BUS. MGT. 7221: Decision Modeling and Applications

Spring Term 1, 2016

Class times: Tuesday 6:00 - 9:15 p.m.  
Classroom: 275 Gerlach Hall  
Office hours:  
1. Tuesday 5:00 – 5:45 p.m.  
2. By e-mail appointment (in 658 FH).

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658 Fisher Hall  
2100 Neil Avenue  
Columbus, Ohio 43210-1144  
Telephone: 614-292-9216  
E-mail: hall.33@fisher.osu.edu

Required Course Materials

1. A sense of humor, and an interest in learning about some exciting ideas that deliver remarkable value to companies.
3. Coursepack containing copyrighted case materials, available online through Uniprint.
4. A variety of required materials posted on the course website at https://carmen.osu.edu

Course Description

Since they began to evolve in the 1940's, decision support methods known collectively as “operations research” or “management science” or “prescriptive analytics” for solving business decision problems have increased greatly in popularity and usefulness. Almost all of the largest 500 U.S. companies use such approaches, in order to make their operations more efficient and profitable. Applications have significantly impacted the business functional areas of operations and logistics, finance, marketing and health care. Many significant applications to public policy and not-for-profit decision making have also been documented.

Among the main educational benefits for managers in gaining familiarity with prescriptive analytics are:

1. an understanding of the ways in which significant business problems are frequently solved, and the advantages of such solution.
2. an ability to identify situations where prescriptive analytics can be useful.
3. an understanding of the assumptions and limitations of prescriptive analytics.
4. insights about how to sell prescriptive analytics to the senior management of your company, or to clients as a consultant.
5. an ability to understand and critically review reports by technical specialists, which is a frequent requirement in many business careers.

The emphasis in the course is on "what a manager can gain from prescriptive analytics without necessarily becoming a technical expert". Therefore, the course is designed as a
"user's guide", in which mathematical techniques which in practice would typically be performed by a computer package or by an expert analyst/programmer are de-emphasized, in favor of broad business interpretation and understanding. The course is organized as a survey of various prescriptive analytics approaches and the types of applications that can be addressed using them. The course BUS. MGT. 7222 (Prof. Schilling, fall semester) performs a similar role for predictive analytics approaches.

Course Prerequisites
The only formal prerequisite is good standing in a graduate program. However, the course is specifically designed for students who enjoy solving business problems with decision models and spreadsheets. The course makes extensive use of formulation of linear programming and related optimization models, and their solution using Excel software.

Class Materials
Ideally, students should bring the lecture notes in their preferred format to class every day. A notebook computer will be needed in class on several days, and also at the exam.

Case Studies
Two case studies will be analyzed during the course. For each case study, each study group should complete a written report that thoroughly but concisely responds to the questions accompanying the case. Advice about case report writing appears on page 5.

Evaluation of Performance

<table>
<thead>
<tr>
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<th>Points</th>
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<tbody>
<tr>
<td>Case reports (by study groups): 2</td>
<td>80</td>
</tr>
<tr>
<td>Case presentation (by study groups): 1</td>
<td>30</td>
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<tr>
<td>Class participation (individually): 1</td>
<td>40</td>
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<td>Final exam (individually): 1</td>
<td>80</td>
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<td><strong>Total</strong></td>
<td><strong>230</strong></td>
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General Procedures
1. The rules of the course do not allow you to share information regarding case studies with other study groups.
2. All case reports must be submitted at the start of class on their due date to receive credit, since the case solution will be discussed in class.

Comment
The maximum benefit to the MBA Program will occur if the instructor and students all work together to enrich the learning experience.
**Detailed Course Outline**

