



BUSM758V: Special Topics in Business: Designing AI Systems

Term: Fall 2024

Professor: Kunpeng (KZ) Zhang

Email: kpzhang@umd.edu

Office Hours: Zoom (by appointment)

Credits: 2

Course Dates: August 26, 2024 - October 14, 2024 (7 weeks)

Course Times: Tue, Thu 10-11:50am EST

Classroom: VMH 1202

Course Description

Artificial Intelligence is transforming business and society at an unprecedented scale. While consumer applications such as face recognition for devices, image tagging on social media, or ChatGPT for information (and entertainment) have fast demonstrated value, there are more serious questions/concerns regarding AI's broader business and societal use. While the opportunities are indeed tremendous (with AI impacting trillions of dollars in value creation per some estimates) there is widespread recognition that there are major challenges ahead. Obtaining returns on investment from AI will not be trivial, and will need intentional design and a deep understanding of the capabilities of key technologies. This course presents students with key foundational concepts that underlie Artificial Intelligence in order to prepare them to be better managers who can make decisions regarding AI design, development and use.

The course is designed for a broad MS/MBA audience and will present these concepts from the basics.

Learning Outcomes

After successfully completing this course you will be able to:

- Draw boundaries around what AI is
- Describe some differences between pretrain vs. fine-tuning of a LLM
- Understand the capabilities of LLMs with in-context learning
- Be able to deploy a LLM in a local computing environment
- Build a LLM agent in your context
- Identify challenges with AI and present possible solutions

Course Structure

Our class time will include lecture, group work, discussion, and some in-class activities. The tentative structure is listed below, subject to change.

Week 1

Introduction

- Introduction to the course
- Introduction to AI
- LLM and its history

Resources of LLMs

- Data for pre-training
- Data for alignment
- Data for coding training

(Question 1 – due by the end of week 2)

Week 2

Pretraining LLMs

- Data preparation
- Transformers
- Pretraining

Week 3

Fine-tuning and Alignment (team proposal due at the end of this week)

- Fine-tuning
- Human alignment

(Question 2 – due by the end of week 4)

Week 4

Decoding and LLM Deployment

- Decoding algorithms
- Efficient LLMs

Week 5

In-Context Learning

- Prompt engineering
- Chain-of-Thought (CoT)

(Question 3 – due by the end of week 6)

Week 6

LLM Agent

- Build a LLM agent
- Applications of LLM agents

Week 7

LLM Evaluation and Applications

- Evaluation metrics
- Evaluation of basic and advanced capabilities of LLMs
- Public benchmarks
- Applications of LLMs

Course Materials & Software

All readings will be provided as online links to publicly accessible articles, papers and cases. In addition, the following textbooks are **optional** and provide excellent context around Artificial Intelligence.

- Mitchell, Melanie. Artificial intelligence: A guide for thinking humans. Penguin UK, 2019.
- Russell, S. Human compatible: Artificial intelligence and the problem of control. Penguin, 2019.

Course Outline

The content is structured around broader questions listed below.

Major Assignments

- Analyses Videos (Individual). There are three questions in the course. Create one 3-5 minute video EACH to answer five of these three questions. Your video should (i) show you talking to the camera explaining your views on the question, (ii) demonstrate the ability to draw on important aspects covered in the class (iii) either use slides or other material as needed to explain your points and (iv) demonstrate some of your own originality by showing connections to current news/events or in other ways. The videos will be graded on content, connection to course material, how coherent and structured the entire presentation is, and originality. You could consider doing a “transcript” before recording the answers.
- Initial Proposal (Individual, or teams of 2/3). At the midway point in the course provide a one page report on a firm for which you will develop an AI system by pretending to be its CEO presenting to the board. The first report should outline the team members, the firm you picked, and what topics you expect your AI system report to cover and why you chose those topics.
- Final Presentation/Report (Individual, or teams of 2/3). Submit/present the AI system report as part of class in a 5 minute presentation along with a written report. Length is not a constraint (to rephrase a famous person: as succinct as possible, but no succinter) – this can be discussed and pre-approved if necessary by email with the professor. The report will be evaluated based on (i) completeness in terms of covering the key aspects that apply to this specific firm/industry with regards to the potential and harms of AI systems (ii) coherence and logical arguments and (iii) consistency with emerging regulations and guidelines. Make sure to research the firm, and news around its industry, to also help develop the AI system report.
- Class Participation. Based on participation in class and online discussions on canvas.

Grading Structure

Assignment	Percentage %
Homework – 3 Videos	45%
Initial Proposal	10%

Final Presentation & Report	30%
Class Participation	15%
Total	100%

Course Policies

University Class Policies

Students are responsible for knowing their rights and reviewing all course related policies found at this link to [UMD's Office of Undergraduate Studies website](#) or [UMD's Graduate Schools list of Course Policies](#).

Class Discussions and Participation Guidelines

The primary goal of our discussions is to enhance the collective learning of the class. The following guidelines can help you make effective contributions to our class discussions. Please see the following list of tips for effective and meaningful discussion participation.

