MGMT 4803/8803 – AI in Business

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Office: Scheller 493 (4164) – Southwest Corner of 4th Floor
Lecture Time: Tuesday/Thursdays 9:30-10:45AM (Undergrad); 12:30-1:45PM (Masters)
Office Hours: Tuesday / Thursday 2:30-3:30PM, or by appointment (email me).
Course Location: TBD
Course Website: TBD
Teaching Assistant: TBD

1. Course Description

A. Overview

Description

Since 2012, artificial intelligence (AI) technology has seen unprecedented advancements due to breakthroughs in deep neural networks. These rapid gains have fueled excitement about AI's potential to revolutionize businesses across industries, from finance and healthcare to retail and manufacturing. However, while AI applications are becoming increasingly visible, the hype often overshadows the significant challenges in successful implementation. To realize the technology's potential, managers must gain a holistic understanding of the technology, including how its components fit together.

This course explores AI's transformative impact on modern organizations, focusing on Large Language Models (LLMs) and the thriving AI ecosystem driving forward these advances. Through three distinct modules, the course offers an in-depth look at cutting-edge AI technologies, their practical applications in businesses, and the emerging AI supply chains, emphasizing the role of open-source software. Students will gain hands-on experience by prototyping AI solutions and analyzing real-world business cases, mastering both technical skills and the ability to evaluate trade-offs in AI implementation. By the end of the course, participants will confidently navigate AI's evolving landscape, make informed decisions about its use, and effectively communicate AI-driven projects to external stakeholders.

Prerequisites
- Undergrads at the Juniors and Seniors only.
- Python proficiency at the level of CS 1301 or MGT 3745. Students should be able to independently set up a programming environment, install Python packages, read technical documentation, and debug code.
  - All course assignments can be completed through Google Colab.

○ We will extensively use APIs from OpenAI and libraries from Hugging Face and LangChain throughout the course, but prior exposure to these technologies is not required.

Note: prior exposure to machine learning (ML) methods (for example, MGT 4803 "ML for Business") is helpful but not required.

B. Learning Objectives

1. *Conceptual Understanding*.
   ○ Develop fluency in fundamental AI principles. Understand their key strengths and limitations (e.g., hallucinations, biases, computation challenges).
   ○ Master essential terminology and concepts, such as Prediction, Generative AI, Language Modeling, Training, Dataset Size, Compute, GPUs, Evaluation, Bias, Tokens, and Context Windows.
   ○ Gain insight into the AI ecosystem by becoming familiar with leading firms. Learn to stay current with AI advancements via news and tech media (e.g., Twitter, NYTimes).
2. *Technical Skills*.
   ○ Gain hands-on experience using high-level AI APIs to create business prototypes and understand typical deployment challenges.
   ○ Understand the trade-offs between prototyping shortcuts and the steps needed for production-ready deployment.
   ○ Build confidence in navigating online documentation and independent learning resources.
3. *Business Skills*.
   ○ Apply a structured framework to identify where AI generates value within business processes and the necessary complements for that value realization.
   ○ Evaluate AI technologies with attention to ethical implications in deployment.
   ○ Develop skills to present and advocate for AI-based projects to non-technical stakeholders effectively.

C. Course Components

See below how these components fit into the [course grading breakdown](#).

Lectures

~30x 75-minute classes focused on both technical content and case analysis. Attendance is mandatory, as participation in discussions is a key class component. The second half of the course will be a case-based discussion. You must read 18x case studies and come to class prepared to discuss them.

● **Name Tags**. You must print out a name tag with your name and place it in front of you during class. This will facilitate getting to know other students and creating a more familiar atmosphere in the class.

- **Sign-in Sheets**. I will provide a sign-in sheet for tracking attendance at each of the case study discussions. (It may go without saying, but you may not fill out the sheet for other students — doing so violates the honor code and will be reported if caught.)

Assignments

Weekly Assignments:
- *Technical Assignments*. The first third of the course will contain weekly technical assignments to introduce you to the high-level open-source libraries used to implement Generative AI applications.
- *Blog Posts* (choose 4x weeks out of 6x opportunities). A written reflection or research on an AI applications in the world (the specific assignment details vary by topic). You will share your thoughts with the class and will engage each other in discussion about it. You must comment on 2x of your classmates' posts in the weeks you post.

Weekly assignments are intended to promote deep engagement with the materials and to take 1-3 hours.