<table>
<thead>
<tr>
<th>Week</th>
<th>Class Date</th>
<th>Chapter</th>
<th>Topic</th>
<th>Homework Problems</th>
<th>Events</th>
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<tbody>
<tr>
<td>1</td>
<td>1/12</td>
<td>1</td>
<td>Introduction to prescriptive analytics for managers</td>
<td>Ch.1: 19,20,25, 26,30</td>
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<tr>
<td>2</td>
<td>1/19</td>
<td>2</td>
<td>Graphical and computer solutions to linear programming</td>
<td>Ch. 2: 22,25,26, 33,37,42,44</td>
<td>Tutorial: T1</td>
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<td>3</td>
<td>1/26</td>
<td>3</td>
<td>Linear programming applications</td>
<td>Ch. 3: 5,9,10,14, 17,19,23,27,31,36, 43,45</td>
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<td>4</td>
<td>2/2</td>
<td>3,4</td>
<td>Linear programming applications, sensitivity analysis</td>
<td>Ch. 4: 13,14,18,20,22,24, 28,31,33</td>
<td>Guest speaker</td>
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<td>5</td>
<td>2/9</td>
<td>4</td>
<td>Sensitivity analysis, integer programming</td>
<td>Ch. 4: 13,14,18,20,22,24, 28,31,33</td>
<td>Case 1</td>
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<td>6</td>
<td>2/16</td>
<td>6</td>
<td>Multiple objective and goal programming</td>
<td>Ch. 6: 15,18,19,25,28,30, 33,35</td>
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<td>7</td>
<td>2/23</td>
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<td>Analytic hierarchy process and workshop</td>
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<td>Case 2</td>
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<td>2/26</td>
<td>Final Exam</td>
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**Case Reports and Deadlines** (see the course website for details of the assignment questions)

**Guest Speaker**
**February 2** (attendance is expected).
Instructor’s Background

- Ph.D. in Management Science, University of California, Berkeley.

- The only multiple time winner of the Fisher College’s Pacesetters’ research award.

- Former President of MSOM, a national society of 1,200 operations management academics and professionals.

- Former Treasurer of INFORMS, a national academic and professional society with 11,300 members.

- Ranked 13th among 1,376 operations management professors in the U.S. (2008 survey of research productivity).

- Current research projects include development of robust optimization approaches for project selection and project scheduling.

- Served as one of two consultants on the largest ever National Institutes of Health project, and developed a model that saved 43,500 lives.

- Currently consulting on prescriptive analytics projects with companies on intellectual property, marketing planning, logistics and project management applications.

- Teaching Executive Education courses in project management.

- Teaching another MBA elective at Fisher: project management (spring term).

- LinkedIn status: not a member, and not interested.
Case Report Writing

The following format has evolved over time as being most suitable for the integration of technical analysis and business insights in MBA case reports. This format provides a very effective, concise, logical and high impact written presentation. Each student group is assumed to be a team of consultants addressing the consulting task(s) described in the case. An example of an excellent case report is posted on the course website.

1. Executive Summary
Purpose: present detailed recommendations without supporting information. Give enough details to permit implementation of your recommendations. Use of tabular format is encouraged. Try to make a strong first impression.

2. Background
One sentence describing the consulting task(s). One sentence describing the consultants.

3. Assumptions
   a. Assumptions of the problem itself, extracted from case information.
   b. Assumptions of the model used (where applicable), each first briefly explained and then justified by practical comments.
   Use of tabular format is encouraged in both items 3a and 3b.

4. Analysis
Purpose: convincingly justify the recommendations in the Executive Summary. Describe the model(s) used. Descriptions need to be detailed enough to permit verification. Lengthy material may be placed in an Appendix, but requires a citation in the Analysis.

5. Other Recommendations
Include one or more unique extensions or analyses that go beyond answering the case question. Creativity, when combined with relevance, is strongly encouraged.

   Items 1 through 5 should not be more than 3 single spaced pages in 12 point font, with conventional margin spacing. A 2 page report which has the same content as a 3 page report is better.

6. Appendix (not included in the page limit)
Where applicable: printouts, charts and figures. All items must have a citation in the body (items 1 through 5) of the report.

Overall Advice
Consider how a senior manager in the client organization would react to your report. Is it well organized? Is it convincing, in that all the recommendations are well supported? Are all the necessary definitions given? Is the report interesting to read? Is it impressive and "high impact"? Considering asking a friend who is in business (but not in the class) for comments.
In-Class Presentations of Case Analysis

The most important thing is to give the necessary information and enjoy yourself giving it. If you enjoy it, the audience probably will also. I base the following comments on my experiences listening to about 300 MBA presentations at OSU, and another 50 at Wharton, Kellogg and Berkeley. The expectations for the presentations are high, as in a top 10 MBA program.

1. The only really bad outcome would be to fail to cover all the main points in 15 minutes. While your presentation itself will not be terminated at 15 minutes, the evaluation of it will be. Therefore, it is essential to practice your timing. You may want to ask the audience to defer their questions to the end, so as not to lose time.

2. All students are expected to attend the presentations and participate by asking questions. If your answer differs significantly from that of the presenting group, this needs to be addressed during the discussion, rather than later.

3. At the start of your presentation, I will need a hard copy of the PowerPoint handout (usually 4-to-1). You will receive some comments that should be helpful to you in the future.

