

Analytical Decision Making (BAX 443)

Tentative Syllabus: This Version 2/15/2022

Contact Information:

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Meetings: 1.10 pm to 4.00pm (Section 1); 5.00pm to 7.50pm (Section 2)

Week	1	2	3	4	5	6	7	8	9	10
Date	3/30	4/6	4/13	4/20	4/27	5/4	5/11	5/18	5/25	6/1

Office Hours: Thursdays from 2 pm-4 pm. Information about how to access office hours can be found on Canvas.

Course Description and Learning Objectives: Decision-making requires understanding the essential features of a business problem in order to translate them into a model that will guide actions. To this end, the class covers different modeling approaches ranging from deterministic linear problems to stochastic dynamic problems. The class will utilize concepts from applied optimization, basic computing, economics and behavioral sciences to inform business decisions. Students will learn how to approach various decision problems and to provide a solution to these problems. In addition, students will be exposed to various types of modeling tools ranging from spreadsheets to Python-based modeling languages.

Good to know:

All lectures are mandatory:

⇒ Attendance will be taken every class. Missing classes WILL have an impact on your final grade

All assignments have to be submitted at the beginning of due class

⇒ Missing to do so will result in losing *all* the points for this particular assignment.

No make-up quiz, assignment or homework will be organized.

Computing: We will use this product by Google:

<https://colab.research.google.com/notebooks/welcome.ipynb>

In class, we will use several Python packages such as:

<https://www.scipy.org/>

<http://cvxopt.org/>

<https://www.cvxpy.org/>

<https://lectures.quantecon.org/>

Class Courtesy

- Arrive on time.
- It is expected that all class members will treat each other with respect and dignity.
- It is not acceptable to insult, harass, or demean any member of the class.
- Professional business behavior should be modeled in the classroom.
- **Make sure to have your cameras on as much as possible. Let me know ahead of each class if this is not possible.**

Grading: The class does not include any final exam.

Participation: 10%

Online-Quiz # 1: 15%

Online-Quiz # 2: 15%

Online-Quiz # 3: 15%

Homework: 20%

Cheat-sheet: 10%

- Late homework submission will not be graded. Homeworks have to be submitted by 11.59 pm on the due date
- Participation: Students are expected to be prepared for class by completing assigned readings and cases, and are expected to participate in class discussions and group exercises. **Highly-rated class participation involves thoughtful comments and questions, not just “floor time” or repetition of facts from the readings.**

Principles of Community: As members University of California Davis, we adhere to UCD's Principles of Community (<https://diversity.ucdavis.edu/principles-community>). In particular, we affirm our commitment to non-violent exchange and the highest standards of conduct and decency toward all. Moreover, we confront and reject all manifestations of discrimination, including those based on race, ethnicity, gender and gender expression, age, visible and non-visible disability, nationality, sexual orientation, citizenship status, veteran status, religious/non-religious, spiritual, or political beliefs, socio-economic class, status within or outside the university, or any of the other differences among people which have been excuses for misunderstanding, dissension or hatred. We recognize and cherish the richness contributed to our lives by our diversity. We take pride in all our achievements, and we celebrate our differences.

Academic Integrity: All students who take this course are governed by the Univ. of California's standards of ethical conduct for students. These sections set forth the responsibilities of students and faculty to maintain a spirit of academic honesty and integrity. It is essential that you are aware of this code of conduct and the disciplinary actions that may be taken in the event of a violation. A copy of the Code of Academic Conduct may be found in your student handbook or at <https://ossja.ucdavis.edu/code-academic-conduct>. Further details may be obtained from the GSM Associate Dean or the Office of Judicial Affairs.

Readings and course material: In addition to lecture notes, each lecture will have assigned readings. No textbook is required for this class. Additional Readings will be posted on Canvas.

