University of Pennsylvania
The Wharton School
Department of Operations, Information and Decisions
OIDD 6120: *Business Analytics*

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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 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 models play an increasingly critical role in deploying this resource, 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, operational, and long-term strategic decision making.

The course has a twofold purpose. First, it seeks to introduce you to simple models and ideas that provide useful (and often surprising) *qualitative* insights about a large spectrum of managerial problems. Second, it aims to give you a feeling for the kinds of problems that can be tackled quantitatively, the methods and software available for doing so, and some of the issues involved in gathering the relevant data. Whether or not you explicitly use these decision models in the future, we believe the course will have impact on the way you think about available data and how it can be used to provide more value in management decisions.

Course Materials

Text
Cliff T. Ragsdale, *Spreadsheet Modeling and Decision Analysis,* Revised 5th Edition, Cincinnati: South-Western College Publishing, 2008, 7 selected chapters.

Canvas Site
The course has a web site on Canvas from which you can download all class materials. The Canvas site will also have Excel files with sample solutions to homework problems, software, and other materials of interest.

Computer Software
We will use *Microsoft Excel* spreadsheets extensively throughout the course. In the first half of the course, we will also use Excel's *Solver* add-in to solve constrained optimization problems. In the second half we will use *Crystal Ball*, an add-in for Monte Carlo simulation. Everyone will be able to access Excel with Solver and Crystal Ball through the School's

computer labs. If you have a Windows laptop, you will also be able to download and install Crystal Ball onto your laptop from the course's Canvas site.

Course Logistics and Classroom Policies

We have two class sessions each week, a lecture and a recitation. In lectures we introduce business analytics concepts, and in recitations we reinforce these concepts. Each recitation will be split into two halves: in the first half we will refresh the lecture material; in the second you will work on an exercise that tests your understanding of the material.

To encourage learning, during lectures you can only use electronic devices that can communicate with other devices (e.g., mobile devices, tablets, laptops) when explicitly allowed by the instructor. These electronic devices may be used during the time in which you are working on recitation exercises.

Class Preparation
The class moves quickly, and you should strive to keep up with the covered topics. For each lecture, we will provide detailed lecture notes. It is good practice to review these lecture notes soon after each class to reinforce your learning from the lecture and to prepare for the recitation exercises.

TA Hours
Teaching assistants' (TAs) office hours and location will be posted on Canvas. All sections of the course in a given quarter have the same assignments and exam, and you may approach any of the TAs with questions.

Grading

Grading Weights
The course grade will be based on a weighted average of the scores earned on attendance, recitations, homework exercises, and the final examination. The weights are as follows:

Attendance	10%
Recitation Exercises	15%
Homework Problems	30%
Final examination	45%

Attendance
We will use TBD to take attendance in each class session. There are 12 class sessions, and you can miss 2 class sessions without impacting your attendance score.

Recitation Exercises
Solutions to recitation exercises are due on Fridays at 11pm.

Homework Assignments
Working on these problems is essential to your mastery of the material. There are **two written homework assignments.** Homework assignments may be done **individually or in pairs**. If you do an assignment as part of a pair, **please submit *one* write-up** with two names on it. (*Do not* submit two copies of the same assignment.) Your homework partner can be a student from any section of the course.

Homework solutions can include PDF, Word, and Excel files and should be uploaded to Canvas by TBD on the assignment's due date. Please remember to include your **name(s) and student ID(s)** on all of the documents you upload.

You are free to discuss all homework assignments with other students. When thinking of whether to work alone or not, you may consider the following trade-offs. 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.

Final Exam

The course's final exam will be held Wednesday December 6 from 7pm to 9pm, room TBA. The examination will be open-book, open-notes and will be conducted in-person. To help you prepare for the final, we will distribute a practice examination with solutions before the last class session.

Class Schedule

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

Class	Date	Type of Class/Topic	Readings	Due
1	24-Oct	Lecture 1: Course Introduction, Linear Optimization	• **Notes:** "Background on CO and LP" and "Formulating and Solving LP using Excel Solver" • **Text–3; 45-62:** How to formulate an LP and then implement the formulation in a spreadsheet.	
2	26-Oct	Recitation 1		**Recitation 1 Exercise:** Friday, October 27, 11pm EDT
3	31-Oct	Lecture 2: Interpreting Optimization Results	• **Notes:** "LP Sensitivity" and "LP Geometry and Solution Concepts" • **Text–4; 136–151:** Sensitivity analysis.	
4	02-Nov	Recitation 2		**Recitation 2 Exercise:** Friday, November 3, 11pm EDT
5	07-Nov	Lecture 3: Multi-Period Flow Models	• **Text–3; 63–102:** Many examples: in class we'll cover those listed in 3.10 and 3.12.	
6	09-Nov	Recitation 3		**Recitation 3 Exercise:** Friday, November 10, 11pm EDT
7	14-Nov	Lecture 4: Decision Trees and the Value of Information		**HW1**: Due date TBD
8	16-Nov	Recitation 4		**Recitation 4 Exercise:** Friday, November 17, 11pm EDT
9	21-Nov	Lecture 5: Monte Carlo Simulation	• **Note: "**Probability and Statistics" • **Text–12; 559–586:** Basics of Monte Carlo simulation	
10	28-Nov	Recitation 5		**Recitation 5 Exercise:** Friday, November 29, 11pm EDT
11	30-Nov	Lecture 6: Making Decisions Using Simulation		
12	05-Dec	Recitation 6		**HW2:** Due Date TBD **Recitation 6 Exercise:** Due Date TBD

Ethics Matrix

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

OIDD 6120: Business Analytics	Materials						People				
	Approved calculator	Laptop* / other electronics	Current book, class notes	Past notes / summaries	Past exams / assignments	Internet content / other outside materials	Approved work team	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
Recitation Exercises	A	A	A	A	A	A	W	D	D	D	D
Homework Problems	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

Notes:

<u>Recitation</u> may be done alone or in a group. You may discuss recitation questions with people in your sections, but you may not share specific answers.

<u>Homework</u> may be done alone or in a pair. You may discuss homework problems with people outside of your homework partner but you may not share specific answers with people outside of your homework partner.

<u>Final exam</u> preparation may be done with others. The materials you are allowed to use during the final exam may only include the course book, notes posted on the course web site, your own written notes, and a calculator. *During the final exam, you may use your laptop/other electronic device only to access the exam online, access/read your notes, and submit your work. In particular, you should not use laptop/other electronics to perform any optimization/simulation tasks.