

# Leveraging ChatGPT for Higher Education Course Offerings

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## Abstract

Since it was released on November 30, 2022, ChatGPT has offered numerous opportunities for higher education professors to improve their course offerings. However, not all information provided by the application is accurate. The application has been known to yield highly inaccurate information with high confidence. Yet, with that knowledge, ChatGPT can still save education practitioners hours of time and improve their courses, as well as help students with library research. By January, 2023, ChatGPT was the fastest growing consumer software application in history, with over 100 million users. Despite any misgivings, it is here to stay. This paper investigates how ChatGPT can be used help IS faculty more easily and effectively prepare and present their courses and discusses potential opportunities and threats from its use. Ways in which students may use the application for library research and feedback are also discussed. Generative AI in its current and evolving formats are proving helpful for students and faculty alike.

Keywords: ChatGPT, Academics, Chat Bots. Artificial Intelligence, Information Systems, Education, Information Security.

Recommended Citation: Mew, L., Money, W.H., (2024). Leveraging ChatGPT for Higher Education Course Offerings. *Information Systems Education Journal* v22(n5) pp 72-80.  
<https://doi.org/10.62273/OKLK1331>

# Leveraging ChatGPT for Higher Education Course Offerings

*Lionel Mew and William H. Money*

## 1. INTRODUCTION

This paper investigates how ChatGPT can be used to help Information Systems faculty more easily and effectively prepare and present their courses, as well as helping students with library research and obtaining feedback on their efforts. Since it was released on November 30, 2022, ChatGPT has offered numerous opportunities for professors to improve their course offerings. However, is believed to sometimes yield highly inaccurate information with high confidence. There may be biases which are difficult to determine, but which are intuitively obvious. Even with that knowledge, ChatGPT can still save professors hours of time. Although it is not perfect, it is suggested that ChatGPT can help instructors develop organized materials, and help students develop insight and improve their deliverables.

This paper provides background on ChatGPT, examines the literature on use in Academia, discusses and how it can help instructors prepare courses. It also discusses how students can ethically use generative AI to add value to their assignments.

## 2. LITERATURE REVIEW

The literature suggests that ChatGPT may offer value in all aspects of planning, organizing, providing content, assessing, and offering courses in higher education.

**ChatGPT**  
Ofgang (2023) found using ChatGPT to prepare for class to be easier than anticipated, although they would not personally use it due to fear of violating institutional policies, fear of plagiarism and preference for human content. The author suggested that the freeware version of ChatGPT was an easy way for educators to prepare for and create course materials. They suggest it can help to quickly generate syllabi, lesson plans, homework assignments and quizzes.

In a 2023 article, Abramson suggests that rather than ban ChatGPT in the classroom, professors use it to encourage critical thinking in liberal arts courses in a similar fashion to calculators helping students learn mathematics. Students can also

use generative AI to improve their research into specific topics as well as to give them feedback on specific assignments.

## 3. BACKGROUND

### Introduction of AI and ChatGPT

Chat Generative Pre-trained Transformer, or ChatGPT, is a model known as a chatbot. It is formed from a combination several technologies including Artificial intelligence, natural language processing, and Neural Networks (machine learning models composed of interconnected processing nodes trained by adjusting the strengths of connections between them (Bishop, 1994). ChatGPT works because it has extensive stored data and is capable of interpreting user requests and generating a suitable response as if it were human.

The application uses components that can trained or be parameterized, and data that can be collected and examined using user input scenarios (Biswas, 2023). The output data include analyses, interpretations, developed stories or generated scenarios, generation, and assessed models. Chat GPT is capable of **"learning,"** and taking direction from prompts to improve its output (McGee, 2023).

The growth and popularity of the system is enormous. ChatGPT, the recent version GPT-3, has reached 1 million users only in 5 days. For comparison, major technology companies, Facebook, Netflix, Instagram, and Twitter could reach this number in 300, 1200, 75, and 720 days respectively (Firat, 2023).

A preview of the AI chatbot created by OpenAI created a media sensation in December 2022. It is based on GPT-3.5, the newest version from OpenAI (Roose, 2022). The most current version, GPT-4 was released on March 14, 2023. It includes an API for the product (Olson, 2023).

### What the Model Does

The model is composed of several modules that enable it to train on a set of inputs. OpenAI has developed a Generative Pre-Trained Transformer (GPT) language model that can create responses in a text form that appears to be human language (Dale, 2021). Two forms of AI are used to create3

the outputs. Unsupervised learning is used for pretraining with unlabeled data to generate the associations in the data. Supervised (guided) AI learning is used to fine-tuning and improve the output on specific prompts or tasks (Erhan, Bengio, Courville, Manzagol, & Vincent, 2010).

