OPMG-GB 4333: Advanced Topics in Data-Driven Decision Making

Fall 2022

INSTRUCTOR

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Office Location: KMC 8-75 (or virtual)

COURSE MEETINGS

Meeting Times: Fridays 1 PM to 4:00 PM (Unless otherwise noted)

Location: TBD

Schedule exceptions
Class will NOT meet on: October 21st and November 25th.
Class will meet on: All other Fridays.

COURSE DESCRIPTION AND LEARNING GOALS

Data-driven decision making has become central to operations in many application areas. This seminar course aims to introduce students to recent literature in using data-driven decision making, with a strong emphasis on applications. We will cover recent breakthroughs in diverse areas including healthcare, revenue management, inventory management and social-good. The class will also include several guest speakers who will join us to discuss their contributions in these areas. Students will be exposed to the frontiers of current research and to open problems in this field and related application areas.

The class will be divided into four different modules. Each module will cover one specific application area (revenue management, inventory management, healthcare and social-good). The last class will consist of project presentations. The schedule below is tentative and subject to change.

Each class will be divided into two halfs. In the first half, we will have student presentation, and in the second half we will have guest presentations. In the first half, we will cover either one or two papers that are relevant to the guest speaker's work that will be presented in the second half (see list of relevant references below for each week). Papers will be assigned a student presenter. The presenter will have around 60 minutes to present the work and then there will be a discussion for around 15 minutes. The class is intended to be an informal forum for discussion and for interaction among the student and faculty participants and works best when everyone contributes. To facilitate

the discussion better, there will also be student facilitators assigned to every session. Their role will be to help facilitate a livelier discussion among all participants and ask questions that will make the discussion more fun and interesting. Since we are collectively exploring an advanced topic, the discussion leader(s) need not feel that they must have a complete grasp of everything being presented – often coming to class with questions leads to the liveliest discussion and the greatest learning.

COURSE OUTLINE

This list is tentative and subject to change.

MODULE 1: Revenue Management

Sep 2 SESSION 1: INTRODUCTION & COURSE OVERVIEW

1. Introduction to Data Driven Decision Making: Course Introduction and Overview

2. Presentation assignments and project overview

Sep 9 SESSION 2: Revenue Management (Presentation by Prof. Renyu Zhang; Class will meet from 9-12:00PM)

Prof. Zhang will discuss his recent work on on cold start to improve market thickness on online advertising platforms [Ye et al., 2020].
Relevant References:

- Bandits: [Agrawal and Devanur, 2014], [Simchi-Levi and Xu, 2021]

- Experimentation on Marketplaces: [Bajari et al., 2021, Johari et al., 2022]

Sep 16 SESSION 3: Revenue Management (Presentation by Prof. Ruihao Zhu)

Prof. Zhu will discuss his recent work on demand learning using non-parametric regression in a non-stationary environment [Simchi-Levi et al., 2020].

Sep 23 SESSION 4: Revenue Management (Presentation by Prof. Jinglong Zhao)

Prof. Zhao will discuss his recent works on the design and analysis of switchback experiments [Bojinov et al., 2020, Zhao and Zhou, 2022].
Relevant References: [Eckles et al., 2017, Bojinov and Shephard, 2019]

MODULE 2: Inventory Management

Sep 30 SESSION 5: Inventory Management (Presentation by Prof. Lennart Baardman)

Prof. Baardman will discuss his recent work on the joint optimization of inventory ordering and product ranking decisions [Zhang et al., 2022].
Relevant References: [Ursu, 2018, Aouad and Segev, 2021, Ferreira et al., 2022]

Oct 7 SESSION 6: Inventory Management (Presentation by Prof. Joren Gijsbrechts)

Prof. Gijsbrechts will discuss his recent works on using Reinforcement Learning to improve inventory management under various realisitc settings [Gijsbrechts et al., 2021].
Relevant References: [Boute et al., 2021, Oroojlooyjadid et al., 2022]

MODULE 3: Healthcare Management

Oct 14 SESSION 7: Healthcare Management (Presentation by Dr. Jackie Baek)

Dr. Baek will discuss her recent work on the design of targeted, behavioral interventions to help tuberculosis patients with treatment adherence.
Relevant References: [Boutilier et al., 2021]

Oct 28 SESSION 8: Healthcare Management (Presentation by Arielle Anderer)

Arielle will discuss her recent work on learning using time-to-event data that is prevalent in healthcare experiments.
Relevant References: [Wager and Xu, 2021, Kalvit and Zeevi, 2021]

Nov 4 SESSION 9: Healthcare Management (Presentation by Prof. Hamsa Bastani)

Prof. Bastani will discuss her recent work on improving essential medicine allocation in resource constrained environments using predictive modeling and data driven optimization.
Relevant References:
MODULE 4: Social Good

Nov 11 SESSION 10: Social Good (Presentation by Prof. Somya Singhvi)

Prof. Singhvi will discuss his recent work on improving the efficiency of rural supply chains and agriculture marketplaces based in India [Levi et al., 2020a, Levi et al., 2020b]
Relevant References:

