RM 294 Fall 2022 Syllabus
Optimization 1

Lecture Time

05165: Monday & Wednesday, noon – 1:00 PM, GSB 3.130
05170: Monday & Wednesday, 1:00 PM – 2:00 PM, GSB 3.130
Please attend your enrolled section.

Instructor

Dr. Daniel Mitchell
Email: daniel.mitchell@austin.utexas.edu
Office Hours: TBD, on Zoom

TA

Suyash Vishnoi: office hours TBD on Zoom

Course Objectives

This course deals with optimization methods that help in decision-making. It is the first course in a two-course sequence. It will cover a broad range of relevant quantitative techniques for decision-making. Each technique will be discussed along with relevant theory and will be illustrated and motivated using important applications in areas such as finance, marketing, statistics, and revenue management. Specific topics/techniques will include linear programming, nonlinear programming, and integer programming.

Covid Flexibility

Due to the Covid pandemic this class is listed as 'Face-to-face.' This means all lectures will be held in person and recorded. Lecture recordings will eventually be posted on Canvas, and all assignments and tests will be submitted via Canvas. With that in mind you must follow along live with lectures and assignments. Inevitably, some of you will have issues and will not be able to attend some lectures, and that's ok, but in order to gain access to recorded lectures you must explain to me why you missed in-person lecture. If UT decides to shutdown campus later in the semester, all classes will be held exclusively on Zoom.

Classroom Safety and COVID-19

To help preserve our in person learning environment, the university recommends the following.

- Adhere to university mask guidance.
- Vaccinations are widely available, free, and not billed to health insurance. The vaccine will help protect against the transmission of the virus to others and reduce serious symptoms in those who are vaccinated.
- Proactive Community Testing remains an important part of the university's efforts to protect our community. Tests are fast and free.
- Visit protect.utexas.edu for more information

Lecture Recordings

Although lectures will be recorded, lecture recordings will be password protected until at least 2 weeks after they are recorded: after all corresponding assignments are due. If you miss in-person lecture for an unavoidable reason, you can email me to request access to the recordings.

If you are granted access to the recording, you will only be able to access it for 24 hours, after that you will have to wait until the password protection is removed for the rest of the class. All remaining lectures will be posted after the last class, in time to study for the final exam.

I know this seems strict, but in the past few semesters with covid I have noticed that attendance starts high, but within a couple weeks it really drops. If you aren't the type of student to ask many questions, then you might be tempted to think that it's just as good to watch the lectures later on your own schedule. The issue with that, in my experience, has been that this snowballs until you're perpetually 2-3 weeks behind and not prepared to complete the assignments. I want you to avoid this pitfall, and so I am enacting a seemingly strict policy. But remember that in a normal semester there wouldn't be any lecture recordings.

Course Materials

Textbook

There is not a required book for this course. If you wish to do additional reading you may consider the following books as a personal reference

- "Optimization methods in finance" by Cornuejols and Tutuncu. The mathematical level at which this book is written is significantly higher than what is expected from students in the class. So, do not get alarmed if you skim through this and find it intimidating.
- "Practical Management Science" by Winston and Albright. This book is at slightly a lower level than the class. But it does provide good reading material for reviewing most of the concepts.

Web Resources

This syllabus, lecture slides, datasets, homework/project announcements, and other materials are posted on Canvas (https://canvas.utexas.edu). Information in Canvas is protected by your UTEID login. All assignments will be submitted through canvas, and the test will also be on Canvas.

Software

We will use python extensively in this course. Python is free and can be installed on any operating system (if you have a Chrome Book this is a little tricky, but still possible). I would recommend you install python through the Anaconda distribution, available at https://www.anaconda.com/products/individual. Additionally, we will use Gurobi optimization software. This is a commercial software that has an interface for python and many other popular programming languages. There is a free academic license and instructions to install Gurobi will be posted on canvas.

Another option, instead of installing Anaconda, is using Google's Colab. This is a free browser driven python development environment. There are some limitations on how much computation and run time is possible on Colab. If you are going to rely heavily on Colab for this class, I would recommend that you subscribe to the Pro version, which costs $10 / month. Think of this as replacing the cost of a textbook.

Assignments

Class participation

In some lectures I will give you time to work on problems. You can work in groups of 2-4 students. Everyone will have 24 hours after lecture to submit your answers to the class participation problems to canvas. You can simply take a picture of your answer with your phone and upload that to canvas. Each member of each group must submit their answers to canvas to receive credit, but please indicate who you worked with on your solution. If you miss class and are given permission to view the lecture recording, you still must submit your class participation within the same 24-hour window as everyone else.

