OSCM 230 Management Science

Fall 2015; Sections #3, 4, 5.

\* Note: Sections #1-2 follow a significantly different syllabus \*

**General Information**

**Instructors:** Professor Yossi Aviv Professor Jacob Feldman

Knight Hall 423 Knight Hall 414

Email: [aviv@wustl.edu](mailto:aviv@wustl.edu) Email: jbfeldman@wustl.edu

Meeting times/location: Tuesdays and Thursdays

Classroom: SH 103

Section 3: 10:00-11:30AM

Section 4: 1:00-2:30PM

Section 5: 2:30-4:00PM

Office hours: Personal assistance for the first part of the semester will be provided by the teaching assistant:

Mr. Seung Hwan Jung ([seunghwan.jung@wustl.edu](mailto:seunghwan.jung@wustl.edu)).

Please make an appointment by contacting the TA directly via email.

Course Description & Objectives

Many managerial decisions, regardless of their functional orientation, are increasingly based on analysis using quantitative models from the discipline of management science. Management science tools, techniques and concepts (e.g., data, models, and software programs) have dramatically changed the way businesses operate in manufacturing, services, marketing, finance, and other areas.

This course is designed to introduce students to fundamental quantitative techniques of using data to make informed management decisions. In particular, we will focus on various ways of *modeling decision problems* in order to enhance decision-making skills. These objectives are facilitated through various *management science* modeling approaches taught in this course, such as: (i) Decision analysis for managerial problems involving uncertainty and risk; (ii) Monte Carlo simulation analysis; (iii) Optimization techniques; and (iv) Data analytics techniques. The implementation of quantitative analysis tools has been facilitated considerably by the development of spreadsheet-based software packages, and so we will make liberal use of Excel and its optimization and data analysis add-ins.

#### Course Materials

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| Optional Textbook: | B. Render, R.M. Stair Jr., and N. Balakrishnan, “Managerial Decision Modeling with Spreadsheets,” 2nd edition, Prentice Hall. |
| No Course Pack! | Course handouts will be distributed in class (thus, you will be assessed a small “lab fee” to cover that expense). PDF copies of the handouts will also be available to you through BLACKBOARD. |

#### Course Requirements & Grading

Individual case preparation 3%

Group case preparation 10%

Mini exams 20%

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| Mid-term exam | 17% |
| Final exam | 30% |
| Quizzes | 15% |
| In-class case studies (graded on effort) | 5% |

Individual case preparation

To ensure adequate preparation for an analysis and discussion of a case exercise in class, you will be required to submit an individually-prepared answer to specific questions from the exercise. See specific details in the detailed session-by-session plan below. **Please submit your answers/analysis and spreadsheet online via Blackboard.** Bring a copy of your answers to the case-discussion sessions. Late turning-in will not be accepted. **The case preparation should reflect your individual work.**

**Group case reports**

All groups (**2-4 students**) will need to submit a written report on a case exercise that is *not* discussed in class (see dates and information in the detailed session-by-session plan below). The report must be typed (1.5-spaced, 11-point Times New Roman font), and include a cover page that specifies the title of the case and the names of the group members who were *actively* involved in the preparation of the specific report. There is no limit on the number of pages in a report, but please be concise.

##### Mini exams

Mini exams are intended to test your knowledge of the required material, and they are for **individual work** **only**. These exams will be “take-home”, and you will have several days to work on them, and submit your answers via Blackboard. **No make-up quizzes will be administered!**

##### Group projects (Two group project reports, 10% each) 20%

You will work in groups of four (maximum) members to do the case study. You will have to submit two case write-ups (one on linear programming, and one on simulation). **Please form your group by September 5, 2014, and self-enroll your group on Blackboard (Click the “Group” link, then click the “View Sign-up Sheet to Join Group,” and then click the “Sign Up” button under the group you are to join).**

Group case reports: Each case report should consist of two parts: case analysis, and appendix. *Case analysis* is a comprehensive technical report consisting of detailed modeling, calculations, and analysis. All your spreadsheet modeling and results should be collected in *appendix*. A sample case report will be provided to you for your reference. Points will be taken off for a badly written report. **The group cases should be your group’s independent work.**

##### Exams (Mid-term 25%, Final 24%) 49%

The best preparation for the exams will be a review of the homework assignments, course notes, quizzes, and cases. A sample exam will be distributed. The mid-term exam will be on **October 20, 2014** during class hours. No late or make-up mid-term exam will be administered.

