o a minimum.

**Professional:** Focus on a maximum or a minimum.

**The Final Challenge**

Solve the problem **by hand** (manually).

Compare the process and result with **ChatGPT**.



## Phase 3: Individual Reflection

### The Reflection Questions

- **Experience:** Was it easy or difficult to use ChatGPT?
- **Process:** How many attempts did you need?
- **Comparison:** Do you prefer ChatGPT problems or Textbook problems?
- **General Opinion:** What do you think about AI in math?

### The Final Project

- **Digital Presentation:** (PowerPoint/PDF).
- **Comparison:** Team problem + By hand solution vs. AI solution.
- **Final Thought:** A paragraph about learning with AI.

| Category | Main Observation |
|---|---|
| **Usefulness of ChatGPT** | It is useful for solving **simple problems and verifying step-by-step procedures**. |
| **Limitations** | It generates problems that are either typical textbook examples, overly complex, or contain errors if prompts lack clarity. |
| **Comparison with Textbooks** | **Textbook problems are generally better aligned** with the course level, easier to understand, and more structured. |
| **Required Specificity Level** | **Detailed instructions are necessary to obtain appropriately formulated problems**. |
| **Difficulty of Generated Problems** | ChatGPT may produce problems that are either too simple or excessively complex. |
| **Pedagogical Perception** | AI is valuable as a support tool but **does not replace human reasoning**. |
| **Applicability to Academic Fields** | Some students were able to relate the problems to their areas of study, making them more relevant. |
| **Metacognitive Learning** | Students recognized the **need to use AI critically and to validate its outputs**. |

## Conclusions


**Much more than cheating**

**Our goal is to change the perspective: ChatGPT is not just for finding answers, it is for critical thinking and analysis.**

Thanks!

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