MGMT 430 (Hybrid)  
Management Science  

Early Fall Session 15/11  
August 17 – October 10, 2015  

Course Description  
Management Science is a discipline that integrates mathematical modeling and quantitative analysis into the managerial decision-making process. A variety of models and approaches are introduced including: linear programming and optimization models (e.g., maximize profit or minimize cost problems, resource-allocation problems), network and transportation models (e.g., shortest route problems, critical path problems), forecasting models, PERT/CPM models (e.g., a model to determine the optimal schedule for a project), simulation models and the use of Crystal Ball, and simple/multiple regression models. Students learn to model problems mathematically and to use spreadsheet packages to solve management science problems. The goal of the course is to provide students with a background in mathematical modeling to augment their problem-solving skills.  
Prerequisite: MATH 150 or MATH 170; MATH 250  
Proctored Exams: None  

Class Day and Time: Wednesday, 5:30 pm – 8:30 pm (Fort Stewart)  
This is a hybrid course which is defined as an online course supported by a weekly in-seat class. Our class will consist both In Class and online instruction through various resources, discussion and homework. Please note that we will meet every week, unless otherwise noted.  
You are expected to attend every class. If you know prior to the beginning of the session that you will miss more than one in-seat class, it is strongly recommended that you wait to take this course at another time.  
The online portion of our course is located in D2L. You will access the course through CougarTrack.  

Textbooks  
Textbooks for the course may be ordered from MBS Direct:  
- online at http://direct.mbsbooks.com/columbia.htm  
- by phone at 800-325-3252  
For additional information about the bookstore, visit http://www.mbsbooks.com.
Course Overview

The goal of this course is to prepare students to

- Assess and organize complex business situations requiring specific, quantifiable outcomes
- Develop a spreadsheet model of the situation so that it can be evaluated quantitatively
- Apply the appropriate decision analysis tools to the spreadsheet model
- Decide on the path forward based on the model’s output and associated risk

The quantitative techniques that are covered in this class are designed to help business leaders understand and analyze problems in an organized fashion, fully capable of providing alternative paths moving forward. While the tools, techniques, and the problems they are applied to differ, they each have a common trait that binds them together. There is a need to quantitatively assess the risk involved with any of the decisions the models may recommend.

Each week we will address different types of management science problems. We will discuss how to approach and model the problems mathematically as well as how to use spreadsheet packages to solve management science problems.

Technology Requirements

Participation in this course will require the basic technology for all online classes at Columbia College:

- A computer with reliable Internet access,
- a web browser,
- Acrobat Reader,
- Microsoft Office or another word processor such as Open Office.

You can find more details about standard technical requirements for our courses on our site.

Course Objectives

- To apply the major techniques of management science to analyze a variety of managerial problems.
- To model problems mathematically and use this as input into an appropriate management science tool.
- To develop an understanding of how to interpret the results of a management science study and use these results to implement better policies.

Measurable Learning Outcomes

After completing this course, students will be able to:

- Understand the types of problems addressed by management science techniques. State problems in a mathematical format.
- Describe and explain the concepts of linear programming.
- Explain the use of linear programming to solve optimization problems.
- Formulate the model linear programming problems mathematically, graphically, and using spreadsheets.
- Transfer a problem formulated mathematically to a spreadsheet format and solve it using a software program.
- Interpret results from solutions to linear programming problems.
- Describe and explain sensitivity analysis.
- Formulate network optimization problems.
- Use binary integer programming.
- Construct and solve queuing model problems.
- Explain different types of forecasting techniques.
- Use Crystal Ball to solve a variety of management science problems.
- Describe the essence of PERT/CPM Models and their use by management.

### Grading

#### Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>324 - 360</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>288 - 323</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>252 - 287</td>
<td>70-79%</td>
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<tr>
<td>D</td>
<td>216 - 251</td>
<td>60-69%</td>
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<tr>
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#### Grade Weights

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<tr>
<th>Assignment Category</th>
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<tbody>
<tr>
<td>Discussions (Online)</td>
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<td>Dropbox (Online)</td>
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<tr>
<td>In Class Participation</td>
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#### Schedule of Graded Assignments

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<thead>
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<td>Introductions</td>
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<tr>
<td></td>
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<td>Thursday /Sunday</td>
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<td></td>
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<td>Sunday</td>
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Assignment Overview

Readings

All readings and lecture review should be completed prior to coming to the in-seat portion of class. I encourage you to take advantage of the self-study resources available in the course.

Discussions (Online)

Discussion activities are designed to help extend your learning into the real world and bridge the gap between theory and practice. Requirements and due dates for discussion assignments will be posted online in the Content area and the Discussions area of the course.

You should read the requirements and do any required Internet research necessary. Then prepare a well-worded and thoughtful response to each question asked, relating your answer directly to the results of your research and the classroom discussion. Conventions of “netiquette” (online etiquette), which include courtesy to all users, will be observed online and the equivalent will be observed in the classroom setting.

Your opinions should be well thought out and you should support your opinion with facts. In other words, tell me the why behind your opinion in terms that show you understand the issues involved and can apply critical analysis to the data and information you have available from your studies and research.