How components Work to Produce a Product ChatGPT works by attempting to understand user prompt and then produce (non-random) strings of words that it predicts (based on weights given **to the parameters**) will best answer the user's question. To do this, the data it was trained on is critical to the result. It human like learning allows it to GPT to learn patterns and relationships and to create what might be human-like responses (Guinness, June 2, 2023).

Understanding the bias potential Lund (2023) states that use of the GPT data can maintain biases and stereotypes present in the data. This is logical since the generative model is trained on a data set. It will incorporate what it has encountered in its response. McGee (2023) observed (by accident) that ChatGPT tendered to generate a biased response to a request that it write Irish Limericks. The outputs from ChatGPT appeared to be positively biased for liberal politicians and negatively biased for conservative politicians. He constructed a test with a sample of 80 limericks and compared the probability of the results showing that the AI was biased to favor liberal politicians and disfavor conservatives. The generative method employed was to instruct ChatGPT to: "Write an Irish Limerick using the word X. In each instance, X was the name of an individual that was the target of the Limerick. Was this a pattern, or a random occurrence? The sentiment would be one of three results, either positive, negative, or neutral. The Limerick generated outcomes indicated that there is "...strong probability of bias in favor of liberals and against conservatives" (McGee, 2023, pg. 2).

#### 4. HIGHER EDUCATION APPLICATION

The literature suggests that AI chatbots such as ChatGPT may be useful for all aspects of preparing and presenting courses in higher education. Ofgang (2023) suggested several ways that educators could easily use ChatGPT for preparing their courses, including generating lesson plans, creating quizzes, developing homework assignments, and developing syllabi. Ofgang uses the ChatGPT freeware version to generate those documents, using various example courses.

#### Syllabus Generation

In the case of syllabus generation, Ofgang uses the example of a survey journalism course on basic news writing. To make the work of the current paper more relevant to Edsig, it was decided to use an Information Security Social Engineering example. The authors signed up for the open access version of ChatGPT, and did not practice or partake of any training. Immediately after joining the application, the chat playground was queried with the prompt, *Create a Syllabus for a 12-session social engineering course*. Within a few seconds, the following output was received:

Course Title: Introduction to Social Engineering

Instructor: \_\_\_\_\_

Course Description:

This course is an introduction to the vast and dynamic field of social engineering. In this course, students will gain an understanding of the psychological mechanisms underlying how social engineering works, and will also gain the technical skills needed to properly identify and defend against social engineering attacks. Upon completion of the course, students will have a working knowledge of social engineering techniques and be able to identify the most common vectors used in social engineering attacks.

Instructor's Contact Information:

Email: \_\_\_\_\_

Phone: \_\_\_\_\_

Course Objectives:

- Learn the fundamentals of social engineering
- Develop the ability to recognize common tactics and strategies used in social engineering attacks
- Create strategies for defense against social engineering attacks
- Develop an understanding of the psychological and technical mechanisms behind social engineering

Course Materials:

- Textbook: Social Engineering: The Art of Deception (By Christopher Hadnagy, Wiley, 2010)
- Compilation of supplemental materials and readings

Course Requirements:  
- Active participation in discussion  
- Completion of reading assignments  
- Mid-term and final examinations

Session Overview:

Session 1: Introduction  
- Introduction to Social Engineering  
- Overview  
- Social Engineering Techniques  
- Human Psychology - Overview

Session 2: Building Trust  
- Introduction to Human Psychology  
- Establishing and Maintaining Trust  
- Influence and Persuasion

Session 3: Pretexting  
- Tactics of Pretexting  
- Common Types of Pretexting  
- Social Engineering Techniques Used in Pretexting

Session 4: Phishing  
- Tactics of Phishing  
- Common Types of Phishing  
- Social Engineering Techniques Used in Phishing

Session 5: Vishing  
- Tactics of Vishing  
- Common Types of Vishing  
- Social Engineering Techniques Used in Vishing

Session 6: Midterm Exam

Session 7: Human Psychology - Advanced  
- Building Rapport  
- Understanding Cognitive Biases

Session 8: Social Engineering in the Real World  
- Practical Social Engineering Scenarios  
- Social Engineering Mitigation Strategies

Session 9: Spamming  
- Tactics of Spamming  
- Common Types of Spamming  
- Social Engineering Techniques Used in Spamming

