University of Pennsylvania
The Wharton School
Department of Operations, Information and Decisions

OIDD 6120: *Business Analytics*

Classroom and Schedule

Class will be held in JMHH 240 on Tue/Thu at 10:15am-11:45am, 1:45pm-3:15pm

Instructor	**Email Contact**	**Office Hours Start Wednesday August 31ˢᵗ**
Noah Gans	gans@wharton.upenn.edu	TBA (see Canvas site)

Teaching Assistants	**Email Contact**	**Office Hours Start Wednesday August 31ˢᵗ**
TBA	TBA	TBA (see Canvas site)
TBA	TBA	TBA (see Canvas site)

Course Description

OIDD 6120 is a course on the use of decision models for business analytics. Its main topics include constrained optimization and decision making under uncertainty. The emphasis is on models that are widely used in diverse industries and functional areas, including operations, finance, accounting, and marketing.

The applicability and use of these models have increased dramatically in recent years due to extraordinary improvements in computer, information, and communication technologies. Large volumes of data are available from automatic capture of browsing and online purchase activity, as well as point-of-sale (POS), Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM) systems.

Information has come to be recognized as a critical resource, and quantitative models play an increasingly critical role in in organizing and structuring information so that it can be used more productively. Friendly interfaces have become effective "delivery vehicles" for powerful decision models that enable the use of these data for more effective short-term, tactical and long-term, strategic decision making.

In addition to introducing you to simple, commonly-used quantitative models, the course will help you develop a sense for the kinds of problems that can be tackled using available methods and software and raise your awareness of some of the issues involved in gathering the relevant data. We believe the course will have an impact on the way you think about available data and how it can be used to provide more value in management decisions.

Canvas Site

The course has a Canvas web site from which you can download printable materials.

https://canvas.upenn.edu/courses/1677679

The Canvas site will also have Excel files with sample solutions to homework problems, solutions to the textbook's end-of-chapter problems, software, and other materials of interest.

Computer Software

We will use *Microsoft Excel* spreadsheets extensively throughout the course. In the first half we will also use Excel's *Solver* add-in to solve constrained optimization problems, and in the second we will use *Crystal Ball*, an add-in for Monte Carlo simulation. If you are a PC user, you will be able to download *Crystal Ball* from the course's Canvas site and run it on your laptop. If you are a mac OS user, you will be able to use Wharton's virtual labs to run *Crystal Ball*: https://support.wharton.upenn.edu/help/virtual-lab.

Recommended Text

There is no required text for the course. Most students find that the class notes, explanatory notes, and spreadsheet examples distributed in class and on Canvas work well for them as they follow the course. At the same time, some students like having a textbook as a complementary source to study, as well as a source of additional practice problems.

If you'd like to have a textbook, we recommend *Spreadsheet Modeling and Decision Analysis* by Cliff T. Ragsdale, Revised 5th Edition, Cincinnati: South-Western College Publishing, 2008. This edition is written for *Crystal Ball* users. The book will be on reserve through Lippincott Library.

If you decide to use the recommended text, it is worthwhile completing the associated readings listed in the class schedule, found at the end of this document, *before* class to help you to prepare for what's covered in class and to better keep up. Those readings are marked in the schedule as **Text–*m*; *ppp–qqq*** and refer to Chapter *m*, pages *ppp–qqq* of the Ragsdale text.

Classroom Management

Masks. You **must** follow the Wharton MBA Program's COVID-19 protocols. For relevant information see: https://mba-inside.wharton.upenn.edu/mba-covid-protocols-recommendations/.

Class Seating. Please come to your assigned section (10:15am, 1:45pm), sit in the same seat, and display your name plate in every session. This will help me get to know you. During the first class, I will pass around a seating chart so that you can write your name in your selected seat.

Attendance and Class Recordings. The MBA Program wants to move away from providing unlimited class recordings to a system in which it only provides recordings for excused absences. To that end, Wharton Computing has built an app that allows students to check in when they arrive in class. If you miss class, the app will allow you to submit a reason for your absence and request a recording of the class. Excused absences are either approved by me in advance or the result of an unforeseen (and documentable) illness or emergency.

Electronics in the Classroom. Phones and other electronic devices should not be used in class. Before the start of class, you should turn off or silence all electronic devices and store them in a pocket or bag. *You should not leave your phone on top of your desk or on your lap under the desk where it's more tempting to check and to use.*

More broadly, the course is structured for lecture and discussion, and it moves more quickly and covers more material than a "flipped" classroom in which students work on spreadsheets during class. To that end, unless I approve a student request to use a tablet or laptop in response to a specific need, these devices should be turned off and put away in a bag before the start of class.

Handouts. Before each class, I will put hard copies of lecture and other notes on a table next to one of the classroom entrances for you to pick up as you enter the room. The notes are designed to help you focus on the class discussion rather than on note taking. It is good practice to review the lecture notes soon after each class to reinforce your learning from the class.

Office Hours

The TA's and I will have office hours via Zoom, and you'll find our office hours and Zoom links on the course's Canvas site. When you have a question during office hours, make sure to raise your hand in Zoom. That will secure a place in the queue of people waiting to ask questions. You can make sure your audio, video, and microphone work on Zoom by following this link: https://zoom.us/test.

Course Grading

Your grade will be based on the points you earn on three homework assignments and on the final exam, with weights as follows:

Homework Assignments	45%
Final examination	55%

The three homework assignments will be equally weighted, each counting for 15% of the total score.