Your initial post should be made in the Discussions area by Thursday at 11:59 pm Central Time (CT). Your two responses to classmates must be posted by Sunday at 11:59 pm CT.

There are graded and ungraded components to the discussions for this class.

- Ungraded discussions are the Introductions and General Questions. These are areas that you can post questions, discuss non-related topics, etc.
- Graded discussions are the six graded discussion activities for this course. Each has an online component and an in class component. Specific assignments are posted in the Content area.
Dropbox (Online)

Dropbox assignments will consist of a problem(s) to be worked or responses to general questions that should be submitted via the appropriate Dropbox folder. Homework problems will not be limited to simply ‘right answer’ or ‘wrong answer’. Rather, points will be awarded for being proximal, for being on time, for correct labeling, etc. The total homework points earned will be added to the class point total.

Submit the assigned exercises or responses to the appropriate Dropbox folder by Sunday at 11:59 pm CT.

In Class Participation

During each in-seat portion of class, you will have an activity that will require you to apply the content from the readings or in class discussions. These activities will range from individual activities (reflections, scenarios, etc.) to group projects (presentations, role playing, etc.).

You must be present and participate in the activities during the in-seat portion of class in order to receive these points.

Quizzes (Online)

At the end of Weeks 2, 4, 6, and 8 you must complete a short quiz. Each quiz will include multiple choice and short answer questions. Each quiz will not be comprehensive; they will cover only the material subsequent to the quiz.

Each quiz is due by Sunday at 11:59 pm CT of the appropriate week.

Course Schedule

Week 1: Introduction to Modeling, Decision Making, Linear Programming

Readings (Before Class)

- Chapter 1
- Chapter 2
- Appendix 2.2

Introductions (Online)

Introduce yourself. Give your name, occupation, hobbies, interest or experience you may have in decision science or mathematical modeling, family information, and/or any other information that can help us get to know you. After you have submitted your profile, respond to at least two of your classmates’ profiles through the threaded discussion option.

Discussion 1 (Online)

Discuss the advantages of analyzing and experimenting with a model as opposed to a real object or situation.

Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Sunday at 11:59 pm CT.

In Class Participation 1

During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.
Dropbox 1 (Online)
Use Week 1 Assignment from the Content area to prepare your answer(s) for this week's dropbox assignment. For Part B, solve using either the graphical method or create an Excel model similar to the 'Par.xls'
Submit to the appropriate Dropbox folder by Sunday at 11:59 pm CT.

Week 2: Sensitivity Analysis
Readings (Before Class)
• Chapter 3
• Appendix 3.1

Discussion 2 (Online)
Post a brief summary of sensitivity analysis. What are the benefits of performing sensitivity analysis?
Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Sunday at 11:59 pm CT.

In Class Participation 2
During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.

Dropbox 2 (Online)
Use Excel Exercise Week 2 from the Content area and answer question 17 at the end chapter 3.
Submit your responses to the appropriate Dropbox folder by Sunday at 11:59 pm CT.

Quiz 1 (Online)
Quiz 1 is due by Sunday at 11:59 pm CT.

Week 3: Network Modeling, Transportation Problems
Readings (Before Class)
• Chapter 6
• Appendix 6.1

Discussion 3
Choose one of the network flow models discussed in this chapter. Describe a situation that this model could be use. What quantities do the arcs represent? What quantities would the nodes represent?
Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Sunday at 11:59 pm CT.

In Class Participation 3
During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.

Dropbox 3 (Online)
Using your textbook, respond to question 7 at the end of chapter 6.
Submit your answer to the appropriate Dropbox folder by Sunday at 11:59 pm CT.
Week 4: Integer Linear Programming

Readings (Before Class)
- Chapter 7
- Appendix 7.1

Discussion 4 (Online)
In the PAR Inc. example from chapter 2, the solutions were not integer values. Does this make sense for this application? Is this a general property of Linear Programming problems? Explain why rounding or truncating non-integer values for the solutions is not an appropriate method for obtaining integer solutions.

Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Sunday at 11:59 pm CT.

In Class Participation 4
During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.

Dropbox 4 (Online)
Using your textbook, respond to question 21 (Part A and B) at the end of chapter 7.
Submit your answer(s) to the appropriate Dropbox folder by Sunday at 11:59 pm CT.

Quiz 2 (Online)
Quiz 2 is due by Sunday at 11:59 pm CT.

Week 5: Project Scheduling

Readings (Before Class)
- Chapter 9
- Appendix 9.1

Discussion 5 (Online)
Describe the differences between PERT and CPM Models. When would it be appropriate to use each of these models?

Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Sunday at 11:59 pm CT.

In Class Participation 5
During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.

Dropbox 5 (Online)
Use the Excel Exercise Week 5 document from the Content area to formulate your responses for this week’s dropbox assignment.
Submit your answer(s) to the appropriate Dropbox folder by Sunday at 11:59 pm CT.

Week 6: Queuing Models

Readings (Before Class)
- Chapter 11
Discussion 6 (Online)
Give an example of each of the queuing models discussed in this chapter:
- Single-channel waiting line,
- Multiple Single-channel waiting lines and
- Multiple-channel waiting line.