Independent Learning

All students are expected to play an active role in their own learning. We simply will not have enough time to cover the details of the software libraries (Hugging Face, LangChain, Gradio) that will be introduced in class. However, these technologies are incredibly deep and powerful and *changing*, and I promise you will be rewarded in the coming years for the extra time spent learning them.

The course is designed with the technical component in the first third so that you have time to explore and tinker with these technologies independently over the remainder of the course. In a real world job, you will likely not have time to do this type of exploration — think of this class as your excuse to *get* to spend time doing this.

Final Project

By the end of the course, you must develop a prototype of an AI application that addresses an important business problem and present your solution. The goal here is to challenge you to think critically about how AI can solve key business issues by automating/streamlining costly processes or enabling new functionality that wasn't previously viable. Final projects will be graded based on four components:
- *Working Prototype*. You may use frameworks such as Gradio, Hugging Face Spaces, or any platform where you can showcase the application in action.
- *Business Problem Framing* (750 words max). What business problem are you solving? How does AI fit into your solution? How will your solution impact the underlying fundamentals of the business?

- *Implementation Plan* (750 words max). How will you evaluate your solution? What ethical, privacy, or bias-related issues could emerge? What additional work would be needed to implement a solution like this in practice in an organization?
- *Presentation*. You will create an engaging video presentation summarizing your work in class (likely around 5 minutes). The top projects may have an opportunity to present their project live for the class with Q&A for extra credit opportunities.

Some guidelines:
- Final project work can be done in teams of up to three; grading standards will be commensurate to the number of teammates (a higher standard for more people).
- The use of generative AI is *highly encouraged* in the process of developing these prototypes. [See below for the course's AI policy.] We will only have time to engage libraries like Transformers or LangChain at a superficial level in class, but you will likely need them to implement interesting solutions. This project is a good chance to learn *how* to work with these technologies.

Sample Projects may include:
- Prediction-based AI
  - *Demand Forecasting System*: Develop a system that uses historical sales data to predict future demand, demonstrating how it can reduce inventory costs and optimize supply chain management.
  - *Fraud Detection in Transactions*: Use AI to detect fraudulent transactions in financial data, explaining how it improves security and reduces financial losses for a business.
  - *Predictive Maintenance for Machinery*: Implement a predictive maintenance system using sensor data to predict equipment failure. Demonstrate how it can save costs by reducing downtime and repair expenses.
- Generative AI
  - *Customer Support Chatbot*: Build an AI-driven chatbot for automating customer support using a pre-trained language model. Show how it reduces operational costs by handling common inquiries. (Service Requests)
  - *Automated Resume Screening Tool*: Create a resume screening tool using natural language processing (NLP) techniques. Showcase its ability to speed up the hiring process and improve candidate selection.
  - *AI-Based Recommendation System*: Build a recommendation system for an e-commerce site, demonstrating how it enhances user experience and increases sales by suggesting relevant products. (Product Reviews)
  - *Data Analysis Assistant*: Integrate custom information into a chatbot that can facilitate business analysis.

D. Course Plan (Tentative)

This course has three modules, arranged around three classes of *complements* to AI technology.

1. Complementary Skills (AI Technology) – focusing on using Large Language Models (LLMs) and Generative AI at scale.
2. Complementary Organizational Processes (AI Applications) – with a focus on how AI is practically used in modern businesses
3. Complementary Ecosystem (AI Supply Chains) – with a focus on the companies developing AI, especially Open Source software

The capstone assignment is to present a prototype of an AI application with an accompanying business case.

Week	Class	Date	Topic	Assignment Due*
1	1	01/07	Course Introduction • Motivation – Productivity Benefits from AI • Course Structure • Course Assignments and Policies	
	2	01/09	Overview of AI Technology • Historical Perspectives on AI Technology • Machine Learning & Prediction • Breakthroughs in the 2010s	
Module 1: Complementary Skills (8x Classes)				
2	3	01/14	GenAI Overview • Generative AI • Language Modeling and Emergence / Transfer Learning • Chatbots and "Sentience" – Three Sleepless Nights	Blog Post I: AI Applications in the World
	4	01/16	The LLM "Black Box" • How LLMs are Trained • Usage Considerations • Weaknesses and Limitations, and how to remedy them	*comments on blog posts due*
3	5	01/21	Prompt Engineering • Principles • Dynamic Prompt Engineering (RAG)	Blog Post II: "Three Sleepless Nights" Exercise