The final exam, which covers the second half of the course, will take place **3:30-5:30** on **December 16, 2014, in Simon103, 104, 106.**

In-class case studies 16%

In-class cases require detailed readings and will often require analysis of relevant data to support your conclusions. For each case, we will give you several warm-up questions to help you prepare for the classroom discussions. **Please submit your answers/analysis and spreadsheet online via Blackboard.** Bring a copy of your answers to the case-discussion sessions. Late turning-in will not be accepted. **The case preparation should be your individual work.**

##### Class participation

We expect you to read the required materials and be prepared for each class. Asking questions, actively participating in class-discussions (especially in case study) would be your contribution to the classroom learning. We reserve the right to make random calls to engage you in discussion. **Your classroom participation will help us determine your final grade if you are at the borderline between grade levels**.

###### Re-grade policy

If you have questions regarding the grading of quizzes, exams, or case studies, re-grade requests can be submitted only **within a week (7 days) of having been handed back.** A re-grade request consists of the originals and a statement of your questions. **You should submit the re-grade requests electronically to the TAs. The TAs have the right of re-grade up or down.**

**Academic Integrity**

The Olin Business School is a community of individuals with diverse backgrounds and interests who share certain fundamental goals. Primary among these goals is the creation and maintenance of an atmosphere conducive to learning and personal growth for everyone in the community. Becoming a member of the Olin community is a privilege that brings certain responsibilities and expectations. The success of Olin in attaining its goals and in maintaining its reputation of academic excellence depends on the willingness of its members, both collectively and individually, to meet their responsibilities. All individuals should conduct themselves with the utmost integrity in all aspects of their life, both on and off campus.

As instructors, we fully support Olin’s Academic and Professional Code of Conduct, and expect that you do, too. If you have any questions about academic integrity in this course, please refer to the publication ***Integrity Matters: Olin Business School Code of Conduct***. You may also consult with us or the BSBA Program Dean if you have questions or concerns.

**Policy on Missing Classes and Exams for Interviews**

We strongly advise that students schedule job and internship interviews around their class times and exam schedules. Employers understand that academics are your top priority. For off-campus interviews at the employer’s site, most will accommodate a student who needs to schedule an interview around a class or exam. For on-campus interviews, you should sign up quickly- as soon as possible- since these timeslots are fixed and are available on a first-come first-served basis only. In the event that an interview conflicts with a scheduled class, you must notify the professor in advance; the sooner you do that you demonstrate professional courtesy and a sense of commitment to the professor. How the professor treats the absence is at the professor’s discretion in accordance with the course syllabus or other means of communication. An interview conflict is not a valid reason for missing an exam. If you experience or anticipate problems, you should seek advice from Weston Career Center advisors.

**Disabilities**

Reasonable accommodations will be made for students with verifiable disabilities. Students who qualify for accommodations must register through Washington University’s Center for Advanced Learning Disability Resources (DR) in Cornerstone. Their staff members will assist us in arranging appropriate accommodations.

**COURSE SCHEDULE**

1. **Tue. Aug. 25: Introduction to Management Science**

Topics

* Course introduction and administrative details.
* Quantitative modeling: preliminaries and examples.

Preparation

* None.

**Part 1 (Sessions #2-8): Modeling Uncertainty**

1. **Thu. Aug. 27: Modeling Uncertainty: Introduction and Preliminaries**

Topics

* Decision criteria.
* Expected payoff criterion.
* Cost of uncertainty and value of information.

Preparation

* None.

1. **Tue. Sep. 1: Decision Trees and Value of Options**

Topics

* Decision trees.
* Example: Analysis of an R&D option.
* Analyzing decision trees using Excel: An illustration.

Preparation

* None.

1. **Thu. Sep. 3: Case Exercise 1 – Capacity Flexibility at GlassCo**

Topics

* Analysis of decision trees using Excel tables.
* Value of flexibility.
* Modeling for insights.

Preparation

* Read the case exercise “Capacity Flexibility at GlassCo.” You are encouraged (not required) to attempt solving the first few questions in the case.
* This session is devoted to in-class analysis. Therefore, you are welcome to bring a laptop to class.

**\*\*\* QUIZ 1 (“Cost of Uncertainty and Options Value”) will be posted on Blackboard. You will have 4-5 days to work on it, and submit your answers via Blackboard. No make-up quizzes will be offered. \*\*\***

1. **Tue. Sep. 8: Introduction to Simulation**

Topics

* Generating random numbers and events.
* Monte Carlo simulation.
* Simulation using Excel Tables.
* Statistical aspects of simulation.

Preparation

* None.

