Yale SCHOOL OF MANAGEMENT

Course Information

Course Number:	MGT 853
Course Title:	Artificial Intelligence: Strategy + Marketing
Term and Year:	Spring-2 2024
Class Meeting Time, Day:	Section 01: Tue / Thu 2:40 pm – 4:00 pm, Evans Hall 4210
	Section 02: Tue / Thu 4:10 pm – 5:30 pm, Evans Hall 4210

Contact Information

Professor:

Name: Vineet Kumar
Office Location: 5455
Telephone Number: 203.436.9657
E-mail Address: vineet.kumar@yale.edu
Office Hours: By Appointment

TA(s):
Seung Yoon Lee (01/02)
seungyoon.lee@yale.edu

Peter Lee (01/02)
peter.s.lee@yale.edu

Course Materials

- Textbook(s): None required

- Recommended Books: Instructor will provide required book chapters via Canvas.

- Readings: **See Detailed Outline of Class Sessions.**

- Software: **Excel may be used for assignments and project if needed.**

Course Description and Objectives

Disclaimer: Syllabus is tentative. Please check latest version on Canvas by "Last Updated" date.

Course Description:

Artificial Intelligence is a general-purpose technology which has the potential to transform many aspects of business and society. In business, the impact ranges from commonplace predictive improvements at one end of the spectrum to opportunities for creating entirely new markets at the other. As background, the course will briefly introduce students to Artificial Intelligence / Machine Learning methods comprising of Unsupervised, Supervised and Reinforcement Learning. Through a combination of lectures and case studies, we will learn how to integrate AI into decision making, focusing on the strategic choices firms face in developing and using AI / ML, including generative AI. We will seek to understand how consumers, decision-makers other stakeholders evaluate decisions made by AI systems and are impacted by it. We will examine the state-of-the-art in explainable and interpretable AI, which aim to make black-box decisions more transparent. Finally, the course

will also explore issues at the intersection of AI and Society including fairness and bias, which have proved especially challenging to address.

Logistics: The course will be taught *in-person only* (there is no virtual option as per SOM policy), unless public health concerns require YSOM to change course.

Audit Policy: This is an elective class designed for graduate students at the Yale School of Management. Please note that this course will not be available for audit, and students must be officially registered to attend.

Course Objectives:

The course is designed to provide a strategic perspective on AI technologies, but given the broad scope of the topic, I've had to make tradeoffs in selecting areas to examine in depth. My goal is that a student who completes the course successfully should be able to:

- Understand the basics of AI and ML models

- Determine how AI objectives connect to business objectives and strategy

- Understand a framework for decisions on AI / ML and identify the major resources required to implement the chosen AI strategy

- Develop a perspective regarding new emerging AI technologies and how they could reshape markets and firms

- Evaluate the broader societal implications of AI, and how different stakeholders (consumers, employees, firms, regulators, investors and others) are impacted by AI.

Note: This is NOT a computer science ML course. We will briefly review selected ML algorithms; we should not expect a comprehensive or in-depth examination of how these algorithms work.

Course Requirements

Course Component	Details	Points
Assignments (Individual and Group)	See details below	50
Attendance and Class Participation (Individual)	Every class	30
Paper Presentation (Group)	See details below	25

Please see the Yale SOM Grading Policy at http://portal.som.yale.edu/page/grading-policy

Class Participation: AI Strategy is a class where significant value is derived from in-class discussions. You will be encouraged, and likely cold-called to air your views in class. Evaluation will be on the quality and to a lesser degree, the number of comments you make. Please come prepared to each class by reading the assigned material and thinking carefully about the preparation questions.

Description of Assignments and Projects

Assignments: Assignments are either individual, pair or group assignments. Group assignments can be done in groups of 3-4 students, whereas Individual assignments must be submitted by each person. Please indicate the contribution of each person for assignments. Everyone in the group is expected to make a significant contribution to **each** assignment, so please budget time to discuss assignments. Late assignments will not be graded. No extensions or exceptions to any due dates should be expected. We don't have any makeup assignments for missed classes or assignments. However, if you have an extenuating circumstance, please contact **AASL**, and they will determine an appropriate course of action.

Your assignment submissions must be 4 pages or fewer (excluding any exhibits), in 11 or 12-point text font and double-spaced text. Make sure to include everyone's names in the submitted file. Please convert everything to one PDF file before submission and submit through Canvas. Please name the file in the following format. For Group assignments, A1_Group04.pdf (Assignment 1, Group 4) Similarly, for individual assignments, please use the notation A1_LastName_FirstName.pdf. For pairs, include both names. Details of Assignments will be posted on Canvas.

Due dates are listed in "Outline of Class Sessions" below. If you have any questions at all, please don't hesitate to check with the professor or TAs.

Project Presentation assignment (Group): All groups should be prepared to present in class. It is important to submit Slides through Canvas, so we can load them up well before class.

After forming a group, students select a research paper to present at the end of the course. We will provide a curated list of academic papers representing cutting edge and seminal research in ML / AI to select from.

Note 1: Students may also check with the instructor if they want to do a custom project. In all cases, groups will receive the same presentation time in class.

Note 2: The same or similar project(s) cannot be submitted or presented in multiple courses.

You will need to set up a meeting with the professor / TAs to go over the paper and obtain feedback and approval. We will send out links to help schedule meeting times during predefined blocks.

The final project deliverable will be a slide deck designed to be presented at the end of the course. Students do not need to turn in a report separately. Students will be evaluated on both the presentation and the content in the slides. The instructor will discuss project details in class.