			● Modular Prompt Engineering (Agents)	
	6	01/23	Developing with LLMs ● LLM Inference Providers ● Local Deployment ● Model Hubs (OSS Model Community)	*comments on blog posts due*
4	7	01/28	Building AI Systems ● Generative AI Systems ● RAG Systems ● Orchestration	Prompt Engineering Assignment (Hugging Face)
	8	01/30	Augmented LLMs and Agents ● Structured Outputs ● Tools ● Agents	
5	9	02/04	Building User Interfaces for AI ● Emerging Interface Patterns ● Gradio / Streamlit	Retrieval-Augmented Generation Exercise (LangChain)
	10	02/06	Other Modalities ● Vision Models ● Audio Models	
Module 2: Complementary Organizational Processes (12x Case Studies)				
6	11	02/11	Products – Dentistry ([VideaHealth](#))	Gradio – Building a Model Interface
	12	02/13	Products – Healthcare ([IBM Watson](#))	
7	13	02/18	Products – Manufacturing ([Intenseye](#))	Final Project – Proposal Due
	14	02/20	Products – AVs ([Waymo](#))	
8	15	02/25	Operations – Pharmaceuticals ([Moderna](#))	Blog Post III — Products
	16	02/27	Operations – Finance ([Ant Financial](#))	*comments on blog posts due*
9	17	03/04	Operations – Media ([Disney](#) / [@PyTorch](#))	Final Project – Business Case Due
	18	03/06	Operations – Tech Recruiting ([Baidu](#))	

10	19	03/11	Corporate Functions – Strategy ([BCG](#))	Blog Post IV – Operations
	20	03/13	Corporate Functions – Customer Service ([Loris](#))	
11	21	03/25	Corporate Functions – Marketing and Sales ([Pernod Ricard](#))	Final Project – Implementation Plan Due
	22	03/27	Corporate Functions – AI Ethics & Alignment ([Timnet Gebru @ Google](#)) Co-Intelligence Chapter 4 – Alignment	
		03/18	*Spring Break*	
		03/20	*Spring Break*	
Module 3: Complementary Ecosystem (6x Case Studies)				
12	23	04/01	Data [Labeling] ([SmartOne](#))	Blog Post V – Corporate Functions
	24	04/03	Compute [Chip Manufacturers] ([NVIDIA](#))	*comments on blog posts due*
13	25	04/08	Algorithms [Open Source Software] ([Hugging Face](#) / B Case)	*[Work on final project]*
	26	04/10	Algorithms [Proprietary Software] (TBD either [OpenAI](#) or [Anthropic](#))	
14	27	04/15	Tech Giants I ([Microsoft (GitHub)](#))	Blog Post VI – AI Ecosystem
	28	04/17	Tech Giants II (TBD either [Google (OSML)](#) or [Amazon (AWS Sagemaker)](#) or [AI Wars](#))	*comments on blog posts due* Final Project Video Presentations Due
Final Project				
15	29	04/22	Final Project Demos	(The instructor will notify ahead of time if you are presenting.)
Potential Industry Visitor				
			Guest Speaker – possibilities: ● Daniel Citron (AI Fashion)	

			● Ben Scharfstein (Village Computing) ● Angela Fan (Meta) ● Alex Wang (Cohere) ● Kevin Crosby (GitHub)	

*All assignments are due at the start of class on the assigned date.

E. Materials

Primary Materials

- Harvard Business Publishing Cases – 18 Cases in Course Pack (~ $100)
- Open Source Software (Free!)
  - [Transformers](#)
  - [LangChain](#)
  - [Gradio](#)
- Other readings will be provided on an as needed basis through canvas

Optional Readings

1. **Economics of AI**
   - **Prediction Machines** (Agarwal, Goldfarb, and Gans 2018)
   - **Competing in the Age of AI** (Iansiti and Lakhani 2020)
   - **Power and Prediction** (Agarwal, Goldfarb, and Gans 2020)
   - **Human + Machine** (Dougherty and Wilson 2024)
   - **Co-Intelligence** (Mollick 2024)
2. **AI Industry War Stories**
   - **Genius Makers: The Mavericks Who Brought AI to Google, Facebook, and the World** (Metz 2021)
   - **The Worlds I See: Curiosity, Exploration, and Discovery at the Dawn of AI** (Li 2023)
3. **Open Source Software**
   - [**Working in Public: The Making and Maintenance of Open Source Software**](#) (Eghbal 2020)

Computing Infrastructure

AI is compute-intensive, and we will build AI applications in this course that will benefit from better compute. Access to a computer equipped modern browser technology (i.e., the latest version of Chrome, Safari, or Firefox) is a must.