Nov 18 SESSION 11: Social Good (Presentation by Prof. Elizabeth Paulson)

Prof. Paulson will discuss her recent work on using data-driven tools for optimal refugee as-

signment [Bansak and Paulson, 2022].
Relevant References: [Ahani et al., 2021, Vera and Banerjee, 2021]

Dec 2 SESSION 12: Social Good (Presentation by Prof. Nikhil Garg)

Prof. Garg will discuss his recent work on measuring under-reporting without ground truth data, an important problem in urban city governance [Liu and Garg, 2022]
Relevant References: [Fader et al., 2005, Abe, 2009, Wu and Yang, 2019]

GRADING

Attendance and Class Participation: 50%

Final Project: 50%

PROFESSIONAL RESPONSIBILITIES FOR THIS COURSE

Attendance

Class attendance is essential to your success in this course and is part of your grade. An excused absence can only be granted in cases of serious illness, grave family emergencies, or religious observance (see below) and must be documented. Job interviews and incompatible travel plans are considered unexcused absences. When possible, please notify me in advance of an excused absence.

Religious Observances and Other Absences

NYU's Calendar Policy on Religious Holidays states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. You must notify me in advance of religious holidays or observances that might coincide with exams, assignments, or class times to schedule mutually acceptable alternatives. Students may also contact religiousaccommodations@nyu.edu for assistance.
Except for religious observances or other absences that may be required in compliance with nondiscrimination law, this class otherwise requires attendance and participation and cannot accommodate conflicts. Please review all class dates at the start of the semester and review all course requirements to identify any foreseeable conflicts with exams, course assignments, projects, or other items required for participation and attendance. If you are aware of a potential conflict, it is strongly recommended that you do not take this class.

Participation

In-class contribution is a significant part of your grade and an important part of our shared learning experience. Your active participation helps me to evaluate your overall performance. You can excel in this area if you come to class on time and contribute to the course by:

- Providing strong evidence of having thought through the material.

- Advancing the discussion by contributing insightful comments and questions.

- Listening attentively in class.

- Demonstrating interest in your peers' comments, questions, and presentations.

- Giving constructive feedback to your peers when appropriate.

Classroom Norms

Arrive to class on time and stay to the end of the class period. Chronically arriving late or leaving class early is unprofessional and disruptive to the entire class. Repeated tardiness will have an impact on your grade.

STERN POLICIES

General Conduct and Behavior

The School expects that students will conduct themselves with respect and professionalism toward faculty, students, and others present in class and will follow the rules laid down by the instructor for classroom behavior. Students who fail to do so may be asked to leave the classroom.

Students are also expected to maintain and abide by the highest standards of professional conduct and behavior. Please familiarize yourself with Stern's Policy in Regard to In-Class Behavior and Expectations and with the NYU Disruptive Bahvior policy, which may be found online.

Course Evaluations

Course evaluations are important to us and to students who come after you. Please complete them thoughtfully.

ACADEMIC INTEGRITY

Integrity is critical to the learning process and to all that we do here at NYU Stern. As members of our community, all students agree to abide by the NYU Stern Student Code of Conduct, which includes a commitment to:

- Exercise integrity in all aspects of one's academic work including, but not limited to, the preparation and completion of exams, papers and all other course requirements by not engaging in any method or means that provides an unfair advantage.

- Clearly acknowledge the work and efforts of others when submitting written work as one's own. Ideas, data, direct quotations (which should be designated with quotation marks), paraphrasing, creative expression, or any other incorporation of the work of others should be fully referenced.

- Refrain from behaving in ways that knowingly support, assist, or in any way attempt to enable another person to engage in any violation of the Code of Conduct. Our support also includes reporting any observed violations of this Code of Conduct or other School and University policies that are deemed to adversely affect the NYU Stern community.

The entire Stern Student Code of Conduct applies to all students enrolled in Stern courses and can be found here: : http://www.stern.nyu.edu/uc/codeofconduct

RECORDING OF CLASSES

Your class may be recorded for educational purposes.

STUDENT ACCESSIBILITY

If you will require academic accommodation of any kind during this course, you must notify me at the beginning of the course (or as soon as your need arises) and provide a letter from the Moses Center for Student Accessibility (212-998-4980, mosescsa@nyu.edu) verifying your registration and outlining the accommodations they recommend. For more information, visit the CSA website:
https://www.nyu.edu/students/communities-and-groups/student-accessibility.html

STUDENT WELLNESS

Classes can get stressful. I encourage you to reach out if you need help. The NYU Wellness Exchange offers mental health support. You can reach them 24/7 at 212 443 9999, or via the "NYU Wellness Exchange" app. There are also drop in hours and appointments. Find out more at:
http://www.nyu.edu/students/health-and-wellness/counseling-services.html

NAME PRONUNCIATION AND PRONOUNS

NYU Stern students now have the ability to include their pronouns and name pronunciation in Albert. I encourage you to share your name pronunciation and pronouns this way. Please utilize this link for additional information:
https://www.nyu.edu/students/student-information-and-resources.html

References

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