Projects will be evaluated on the following aspects: (a) clarity of thought and presentation, (b) depth of analysis, (c) insights obtained and (d) value to audience. Depth is valued more than a comprehensive but superficial presentation. Interpreting the model, results, and learnings in your own words is valued, rather than merely repeating what the paper says.

Yale SOM Policies

Please see the Yale School of Management Bulletin at https://bulletin.yale.edu/bulletins/som/rights-and-responsibilities-students for Rights and Responsibilities of students and for the honor code.

Laptop/Device Policy

Usage NOT allowed without the express permission of the instructor. There will be (at most) a couple of sessions where laptops will be useful in class, and the instructor will specifically mention these in class.

Outline of Class Sessions

#	Date	Topic	Assignment Due (9 am)
Module A: AI Foundations			
1	Mar 26 (Tue)	Course Introduction and Supervised and Unsupervised Algorithms	
2	Mar 28 (Thu)	Deep Learning	
3	April 2 (Tue)	Reinforcement Learning and Generative Models	**A1 (Individual / Pairs)**
Module B: AI Decision Making Framework			
4	April 4 (Thu)	Economics of AI $\Longleftrightarrow$ Business Strategy	
5	April 9 (Tue)	Decision Making with AI Interpretable and Explainable AI	**A2 (Individual)** and **Project Choice**
6	April 11 (Thu)	Algorithmic Fairness	
Module C: AI in Business + Society			
7	April 16 (Tue)	Uber (CASE)	**A3 (Individual)**
8	April 18 (Thu)	Zebra Medical (CASE)	
9	April 23 (Tue)	Miroglio Fashion (CASE)	**A4 (Individual)**
10	April 25 (Thu)	Human Capital with GROW	
11	April 30 (Tue)	Guest Speaker (awaiting confirmation)	
Module D: Project Presentations and Course Wrap			
12	May 2 (Thu)	Presentations	
13	May 7 (Tue)	Presentations and Course Wrap	

Note: The content of some sessions is likely to change. I will post an announcement when there are material updates to the syllabus.

Detailed Outline of Class Sessions

Please note that "Preparation Questions" below are provided to help you prepare better for class discussion. These are NOT assignment questions and do not need to be turned in. Assignment questions will be posted separately on Canvas.

Readings available only on Canvas are marked with a (*).

Session 1: Introduction

Learning Material:

(a) (*) The Business of AI, by E. Brynjolfsson and A. McAfee, HBR

(b) (*) Artificial Intelligence for the Real World, T. Davenport; R. Ronanki, HBR

(c) (*) Competing in the age of AI, by M. Iansiti and K. R. Lakhani, HBR

(d) An Executives Guide to AI, by M. Chui, V. Kamalnath, and B. McCarthy, McKinsey & Co.
https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/an-executives-guide-to-ai

(e) Ten Things Every Manager Should Know about Artificial Intelligence, by P. Gerbert, M. Hecker, S. Steinhäuser, and P. Ruwolt
https://www.bcg.com/publications/2017/technology-digital-strategy-ten-things-every-manager-should-know-about-artificial-intelligence

(f) (Optional) The Building Blocks of an AI Strategy, by A. Joshi and M. Wade, MIT Sloan Review
https://sloanreview.mit.edu/article/the-building-blocks-of-an-ai-strategy/

(g) (Optional) The Building Blocks of Artificial Intelligence, by P. Gerbert, M. Hecker, S. Steinhäuser, and P. Ruwolt
https://www.bcg.com/publications/2017/technology-digital-strategy-building-blocks-artificial-intelligence

(h) (Optional) The State of AI in 2021, by M. Chui, B. Hall, A. Singla, and A. Sukharevsky, McKinsey & Co.
https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/global-survey-the-state-of-ai-in-2021

Preparation Questions:

(1) Where do you think the most promising applications of AI are in business? What criteria did you use in determining this?

(2) Where do you think AI is less likely to have an impact?

(3) What does an AI-first business mean to you?

(4) Do you think AI can replace human jobs? Which sectors or job types do you think are most vulnerable?

(5) What is the difference between AI and ML?

Session 2: Supervised and Unsupervised Algorithms

Learning Material:

(a) A Concise Explanation of Learning Algorithms with the Mitchell Paradigm.
https://www.kdnuggets.com/2018/10/mitchell-paradigm-concise-explanation-learning-algorithms.html

(b) Introduction to Machine Learning and Problem Framing.
https://developers.google.com/machine-learning/problem-framing

(c) The Building Blocks of AI, by N. Shnoudeh.
https://nancyshnoudeh.medium.com/the-building-blocks-of-ai-31e5b3ad0857

(d) (*) Deep Learning – Book (Chapter 1 and 2). https://mitpress.mit.edu/9780262537551/deep-learning/

(e) (Optional) Recall, Precision, F1, ROC, AUC, and everything. By O. Shalev.
https://medium.com/swlh/recall-precision-f1-roc-auc-and-everything-542aedf322b9

(f) (Optional) Evaluating a Machine Learning Model, by J. Jordan.
https://www.jeremyjordan.me/evaluating-a-machine-learning-model/

Preparation Questions:

(1) What are the essential elements of ML models? What purpose does each element serve?

(2) What are the choices made by designers in developing AI models?

(3) What is the overfitting and underfitting problem?

(4) What is the bias variance tradeoff in ML models?

(5) How should ML models be evaluated and why?

(6) How should a manager / decision-maker choose from among ML models?

(7) What are the main differences between deep learning and traditional machine learning models? (What) Can deep neural nets do things that shallow nets cannot?