Nevertheless, this course is *accessible* to those without top-end computers. In particular, this course will take three steps to ensure equitable access to technology for all students:

- All assignments will be distributed via Google Colab, which can be executed for free by students.
- The course will focus on teaching AI through the lens of *open-source software*, which is freely accessible.
- The one exception is the use of OpenAI's API. Instead, the course instructor will provide a limited budget for OpenAI token credits. Each student will be provided an OpenAI API key upon request.

More technically inclined students are free to explore alternative ways to implement AI technologies, not limited to:
- Using Managed API Services from other providers like Google or Anthropic
- Locally running an Open Source LLMs on your own machine or on GPUs provided through Colab.

F. Course Communications

Website.

TBD – Canvas, Piazza, etc.

Course Announcements.

TBD

Instructor Email.
TBD.

2. Course Policies

A. Grading Structure and Policies

Course Component		Percentage of Grade	Grading Breakdown
Technical Assignments		15	3x assignments, 5x points per assignment (Must complete all assignments) *Note: these are intended as building blocks to help with the final project and are <u>strongly</u> recommended.*
Case Study Discussion Participation		25	18x Case Studies total. Point opportunities per class: • 1x point for attendance • 1x point for active participation Maximum of 25 points. *Note: "Activeness" of participation is based on your contributions to the class discussion: either a helpful comment or question. High-quality contributions are meaningful, thoughtful, relevant remarks or questions that enhance everyone's understanding of the case or concepts discussed and do not have to be "correct." Seemingly erroneous comments can be highly valuable as well. If, by nature, you are a quiet person and would like to be called upon in class, please*

Course Component		Percentage of Grade	Grading Breakdown
			let me know, and I will help draw you into the class discussions. Assessment of activeness is up to my subjective judgment and cannot be disputed.
Blog Posts		20	6x assignments opportunities In the weeks that you post: • 4x points per assignment, • 1x point for 2x comments on other's posts Maximum of 20 points. (You only have to complete 4x assignments to get a full score, but can complete more to make up for missed credit..)
Final Project		40	Breakdown: • 10 Implementation Plan • 10 Business Case • 10 Prototype • 10 Presentation / Video • Up to 5 extra credit points for live presentation in front of class.

Letter grades for this course will be based on the following cutoffs
- A: 90-100%,
- B: 80-89.99%,
- C: 70-79.99%,
- D: 60-69.99%,

- F: <60

The instructor reserves the right to adjust *down* the lower-bound of each grade category (i.e., grant a higher letter grade for a lower numeric score) or provide opportunities for extra credit; any such changes will be made uniformly available to the entire class.

I aim to return grades within a week of each assignment's submission. Note that graduate assistants may assist me with grading. Case Study Discussion Participation will not be made available on Canvas, but you can check with me for your score at any point.

Grading Philosophy.

This is a new course, and I intend that even those without significant exposure to programming or AI technologies can get an A if they put in the appropriate amount of effort and learn the relevant skills. Grading is my tool for incentivizing and rewarding that effort and learning.

In the past, I've seen students put *a lot* of effort into disputing grades perceived as too low. Naturally, [you can do that](#) in this course. However, I strongly prefer that students instead put in that effort *up front* to produce higher-quality submissions. Show your work and fully complete the assignment, and I promise to reward it. My goal is that everyone feels they learn a lot and receive a fair grade corresponding to the effort they put in at the end of the course.

Attendance.

Your presence contributes to the class environment and your fellow students' learning. Therefore, as a norm, in-person attendance is expected. For technical lectures (1–10), attendance/participation is ungraded. The intention is for these lectures to be recorded and posted to Canvas, with the idea that different people learn technical skills differently. For case lectures (11-28), attendance/participation is mandatory and will be graded (as described above).

In this course, you are responsible for managing your attendance. It is "okay" to miss class for a valid reason (you don't need to feel bad about it — life happens, I get it!), but any missed classes will result in missed Case Study Discussion Participation Points. As a common courtesy, I would appreciate it if you notified me if you plan to miss a class.

Missing Class – Optional Make-Up Assignment

Up to three times during the course, you can make up the 2x participation points for a missed case discussion session by submitting a 1x page case summary and three key observations you would have contributed to class discussion. This is due one day after the start time of the missed class, and can be submitted via canvas. For these case summaries, you may use AI to assist per [the AI usage policy](#), but responses should go well beyond naive prompting. This assignment is intended to deepen your engagement with the case—meaningful learning will come only if you engage the case details.