While there is no grade component directly related to class attendance, if you miss a class you will only be able to access its video recording if you have an excused absence.

Homework Assignments

Your work on the course's three homework problem sets (HWs) is essential to your mastery of the material. You'll be able to download these HWs from Canvas: HW1 at the end of the first day of class; HW2 at the end of the day that HW1 is due; and HW3 at the end of the day that HW2 is due. Similarly, you'll be able to download sample solutions for the HWs from Canvas at the end of the days they are due.

You can complete HW assignments **individually or in pairs**. Your partner can be from another section of the course. You are free to discuss the homework assignments with other students beyond a homework partner in general terms but are not free to share specific answers.

When thinking of whether to work alone or not, you may consider the following trade-offs. On the one hand, working alone has the advantage that you get the best insight into how well you are mastering the material. On the other hand, particularly if this material is entirely new to you, you may find that discussing the problem with another person helps in the learning process.

To hand in a HW you must upload your write-up to **Canvas** by **9am Eastern (Philly) time** of the day on which the homework is due. **Late submissions will not be accepted.**

Canvas will only accept uploads from Canvas HW Groups. To **form/join a HW Group**, go to the **People menu** item on the left of the course's main Canvas page, select the **HW Groups** tab, and add your name to an empty group or to the group that your homework partner has already joined. Once you have your HW Group, **hand in a homework assignment** by going to the relevant homework found within the Assignments or Syllabus menu on the course's Canvas homepage, click the **Upload button**, and upload your Word or PDF file.

Self-Study Problems

Each time I post a HW to Canvas, I will also post a set of **self-study problems** and their solutions. The self-study questions are similar to HW problems, and together, the HW and self-study problems will give you a good idea of what you can expect on the final exam. You do *not* need to hand in your solutions to the self-study problems.

Final Exam

The exam will be open-book, open-notes. A practice exam with solutions will be distributed before the last class session.

The final exam's timing and format (on-line or paper and pencil) are TBA. Once the specific details are settled with the MBAPO, I will announce them.

Ethics Matrix

The course involves a mix of work by individuals and homework groups, and the matrix below describes who you are allowed to work with and what materials you are allowed to use for each assignment. It is your responsibility to understand and follow the matrix.

OIDD 612: Business Analytics	Materials						People				
	Approved calculator	Laptop / other electronics	Current book, class notes	Past notes / summaries	Past exams / assignments	Internet content / other outside materials	Homework Partner	Other student(s) in same section	Student(s) in other sections (same term)	Wharton student not taking the class this term	Person outside of Wharton
Homework	A	A	A	A	A	A	W	D	D	D	D
Final Exam	A	**	A								

	A = Allowed material Shaded Cell = Not allowed	W = Allowed to work together D = Discussion of general concepts and procedures is allowed but no sharing of specific answers. Shaded Cell = Not allowed

Homework can be done alone or in a pair. You may discuss homework problems with people outside of your homework partner in general terms, but you may not share specific answers with people outside of your homework partner.

Final exam preparation may be done with others. The materials you are allowed to use during the final exam may only include the course book, documents posted on the course web site this quarter, your own written notes, and a calculator.

** You are not allowed to use a laptop or other electronic device to perform any optimization or simulation tasks. If the final exam uses a pencil-and-paper format, you may not use a computer. If the final exam uses an online format you may use a computer only to access the online exam, access/read your notes, and submit your work.

Class Schedule

The schedule below provides a class-by-class view of topics, associated readings, and course deliverables.

Class	Date	Session Topic	Notes / Optional Readings	Due
1	Tues Aug 30	Introduction	• **Text–1; 1–13:** Sketches of applications. • **Text–2; 17–39:** Geometry of linear optimization problems, for intuition.	
2	Thu Sept 1	Interpreting Optimization Results Constrained Optimization and Economics	• **Notes from Class #1** - *Fabulous Nuts*: We'll discuss this problem in class. • **Text–3; 45–62:** Formulating a linear program and implementing it in a spreadsheet. • **Text–4; 136–151:** Sensitivity analysis.	
3	Tues Sept 6	Network Applications I	• **Notes from Class #2 – *GlobChem:*** We'll discuss this problem in class. • **Text–3; 63–102**: Many examples: in class we'll cover those listed in 3.10 and 3.12.	
4	Thu Sept 8	Network Applications II	• **Notes from Class #3 – *RE Investment***: We'll discuss this problem in class.	
5	Tues Sept 13	Integer Models	• **Text–6; 232—268:** Integer models, examples. We will focus mainly on *binary* variables.	HW 1
6	Thu Sept 15	Decision Making Under Uncertainty	• Decision Trees: test marketing; value of information.	
7	Tues Sept 20	Introduction to Simulation	• **Text–12; 559–586:** Basics of Monte Carlo simulation.	
8	Thu Sept 22	Risk Management	• Asian options.	HW 2
9	Tues Sept 27	Correlated Random Variables	• 2022 US mid-term congressional elections.	
10	Thu Sept 29	Optimization via Simulation	• Newsvendor problem.	
11	Tues Oct 4	Nonlinear Optimization Using Scenarios to Model Uncertainty	• Portfolio analysis.	HW 3
12	Tue Oct 11	Decision Trees and Optimization Course Wrap-Up	• Decision-making in clinical trials. • Review and exam preparation.	