Textpak:

- Introduction to Optimization Models, Darden, UV4303
- Theory of Pricing Analytics (Chapter 1 from Pricing Segmentation and Analytics by Bodea and Ferguson)
- Pricing in Business-to-Business Environments (from Pricing Segmentation and Analytics by Bodea and Ferguson)
- Chapter 1 (Introduction and Chapter 4 (Duality Theory) from Introduction to Linear Optimization by Bertsimas and Tsitsikis
- Game Theory Models of Pricing
- Case Pricing Games: Sony PlayStation and Microsoft Box, case # W88C82 (Michigan Ross)

Tentative Course Plan

(Readings in *Italics* are on Canvas, the rest are in the textpak)

<i>Session: Topic</i>	<i>Readings</i>	<i>Prepare/Turn in</i>
Session 1 Introduction	<i>Note on the Value of Modeling</i> <i>Marketing Optimization Methods</i>	
Session 2 Linear Optimization I	Chapter 1 (introduction) of Linear Optimization by Bertsimas and Tsitsiklis	
Session 3 Linear Optimization II	Chapter 4 on duality Theory of Linear Optimization by Bertsimas and Tsitsiklis	
Session 4 Linear Optimization III		Online Quiz
Session 5 Non-Linear Optimization I	Theory of Pricing Analytics <i>Note on non-linear optimization</i> Optional: <i>Convex Optimization by Boyd and Vandenberghe</i>	
Session 6 Non-Linear Optimization II	Pricing in Business-to-Business Environments	
Session 7 Stochastic Optimization I	Optional: <i>Optimization Methods in Finance</i>	Online Quiz
Session 8 Stochastic Optimization II		
Session 9 Strategy, Risk and Uncertainty I	Case Study: Pricing Game <i>Chapter 10 from DSA</i> (book on Canvas) Optional: <i>Game Theory Models of Pricing</i>	
Session 10 Strategy, Risk and Uncertainty II Class Wrap-Up		Online Quiz Cheat Sheet Homework

Additional Information

Statement on Accommodation

UC Davis is committed to educational equity in the academic setting, and in serving a diverse student body. All students who are interested in learning about how disabilities are accommodated can visit the [Student Disability Center](#) (SDC). If you are a student who requires academic accommodations, please contact the SDC directly at sdc@ucdavis.edu or 530-752-3184. If you receive an SDC Letter of Accommodation, submit it to your instructor for each course as soon as possible, at least within the first two weeks of a course.

Rights and Responsibilities

All participants in the course, instructor and students, are expected to follow the UC Davis [Principles of Community](#), which includes affirmation of the right of [freedom of expression](#), and rejection of discrimination. The right to express points-of-view without fear of retaliation or censorship is a cornerstone of academic freedom. A diversity of opinions with respectful disagreement and informed debate enriches learning. However, in this course, any expression or disagreement should adhere to the obligations we have toward each other to build and maintain a climate of mutual respect and caring. You are expected to take UC Davis's [Code of Academic Conduct](#) as seriously as we do. You were given this code of conduct with explicit explanations of violations (e.g. plagiarism, cheating, unauthorized collaboration, etc.) and your responsibilities in regard to them during orientation, and you signed a statement affirming that you understand it. Academic conduct violations will not be tolerated, and your instructor will not hesitate to turn violators over to Student Judicial Affairs. If you are uncertain about what constitutes an academic conduct violation, please refer to the code linked above, contact your instructor, or refer to the [Office of Student Judicial Affairs](#). All material in the course that is not otherwise subject to copyright is the copyright of the course instructor and should be considered the instructor's intellectual property.

Safety and Emergency Preparedness

UC Davis has many resources to help in case of emergency or crisis. While reviewing campus [Emergency Information](#), you may want to register for UC Davis Warn Me and Aggie Alert, which will give you timely information and instructions about emergencies and situations on campus that affect your safety. If there is an emergency in the classroom or in non-Davis locations, follow the instructions of your instructor.

Student Wellness

You deserve respect, and are encouraged to [practice self-care](#) so that you can remain focused and engaged; that might mean getting a drink of water, leaving to use the restroom, taking a moment to stretch, or doing something else you need to do to take care of yourself. Please be respectful

of others by minimizing distractions when practicing self-care – especially in lab, field or studio settings where safety is imperative.

College life can be overwhelming at times but know that you are not alone if you're feeling stressed. For many of us, systems of oppression such as racism, sexism, heterosexism or cissexism may cause additional stress. Please remember to practice self-care and reach out for support if and when you need it.

You can visit [Virtual UC Davis](#) to find resources related to health and well-being, academics, basic needs (food and housing) and more.

Disclaimer

Unexpected events might require elements of this syllabus to change. Your instructor will keep you informed of any changes.