Session 10: Defending Against Social Engineering Attacks  
- Tactics to Neutralize Social Engineering Threats  
- Principles of Defending Against Social

Engineering

Session 11: Detection Strategies  
- Common Social Engineering Detection Strategies  
- Understanding Social Engineering Vectors

Session 12: Final Exam

Grading:  
Grades will be based on participation, exams, assigned readings, and class contribution. The final grade will be calculated as follows:

- Participation: 10%
- Exams: 40%
- Reading Assignments and Class Contribution: 50%

Textbook:  
Social Engineering: The Art of Deception (By Christopher Hadnagy, Wiley, 2010)

Campus Resources

- Academic Resource Center
- Library
- Student Success Center
- Technology Support Center
- Writing Center

The course outline was compared to the recommended text to determine how much the content was incorporated into the social engineering course. The ChatGPT course did not simply replicate the content of the text. The course approaches the social engineering subject from a psychological perspective. It emphasized the psychological construct of trust to explain how the social engineering technique could be successfully employed, including a section for an example case (detailed in the recommended text) and addressing the processes involved in both creating social engineering attacks and defending against them.

A second comparison was made to assess if the ChatGPT course addresses the topics covered in a college-level course on social engineering. The suggested outline and content were again contrasted with Purdue University's short course on social engineering. This course is designed to provide cybersecurity professionals with opportunities to broaden their skills on an accelerated basis. This university-level course

incorporated a historical perspective (omitted for the ChatGPT course), included the psychological constraints, and again included social engineering processes and techniques.

There is no apparent plagiarism or copying of the text or this specific sample course and assigned text used for the comparison. As would be expected, "words" produced by ChatGPT appear to be strongly relevant to the prompt (social engineering course), and there are no anomalous insertion or unrelated inputs or assignments.

It was thought impressive that within a few seconds, the ChatGPT application generated a useable syllabus. Upon reflection, it was seen that the application selected a book to be used as the course text. The assumption may be that the course description, objectives and lessons would be drawn from the text, with housekeeping such as tests, grading, resources, etc. inserted based on typical syllabi, or a standardized syllabus.

It was found in later investigation, however, that the application not only listed the title of the text incorrectly, but that the sessions did not correspond to the chapters in the text. So, the question is, how was the syllabus generated? Like Google, the search algorithms used are not easily available. Despite this, the application generated in seconds, something that would likely take a professor much longer to develop. It is suggested that the generated syllabus may be used as a starting point, with verification, due diligence and modification, to yield a definitive course syllabus.

The syllabus was not used for the actual course. The syllabus used was constituted from relevant subjects contained in various texts, and updated over a number of years. However, it would have been okay to use the generated syllabus as it covered most, if not all of the objectives expected of a social engineering course.

For comparison, the syllabus actually used in the course contained the following topics:

Introduction  
Elicitation  
Pretexting  
Mind Tricks  
Persuasion & Influence  
Physical Tools  
Software Tools  
Targeting  
Information Gathering  
Scenarios  
Prevention & Mitigation

As a comparison shows, the generated topics are more specific in some areas, where the actual syllabus is more holistic in nature.

#### Test/Quiz Generation

Ofgang suggests that ChatGPT may be used to quickly generate quizzes, further noting that in liberal arts courses not using a textbook, creating quizzes can be a time-consuming endeavor (2023). Once again using a journalism example, Ofgang asks ChatGPT to generate a writing exercise using the inverted pyramid. Interestingly, instead of a writing exercise, the application generates five multiple choice questions, each with four answers. It is interesting because when the application is questioned using a Social Engineering example, ChatGPT returns a series of short-answer questions. Using the query:

*Create a quiz for the following session: Session 1: Introduction*  
*- Introduction to Social Engineering*  
*- Overview*  
*- Social Engineering Techniques*  
*- Human Psychology - Overview*

The application returns:

1) What is social engineering?

A) Social engineering is a type of exploitation that relies on human interactions and psychological manipulation to gain access to confidential information, assets, or sensitive data.

2) What are some of the techniques used in social engineering?

A) Common social engineering techniques include phishing attacks, impersonation attacks, and pretexting.

3) What is the role of human psychology in social engineering?

A) Human psychology plays an important role in social engineering as it is used to manipulate people into giving away confidential information or assets.