4. For the purposes of the presentation, you are consultants and your classmates are your clients. You are therefore presenting to them, rather than to the instructor. Obviously, you would like a second consulting contract. Is your presentation impressive enough to earn it?

5. Either one or two speakers probably works best. Having three or more speakers in a 15 minute presentation loses too much time in the transitions. Moreover, it stresses the audience, since they need to keep adjusting to different speaking styles. Other group members can participate by answering questions from the front of the room afterwards, operating the computer, assisting with a demonstration, distributing handouts, and so on. It is important to choose the speaker(s) from within your study group carefully, perhaps even by holding auditions, since the entire group will be evaluated on their performance.

6. Your presentation can be as informal, humorous, offbeat and irreverent as you like. (I may regret this comment later 😄.) But please treat comments and questions from the audience seriously, and address them professionally.

7. It is your responsibility to ensure that there are no hardware / software problems. Presumably you will want to practice your presentation system live beforehand. Comments and advice are available before your presentation.

8. There is absolutely no obligation to dress more formally than usual while giving your presentation. However, if you feel that it enhances your presence, then go ahead.
Class Attendance and Participation

1. MBA program admission decisions are based substantially on business experience. A major reason is that MBA program courses require active participation by students, so that students can share and learn from each others’ experiences and insights.
2. In the context of the previous point, merely attending class does not constitute “active participation”. More is expected, especially in elective classes which presumably match students’ long term career interests.
3. Students who consistently answer questions, ask interesting questions or contribute good ideas to class discussion can expect to receive between 20/40 and 40/40 points, depending on the quality of participation. A good rule of thumb is that each student should participate actively at least every third lecture class. Quality of ideas is more important than quantity. Class participation is definitely expected during guest speaker presentations and discussions of case analysis.
4. Nonetheless, regular class attendance has some value. Therefore, students who attend all classes, and maintain a professional attitude (such as would be expected in a business meeting), but do not participate actively, can expect to receive 15/40 points.
5. Students whose classroom activities would be inappropriate in a business meeting, even on one occasion, can expect to receive 0/40 points. Examples of inappropriate activities include the use of a computer to read e-mail or surf the www during class time. If this point needs clarification, please ask the instructor.
6. If (probably due to some emergency) you need an exception to the above policies, please justify this to the instructor before class.

Final Exam

1. Exam Philosophy
In an MBA program, an exam should measure how much a student has learned about solving business decision problems which is exportable to the workplace. It follows that the exam needs to simulate the workplace as closely as possible. This means that the exam should (a) allow open access to all materials, and (b) be computer based.

2. Advice and Procedures
a. Bring to the exam all materials related to the course.
b. Bring to the exam a notebook computer loaded with MS Excel and other relevant software.
c. Your solution should be a brief Executive Summary which contains the key decisions and numbers in your solution, typed in MS Word. You can attach standard printouts from the software. Please label the printouts clearly and refer to them in the text.
d. The exam time is TBA. The time period given will be sufficient if you bring the appropriate materials and work efficiently during the exam.
e. If necessary, adjust the default settings on your software to provide the best possible results. An example is the “Tolerance” setting in Excel, which should be set to 0%.
f. Give as much information as possible about how your solutions were developed. For example, if using linear programming, provide the full details of your formulation.
g. For the period of the exam, you should not communicate with others.
3. Exam Lab
a. The lab is usually kept locked, but will be opened 15 minutes beforehand. In view of the information which follows, there should be no need to visit the lab beforehand.
b. The computers don’t have floppy disk or CD-Rom drives. If you need to transfer information to the desktop computer, you have two options:
   - use a USB-accessible storage device.
   - mail the file to yourself, and open up your e-mail on the desktop computer (note that your computer needs to be registered in order to access the College’s wireless network).
c. Here is how to access the software:
   - MS Excel is on the desktop (at the bottom).
d. Submit your solutions to the Carmen drop box. The cover page of the exam indicates the penalty for late submission.

For the First Class on 1/12/16

1. It is strongly recommended that you thoroughly read this syllabus and the frequently asked questions document for the course. We will not spend class time going over the syllabus, but there will be a chance to ask questions about it.
2. You need to purchase and bring the textbook.
3. You need to purchase and bring the packet of cases.
4. You need to access the course website, briefly survey the materials posted, and bring any questions about them to the class.
5. You need to bring the lecture notes in whatever format you prefer for convenient note taking. For the first class, 40 pages will be enough.
6. You need to find a study group. Study groups will be organized in the first or second class.