Projects

The focus of this course is in solving quantitative problems, especially in teams. Hence the course will center on 3 group projects. Since in most work environments you do not decide with whom you work, you will be assigned to a team randomly. Your team will also change for every project. By the end of the semester, you will have ideally learned to work with several types of team members. Feedback from each member you have worked with will be obtained and will contribute to your final grade. Each team member will be asked to rank the other members of the team from most to least hardworking. If you do not submit a peer evaluation for a group project, you will not receive credit from your peers' evaluation of you.

Homework

Homework will be posted on Canvas. There will be 5 homework assignments. A large component of your grade will be based on course projects; each project will be related to a homework assignment. Two homework assignments are unrelated to projects. If you do not receive a passing grade on a homework assignment you CANNOT receive credit on the corresponding project! If you have not submitted a homework assignment before the homework due date you will not be allowed to submit the corresponding project and will receive a grade of 0% on the project. If you submit the homework but receive a non-passing grade, I will ask you to redo the homework before being allowed to submit the project. This will not affect your grade on the homework assignment, it will just allow you to earn a grade on the project. If you try to take advantage of this and just submit a garbage solution to the homework before the due date to get an extension, I reserve the right to prohibit you from receiving credit on the project. You may discuss how to solve the homework problems with other students, but you must submit your own solutions.

Additionally, I will post one question per topic that is more difficult than the usual homework, but less difficult than the project. These questions will not be graded, but you can expect at least one question like this on the exams. These questions will serve as your practice exams.

Exams

There is a midterm and a final exam. The midterm will be on **October 12**, and the final exam will be scheduled by UT later in the semester. The final will be comprehensive.

The exams will be taken on your laptop through Canvas, in person. The exams are open book and open note, but you are NOT allowed to work with other students on the exams or browse

the internet for solutions! I have a ZERO TOLERANCE policy towards cheating on the exams, if you get caught you will be turned in to the office of the Dean of Students.

Projects for Financial Analytics Students

Several of you are in the financial analytics track of the MSBA program. To accommodate your interest in financial analytics, for some of the projects you will have to option to complete a different project than the non-FA students. The FA projects will focus on the same quantitative skills but will be geared towards financial applications. You will be required to choose between the FA or non-FA project before it is posted, if you do not indicate that you want to complete the FA project before the projects are posted to canvas, you will have to complete the non-FA project. You need not be an FA student to participate in the FA projects, but I would expect that this will mostly be taken up by FA students. There will be one project that is a finance project for everyone.

Grading

- Class participation: 5%
- Homework: 15%
- Projects: 40%
- Project Peer Evaluation: 5%
- Midterm: 15%
- Final: 20%

Please note that there is no way I can guess at what your final grade will be until the final exam has been graded. As a general guideline, I tend to grade stringently and curve generously.

Schedule

This is a rough schedule of topics covered in the course. It is subject to change based on how fast or slow we're going.

Week 1 – August 22 & 25	Welcome and Introduction to Linear Algebra
Week 2 – August 29 & 31	Linear Algebra
Week 3 – September 5 & 7	Linear Algebra
Week 4 – September 12 & 14	Linear Programming
Week 5 – September 19 & 21	Linear Programming
Week 6 – September 26 & 28	Linear Programming
Week 7 – October 3 & 5	Linear & Integer Programming
Week 8 – October 10 & 12	Integer Programming & Midterm Exam
Week 9 – October 17 & 19	Integer Programming
Week 10 – October 24 & 26	Integer Programming
Week 11 – October 31 & November 1	Non-Linear Programming
Week 12 – November 7 & 9	Non-Linear Programming

Week 13 – November 14 & 16	Non-Linear Programming
Week 14 – November 28 & 30	Non-Linear Programming
Week 15 –December 5	Final Exam Review

Students with Disabilities

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, http://diversity.utexas.edu/disability.

Diversity and Inclusion

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed and that the diversity that students bring to this class can be comfortably expressed and be viewed as a resource, strength and benefit to all students. Please come to me at any time with any concerns.

Class Recording Privacy

Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the class in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

Sharing of Course Materials is Prohibited

No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class without explicit, written permission of the instructor. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. The University is well aware of the sites used for sharing materials, and any materials found on such sites that are associated with a specific student, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure of the course.

Religious Holy Days

By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

Campus Safety

Please note the following key recommendations regarding emergency evacuation, provided by the Office of Campus Safety and Security. More info at https://preparedness.utexas.edu/.

- Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings and assemble outside when a fire alarm is activated.

- Familiarize yourself with all exit doors of each classroom and building you may occupy.
- If you need evacuation assistance, inform the instructor in writing a.s.a.p.
- In the event of an evacuation, follow the instruction of faculty or class instructors.
- Do not re-enter a building unless given instructions by Austin or UT police or fire authorities.
- Behavior Concerns Advice Line (BCAL): 512-232-5050 or on-line.
- In case of emergency, further information will be available at http://www.utexas.edu/emergency.

Policy on Scholastic Dishonesty

The McCombs School of Business has no tolerance for acts of scholastic dishonesty. The responsibilities of both students and faculty with regard to scholastic dishonesty are described in detail in the BBA Program's Statement on Scholastic Dishonesty at http://my.mccombs.utexas.edu/BBA/Code-of-Ethics. By teaching this course, I have agreed to observe all faculty responsibilities described there. By enrolling in this class, you have agreed to observe all student responsibilities described there. If the application of the Statement on Scholastic Dishonesty to this class or its assignments is unclear in any way, it is your responsibility to ask me for clarification. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since dishonesty harms the individual, all students, the integrity of the University, and the value of our academic brand, policies on scholastic dishonesty will be strictly enforced. You should refer to the Student Conduct and Academic Integrity website at http://deanofstudents.utexas.edu/conduct to access the official University policies and procedures on scholastic dishonesty as well as further elaboration on what constitutes scholastic dishonesty.

Title IX Reporting

Title IX is a federal law that protects against sex and gender-based discrimination, sexual harassment, sexual assault, sexual misconduct, dating/domestic violence and stalking at federally funded educational institutions. UT Austin is committed to fostering a learning and working environment free from discrimination in all its forms. When sexual misconduct occurs in our community, the university can:

1. Intervene to prevent harmful behavior from continuing or escalating.
2. Provide support and remedies to students and employees who have experienced harm or have become involved in a Title IX investigation.
3. Investigate and discipline violations of the university's relevant policies.

Beginning January 1, 2020, Texas Senate Bill 212 requires all employees of Texas universities, including faculty, report any information to the Title IX Office regarding sexual harassment, sexual assault, dating violence and stalking that is disclosed to them. Texas law requires that all employees who witness or receive any information of this type (including, but not limited to, writing assignments, class discussions, or one-on-one conversations) must be reported. **I am a Responsible Employee and must report any Title IX related incidents** that are disclosed in writing, discussion, or one-on-one. Before talking with me, or with any faculty or

staff member about a Title IX related incident, be sure to ask whether they are a responsible employee. If you would like to speak with someone who can provide support or remedies without making an official report to the university, please email advocate@austin.utexas.edu. For more information about reporting options and resources, visit http://www.titleix.utexas.edu/, contact the Title IX Office via email at titleix@austin.utexas.edu, or call 512-471-0419.

Although graduate teaching and research assistants are not subject to Texas Senate Bill 212, they are still mandatory reporters under Federal Title IX laws and are required to report a wide range of behaviors we refer to as sexual misconduct, including the types of sexual misconduct covered under Texas Senate Bill 212. The Title IX office has developed supportive ways to respond to a survivor and compiled campus resources to support survivors.

McCombs Professional Conduct Policy

The highest professional standards are expected of members of the McCombs community. The collective class reputation and the value of the McCombs experience hinges on this. Please let me know right away if this ever is not the case.

Faculty are expected to be professional and prepared to deliver value for each and every class session. Students are expected to be professional in all respects. Classroom expectations of students include:

- Students will arrive on time.
- Students will be fully prepared for each class.
- Students will attend the class section to which they are registered.
- Students will respect the views and opinions of their colleagues. Disagreement and debate are encouraged. Intolerance for the views of others is unacceptable.
- Phones and wireless devices are turned off unless otherwise instructed by the professor.

Getting Help with Zoom

Students needing help with Zoom should can refer to the McCombs Student Instructional Resources Wiki. All Canvas webpages for all McCombs courses will have a link to the McCombs Student Instructional Resource Wiki on the bottom left corner, so students can access it from their Canvas course pages.

Class Recording Policy

Class recordings are reserved only for students in this class for educational purposes. The recordings should not be shared outside the class in any form. Violation of this restriction could lead to Student Misconduct proceedings.

Changes in Syllabus

Please note that this semester is likely to be quite unique and fluid, as such this syllabus is also subject to change.