1. **Thu. Sep. 10: Exercises in Monte Carlo Simulation**

Topics

* In this session, we will go over several examples of Monte Carlo simulation.

Preparation

* We recommend bringing laptops to class.

***\*\*\* NO CLASS ON TUESDAY, SEP. 15 \*\*\****

1. **Thu. Sep. 17: Process Simulation and Policy Evaluation**

Topics

* Process simulation: Examples
* Modeling for insights.
* Policy evaluation.
* Generating trade-off curves.

Preparation

* None.

***\*\*\* NO CLASS ON TUESDAY, SEP. 22 \*\*\****

1. **Thu. Sep. 24: Case Exercise 2 – A Dynamic Pricing Exercise**

Topics

* Case Analysis.
* Modeling for insights.
* Modeling the value of information, and the value of analytics.

Preparation

* Read the case exercise “Dynamic List Pricing and the Value of Consumer Analytics – A Simulation.”
* **Individual case prep #1: Submit a typed report (at most two pages) describing your best answer to Question 4 (only) at the beginning of this session. Explain how you modified the template spreadsheet, and how your analysis was done. Be concise and clear. If you do not plan to attend this class session, please make an arrangement to submit your report to the TA in advance. Late submissions will not be graded.**
* This session is devoted to in-class analysis. Therefore, you are welcome to bring a laptop to class.

**\*\*\* QUIZ 2 (“Simulation and Policy Evaluation”) will be posted on Blackboard. You will have 4-5 days to work on it, and submit your answers via Blackboard. No make-up quizzes will be offered. \*\*\***

**GROUP PROJECT 1: “Procurement Contracts at Predicto”**

**DUE DATE: 11:59PM, October 8, 2015 – via Blackboard.**

**All of the listed homework is just for practice. They will not affect the final grade.**

**\*\*No dates listed because they are subject to change, although there will be NO CLASS ON NOV. 3rd.**

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|  | **Introduction to Linear Optimization** | |
| Topics  Read | LP Formulation  Solution Approach  Chapter 2.1-2.3, 2.7-2.8 |
|  | **Linear Optimization** | |
| Topics  Read  HW #1[[1]](#footnote-1) | LP Formulation  Solution Approach  Chapter 2.4-2.6, 2.9  Chapter 3.1-3.3, 3.5, 3.7 |
|  | Linear Optimization | |
| Topics  Read  HW #2 | LP Formulation  Chapter 3.4, 3.6, 3.8 |
|  | **Linear Optimization** | |
|  | Topics  Read  HW #3  **Quiz #1** | LP Formulation Chapter 5.1-5.3, 5.6  **Linear Programming Formulation** |
| 🖉 | **Trade-off Analysis** | |
| Topics  **Turn in**  Read | Sensitivity Analysis “People’s Investment” **Case study preparation #2 (“Red Brand Canners”) (BLACKBOARD)**  Chapter 4 |
| 🖉 | **Trade-off Analysis** | |
| Topics  **Turn in** | Sensitivity Analysis  “Parket Sisters” (BLACKBOARD)  **Case study preparation #3 (“Parket Sisters”)** |
|  | **Trade-off Analysis** | |
|  | Topics | Sensitivity Analysis  “Parket Sisters” |
|  | **MIDTERM EXAM – Oct 13 (25% Simulation Optimization, 75% LP)**  **General Optimization** | |
|  | Topics  Read HW #4 **Quiz #2** | Smooth problems Solution challenges, algorithms  Chapter 6.6  **Sensitivity Analysis** |
|  | General Optimization | |
| 🖉 | Topics  **Turn-in** | Smooth problems  Quadratic optimization  “Cost Modeling” and “Charity Advertising Budget” (BLACKBOARD)  **Case study preparation #4(“Portfolio Optimization”)** |
|  | **General Optimization** | |
| Topics  Read  HW #5  **Quiz #3** | Non-smooth problems  Binary decisions  Chapter 6.1-6.4  **General Optimization** |
|  | **General Optimization** | |
| Topics  Read  HW #6 | Non-smooth problems  Logical constraints  **“**Scheduling Employees in Quebec’s Liquor Stores with Integer Programming”(Blackboard)  **“**Early Integer Programming.” (BLACKBOARD) |
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|  | **Data Analytics** | |
|  | Topics  Read | TBD |
| 🖉 | **Data Analytics** | |
| Topics Read Turn in  HW #8 | TBD  **Case study preparation #5 (TBD)** |
| 🖉 | **Data Analytics** | |
| Topics **Turn in** | TBD |

1. Homework is due before class, but will not be collected. [↑](#footnote-ref-1)