A few more attempts at quiz generation were made using trial-and-error (remember, these queries were made without training, and just minutes after signing up for the app). The revised queries were to make it 10 questions, to make the quiz multiple choice with four answers per question, and to provide correct answers in addition to the choices. The final query used is:

Create a 10-question multiple choice quiz with correct answers for the following session:

*Session 1: Introduction*

- *Introduction to Social Engineering*
- *Overview*
- *Social Engineering Techniques*
- *Human Psychology – Overview*

The resultant quiz returned is:

1. What is the definition of Social Engineering?
- a. The use of physical tools to physically gain access to an organization
  - b. The process of attempting to convince people to do something, give away something, or believe something
  - c. The study of how humans interact with computers
  - d. The use of malware to invade a system

Answer: b. The process of attempting to convince people to do something, give away something, or believe something

2. What is a primary goal of social engineering?
- a. To gain mental control of a system
  - b. To maliciously circulate false information
  - c. To gain physical access to a building or company
  - d. To gain control of system resources

Answer: c. To gain physical access to a building or company

3. What is one example of a social engineering technique?
- a. Lifting a security badge from an employee
  - b. Creating a computer virus
  - c. Writing a program to infiltrate a system
  - d. Posing as a service technician

Answer: d. Posing as a service technician

4. What is the goal of social engineering techniques?
- a. To gain physical access to an organization
  - b. To damage the reputation of an organization
  - c. To gain control of a computer system
  - d. To spread malicious software

Answer: a. To gain physical access to an organization

5. What is an example of human psychology that can be used to aid in social engineering?
- a. The use of fear tactics
  - b. The use of complicated technical jargon
  - c. The use of encryption algorithms
  - d. The use of false identities

Answer: a. The use of fear tactics

6. How can human psychology be used to help prevent social engineering?
- a. By educating people about the potential risks
  - b. By investing in advanced security systems
  - c. By implementing strict access control policies
  - d. By using encryption algorithms

Answer: a. By educating people about the potential risks

7. What is one way to detect a social engineering attack?
- a. Monitoring employee emails
  - b. Analyzing system logs
  - c. Installing antivirus software
  - d. Limiting physical access

Answer: b. Analyzing system logs

8. What is one way to protect yourself against social engineering attacks?
- a. Keeping confidential information secure
  - b. Limiting physical access
  - c. Using strong passwords
  - d. Installing antivirus software

Answer: c. Using strong passwords

9. What is a basic rule of social engineering?
- a. Never accept files from strangers
  - b. Never click on suspicious links
  - c. Always trust people
  - d. Always give out personal information

Answer: b. Never click on suspicious links

10. What is an example of a physical security measure to prevent social engineering?
- a. Installing antivirus software

- b. Using strong passwords
- c. Limiting physical access
- d. Monitoring employee emails

Answer: c. Limiting physical access

Many of these questions show up in Social Engineering test banks, and are apparently well-designed questions. The application quickly generated the questions, answers and correct answers. While the caution to use due diligence and verification remains, the application again proves to be a quick quiz generator which, with those caveats, may be a great help to professors.

With respect to traditional guidelines for developing and assessing multiple choice questions, such as using plausible distractors, avoiding clues and negatives, having only one correct answer, etc., the application does a good job of creating basic questions to good effect.

In summary, the ease with which the application generated multiple choice questions cannot be overrated. Especially with increased specificity of the question content, the application easily and quickly generated usable questions. As anyone who has developed questions for a quiz at the last minute can attest, this is not the easiest of endeavors, and the tool is helpful in this regard.

The authors have since used the application to generate questions for various subjects, courses and chapters, all with varying content. These were often used, as those with experience will understand how difficult it is to self-generate multiple choice questions. By providing the application with the specific content from which to generate the questions and answers, concerns about reliability and correctness are diminished.

#### Lesson Plans

Ofgang notes that while it takes experienced educators a significant amount of time to organize and coherent lesson plans, ChatGPT can generate one in short order. Ofgang (2023) again used a Journalism example, but this work used the same Social Engineering scenario used for previous generations. The prompt is:

*Create a lesson plan for the following session:*

- Session 1: Introduction*
- Introduction to Social Engineering*
  - Overview*
  - Social Engineering Techniques*
  - Human Psychology - Overview*

The result is:

Objective: By the end of the session, students will understand the basics of social engineering, several of the most common social engineering techniques, and the psychological principles upon which social engineering relies.