<u>*Late Assignments.*</u>

Unless otherwise stated, all assignments are due at the start of class on the listed due date for the assignment. The Canvas timestamp determines submission time — no grace period is given for network issues on the student end. Assignments must be uploaded as a pdf or jupyter notebook — links to google docs or colab notebooks are not accepted (there is no way to verify assignment completion before the due date).

Assignments can be turned in late, losing 1 point per day, without additional explanation required. For example, if an assignment is due on 01/14 at 9:30 AM but is submitted on 01/14 at 3:00 PM, 1 point will be deducted. If submitted at 9:31 AM on 01/15, 2 points will be deducted. (Note that for a 5-point assignment, a 1-point reduction is a substantial amount.)

<u>*Grading Disputes.*</u>

Students may petition the instructor to re-grade assignments via email if a significant misgrading occurs. In your email, include a detailed rationale for the regrade request. All requests must be submitted within 2 days of the returned grade.

Please use this privilege lightly – I will default to trusting the judgment of the original grader, whether myself or a graduate assistant. *Note that regrading may result in an even lower grade.*

B. Additional Policies

<u>*Classroom Conduct.*</u>

Please be engaged and civil in classroom discussions. To get to this GA Tech, you all have been excellent students somewhere — please continue to model that here.

The following are not permitted during class discussions.
- Use of electronic devices (except to reference course docs or use technology relevant to the class discussion)
- napping
- talking outside of the class discussion
- reading the newspaper (includes working puzzles contained therein)
- studying or doing homework for other courses
- arriving at class late & leaving class early on a consistent basis

Such behavior risks losing class participation points. In extreme cases, students will be asked to leave the class & a referral will be made to the Office of Student Integrity.

<u>*Collaboration Policy.*</u>

All blog posts must be individually completed. Collaboration is allowed in groups of up to 3x on technical assignments and the final project. Any collaboration must be reported. All

collaborations will be graded on a correspondingly higher difficulty scale, and each member will receive the same grade for the relevant assignment.

Use of AI & LLMs.

This is a course about AI, and you will have access to AI in most work settings. Therefore, unless otherwise stated, using LLMs for assignments is permitted (and encouraged) in this class.

For all non-code assignments, if you use an LLM, you must add a paragraph summarizing your interactions with the LLM and what tasks you used it for. When it makes sense, please also comment on whether anything surprised you or whether the chatbot failed at any particular tasks.

You should never submit an unedited output of an LLM as a final product. The value of these tools comes from iteratively interacting with them and then selecting from and rearchitecting their output to suit your purpose. You will likely need to do this in any future job, so you may as well start doing it now. Therefore, the standards for grading will be commensurately adjusted *– you should be able to submit a higher quality assignment than a naively prompted LLM can.*

If there are any assignments that explicitly aim to *assess knowledge* (such as proctored quizzes or exams), the use of AI tools will not be permitted. Such assignments will explicitly state this restriction. There is no plan for such assignments as of the start of the course.

Plagiarism.

Plagiarism, which includes copying homework, is considered a serious offense. You are not allowed to copy and paste or submit materials created or published by others, as if you created the materials. Similarly, you are responsible for checking the output of any AI-generated text to ensure a lack of plagiarism. All materials submitted and posted must be your own original work. You may not submit materials produced for other courses or prior iterations of this course without explicit approval of the instructor.

Honor Code.

The Georgia Tech Honor Code is in effect. The complete text is on the Honor Advisory Council website: https://osi.gatech.edu/content/honor-code. You are expected to be aware of actions that constitute cheating, fabrication or falsifications, multiple submissions of essentially the same work for different classes, plagiarism, and complicity in academic misconduct. Suspected cases of academic misconduct are investigated by the Office of Dean of Students.

Accommodation for Disabilities.

If you have established accommodations with the Offices of Disability Services, please communicate your approved accommodations to the instructor at your earliest convenience so

we can discuss your needs in this course. Any accommodations granted will begin after you present documentation. Accommodations for a specific event will be considered after the request but before the event. No retroactive accommodations will be made.

If you have a need but have not yet established accommodations through Disability Services, you should contact Disability Services at 404.894.2563 or dsinfo@gatech.edu or http://disabilityservices.gatech.edu. Disability Services offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s), and Disability Services.

Should a new disability be identified during the semester, the instructor will work with Disability Services to accommodate your needs from that time forward.