Examples of Good Discussion Contributions:

- Comments that report and explain content, opinions, or analysis by stating clear assumptions, critically self reflecting, citing specific sources, and/or conducting explicit, systematic analysis
- Comments/questions that provide or seek clarification
- Comments with good timing as well as good substance providing substantiated claims and evidence and sharing sources where possible
- Comments that make points clearly 4 Last updated 1/10/2023
- Comments that move learning forward by building an argument and/or drawing on other comments without repeating
- Comments that respectfully articulate a point of agreement/disagreement

Examples of Ineffective Discussion Contributions:

- Destructive attacks
- Interrupting peers
- Monopolization of the discussion
- Disrespectfully articulating a point of agreement/disagreement
- Out-of-sequence comments / destroying the flow of class discussion

Resources & Accommodations

Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The [Accessibility & Disability Service \(ADS\)](#) provides reasonable accommodations to qualified individuals to provide equal access to services, programs

and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements. For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu. More information and services are available from the [UMD Counseling Center](#).

Student Resources and Services

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit [UMD's Student Academic Success website](#) to learn more about the wide range of campus resources available to you.

In particular, everyone can use some help sharpen their communication skills (and improving their grade) by visiting [UMD's Writing Center](#) and schedule an appointment with the campus Writing Center. You should also know there are a wide range of resources to support you with whatever you might need ([UMD's Student Resources and Services website](#) may help). If you feel it would be helpful to have someone to talk to, visit [UMD's Counseling Center](#).

Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit [UMD's Division of Student Affairs website](#) for information about resources the campus offers you and let me know if I can help in any way.

Statement on Diversity and Inclusion

As part of the [Smith School's commitment to diversity and inclusion](#), we recognize the importance of a diverse student body as necessary to a THRIVING environment. We are committed to fostering inclusive and equitable classroom environments. The Robert H. Smith School of Business strives to ensure all members of the Smith community feel welcomed, valued, and proud of every aspect of who they are. Through education, knowledge creation, advocacy, programming, and support, Maryland Smith commits to building an inclusive community that fosters a sense of belonging among all stakeholders. Additional UMD-wide resources are available to you in [the Office of Diversity and Inclusion](#).

I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all 5 Last updated 1/10/2023 aspects of your identity, is your choice whether to disclose (e.g., should it come

up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps. For more resources and information, visit the [LGBTQ+ Equity Center](#).

Technology Policy

Please refrain from using cellphones, laptops, and other electronic devices during class sessions unless we have designated such use as part of a class exercise.

Faculty Expectations

- I will respond to emails typically within 24-48 hours. Feedback on assignments and grades will be returned in a timely manner, targeting an interval of 5 working days.

Student Expectations

- Students are expected to be on time to class, read assigned readings prior to class, submit all assignments by the deadline and treat each other professionally like they might colleagues at work.

Attendance and Participation

- Given the interactive style of this class, attendance will be crucial to note-taking and thus your performance in this class. Attendance is particularly important also because class discussion will be a critical component for your learning.
- Each student is expected to make substantive contributions to the learning experience, and attendance is expected for every session.
- Students with a legitimate reason to miss a live session should communicate in advance with the instructor, except in the case of an emergency.
- Students who miss a live session are responsible for learning what they miss from that session.
- Additionally, students must complete all readings and assignments in a timely manner in order to fully participate in class.

Absences and Late Policy

Late assignments require prior permission from the instructor and must be accompanied by a legitimate reason for not meeting a target deadline.

[The complete university policy on absences can be found here.](#)

As per university policy, one missed class with an email notification (preferably before) is acceptable. For absences longer than 1 class session, or more than twice in the semester, documentation is required. With appropriate documentation students will be given one week from documentation to take the assignment and ½ points for 2 weeks after documentation receipt.

i.e. For Major Scheduled Graded Events (MSGEs), only University approved absences (religious observance, unforeseen life circumstances out of your control (with

documentation), or documented illnesses with appropriate documentation will be accepted.

Academic Integrity

The University's [Code of Academic Integrity](#) is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the Smith School does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time at the Smith School.**

It is important to note that course assistance websites, such as CourseHero, are not permitted sources for Smith School courses, unless the instructor explicitly gives permission for you to use one of these sites. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. These sites offer information that 6 Last updated 1/10/2023 might not be accurate and that shortcut the learning process, particularly the critical thinking steps necessary for collegelevel assignments.

Additionally, it is understandable that students may use a variety of online or virtual forums for course-wide discussion (e.g., GroupME or WeChat). Collaboration in this way regarding concepts discussed in this course is permissible. However, collaboration on graded assignments is strictly prohibited unless otherwise stated. Examples of prohibited collaboration include: asking classmates for answers on quizzes or exams, asking for access codes to clicker polls, etc. Finally, on each exam or assignment you must write out and sign the following pledge: "***I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment.***" Please visit the [Office of Undergraduate Studies' full list of campus-wide policies](#) and follow up with me if you have questions.

To help you avoid unintentional violations, the following table lists levels of collaboration that are acceptable for each type of assignment. If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to me straight away. Also, if you are ever unclear about acceptable levels of collaboration, please ask!

Course Evaluation

Please submit a course evaluation through CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to CourseEvalUM is confidential. Campus will notify you when CourseEvalUM is open for you to complete your evaluations for fall semester courses. Please go directly to the [Course Eval UM website](#) to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo, the evaluation reports

for the thousands of courses for which 70% or more students submitted their evaluations.
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About the Instructor

Please visit my website to know more about me. <https://kpzhang.github.io>