Time: 60 minutes

Materials Needed:  
Whiteboard/Blackboard, Markers/Chalk, Handouts

Activity 1: Introduction (10 minutes)

- Instructor introduces the topic of social engineering and its ethical and legal framework (5 minutes)
- Instructor explains the reasons why social engineering is a problem and the types of attackers who use it (5 minutes)

Activity 2: Overview of Social Engineering Techniques (20 minutes)

- Instructor reviews common social engineering attack techniques, such as phishing, vishing, baiting, and tailgating (10 minutes)
- Instructor provides examples of each type of attack (10 minutes)

Activity 3: Human Psychology Overview (30 minutes)

- Instructor explains the psychology which drives social engineers, including how to manipulate emotions, predict behavior, gain trust, and take advantage of cognitive biases (15 minutes)
- Instructor reviews tactics used by social engineers to build relationships and earn trust (15 minutes)

Activity 4: Summary/Questions (10 minutes)

- Instructor summarizes the lesson objectives (5 minutes)
- Students ask any remaining questions (5 minutes)

These results are impressive, since given the task, the application sequentially organizes the material, with not only the material to be covered, but the time it takes to cover each area. Although the instructor must make changes to this lesson plan to achieve the specific results desired, this is a good starting point which is anticipated to save the instructor a significant amount of time. As with test generation, increased specificity yields

more specific results.

### Homework Assignments

Ofgang used the example of the inverted pyramid to ask ChatGPT to devise a short homework assignment. In this work, the same Social Engineering example previously used was used again. **The query is:**

*Create a homework assignment for the following session:*

*Session 1: Introduction*

*- Introduction to Social Engineering*

*- Overview*

*- Social Engineering Techniques*

*- Human Psychology - Overview*

The results are:

Homework Assignment:

1. Research the three models of social engineering (Cialdini Model, Social Engineering Triangle, and Integrated Model). Create an overview of the three models and write a brief essay comparing and contrasting them.
2. Read an article or watch a video on human psychology related to social engineering and summarize the key points.
3. Think of an example of an effective social engineering technique and explain what made it successful.
4. Prepare a short presentation for the next session summarizing the key points you have learned about social engineering and human psychology.

As in the previous examples, while the results may have to be modified, the application quickly provides a sound basis for the instructor to build on. As with previous use cases, the more specific the input, the better the output.

### Critical Thinking and Other Uses

In a 2023 article, Abramson suggests that rather than ban ChatGPT in the classroom, professors use it to encourage critical thinking, thus helping students prepare for life as they leave academia. In the same way as calculators help students learn mathematics, ChatGPT may be used to help students think critically about liberal arts assignments. One example of this is using ChatGPT to generate the first draft of an essay,

then critically reviewing and editing it as a second draft.

Others suggest it can be used for brainstorming, content creation, translating and tutoring. Liberman (2023) provides examples where ChatGPT is used for generating and analyzing text with varying tone, generative email, grading and finding resources.

Generative AI can also provide valuable feedback to students. Applications such as Claude.AI can provide detailed recommendations for improving essays and writing assignments based on various writing manuals.

### Generative AI Assignments

Specific deliverables may be assigned by instructors to help students understand and investigate how generative AI may be used to improve their work.

One such assignment has three parts. The first part is to have students read an article on a specific topic, then write a 500-word essay highlighting and expounding on the topic. The second part of the assignment involves having students use ChatGPT to generate the same 500-word assignment. In the final part of the assignment, students are asked to write 500 words comparing their essay with the same essay generated by ChatGPT. This has proven successful in encouraging students to consider whether generative AI adds value to the final product, how it can prove insightful in adding value through library research, how attribution and citation are applied, and what the advantages and limitations are of using this technology in their studies.

Another assignment adds value through improving the quality of student writing. In a freshman seminar, students are required to visit the school writing center to meet with a writing consultant before submitting each major deliverable, including a six-page literature review and a 12-page argument paper. Although it is a course requirement, many students balk at meeting with the writing consultant.

In the latest offering of the seminar, students were required to use Claude.AI to provide detailed feedback on their writing prior to meeting with the writing consultant. They were then tasked to revise their papers using the generated feedback, then meet with the writing consultant. It was found that after this assignment, students were more likely to visit the writing consultant, and those students who still did not use the

services of the writing consultant had improved papers simply through use of the AI generated feedback.

## 5. CONCLUSION

There is no question that ChatGPT adds value and saves time for faculty developing and generating courses. It can quickly generate syllabi, homework assignments, quizzes and lesson plans and much, much more. However, it has been demonstrated to display biases, and to confidently generate incorrect information. As a program, it is unable to capture insight the instructor may have through knowledge, experience, critical thinking or the integration of those processes. Like any tool, it can add value when its outputs are validated, checked, and massaged to yield savings of time and effort. It can also be used to help students deliver better assignments through assistance in library research as well as improving their written assignments. Emerging AI applications will prove useful in current and future academic efforts by students and instructors.

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