Which would you prefer to wait in? Why?

Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Sunday at 11:59 pm CT.

In Class Participation 6
During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.

Dropbox 6 (Online)
Using your textbook, respond to question 17 at the end of Chapter 11.
Submit your answer(s) to the appropriate Dropbox folder by Sunday at 11:59 pm CT.

Quiz 3 (Online)
Quiz 3 is due by Sunday at 11:59 pm CT.

Week 7: Forecasting and Regression Analysis

Readings (Before Class)
- Chapter 15
- Appendix 15.1
- Appendix 15.2
- Week 7 Notes in Content area

Discussion 7 (Online)
Choose one of the following time series patterns discussed in this chapter: horizontal, trend, seasonal, or cyclical. Describe a situation or set of data that would demonstrate this pattern. Explain what characteristics the data possess to support your choice.

Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Sunday at 11:59 pm CT.

In Class Participation 7
During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.

Dropbox 7 (Online)
Using your textbook, respond to question 19 at the end of chapter 15.
Submit your answer(s) to the appropriate Dropbox folder by Sunday at 11:59 pm CT.

Week 8: Simulation using Crystal Ball®

Readings (Before Class)
- Chapter 12
- Appendix 12.2
Discussion 8 (Online)

What situations are appropriate to model using simulation? What characteristics should a model have for simulation to be used?

Your initial response is due by Thursday at 11:59 pm CT. Your two responses to two classmates’ posts are due by Saturday at 11:59 pm CT.

In Class Participation 8

During the in-seat portion of class you will complete an activity that must be completed by the end of class. This activity will be graded and posted online.

Dropbox 8 (Online)

Using your textbook, respond to question 7 at the end of chapter 12.

Submit your answer(s) to the appropriate Dropbox folder by Saturday at 11:59 pm CT.

Quiz 4 (Online)

Quiz 4 is due by Saturday at 11:59 pm CT.

Course Policies

Student Conduct

All Columbia College students, whether enrolled in a land-based or online course, are responsible for behaving in a manner consistent with Columbia College's Student Conduct Code and Acceptable Use Policy. Students violating these policies will be referred to the office of Student Affairs and/or the office of Academic Affairs for possible disciplinary action. The Student Code of Conduct and the Computer Use Policy for students can be found in the Columbia College Student Handbook. The Handbook is available online; you can also obtain a copy by calling the Student Affairs office (Campus Life) at 573-875-7400. The teacher maintains the right to manage a positive learning environment, and all students must adhere to the conventions of online etiquette.

Plagiarism

Your grade will be based in large part on the originality of your ideas and your written presentation of these ideas. Presenting the words, ideas, or expression of another in any form as your own is plagiarism. Students who fail to properly give credit for information contained in their written work (papers, journals, exams, etc.) are violating the intellectual property rights of the original author. For proper citation of the original authors, you should reference the appropriate publication manual for your degree program or course (APA, MLA, etc.). Violations are taken seriously in higher education and may result in a failing grade on the assignment, a grade of "F" for the course, or dismissal from the College.

Collaboration conducted between students without prior permission from the instructor is considered plagiarism and will be treated as such. Spouses and roommates taking the same course should be particularly careful.

All required papers may be submitted for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers may be included in the Turnitin.com reference database for the purpose of detecting plagiarism. This service is subject to the Terms and Conditions of Use posted on the Turnitin.com site.

A plagiarism tutorial is located in the content area of the D2L website. Additionally, work that was completed in a prior course and submitted in the current course will not be accepted.
Non-Discrimination

There will be no discrimination on the basis of sex, race, color, national origin, sexual orientation, religion, ideology, political affiliation, veteran status, age, physical handicap, or marital status.

Disability Services

Students with documented disabilities who may need academic services for this course are required to register with the Coordinator for Disability Services at (573) 875-7626. Until the student has been cleared through the disability services office, accommodations do not have to be granted. If you are a student who has a documented disability, it is important for you to read the entire syllabus before enrolling in the course. The structure or the content of the course may make an accommodation not feasible.

Attendance Policy

Attendance for a week will be counted as having submitted a course assignment for which points have been earned during that week of the session or if the proctoring information has been submitted or the plagiarism quiz taken if there is no other assignment due that week. A class week is defined as the period of time between Monday and Sunday (except for Week 8, when the week and the course will end on Saturday at 11:59 pm CT). The course and system deadlines are all based on the Central Time Zone.

Email

All students are provided a CougarMail account when they enroll in classes at Columbia College. You are responsible for monitoring email from that account for important messages from the College and from your instructor. You may forward your Cougar email account to another account; however, the College cannot be held responsible for breaches in security or service interruptions with other email providers.

Students should use email for private messages to the instructor and other students. The class discussions are for public messages so the class members can each see what others have to say about any given topic and respond.

Late Assignment Policy

A hybrid class requires regular participation and a commitment to your instructor and your classmates to regularly engage in the reading, discussion and writing assignments. Although most of the communication for this course is asynchronous, you must be able to commit to the schedule of work for the class for the next eight weeks. You must keep up with the schedule of reading and writing to successfully complete the class.

Course Evaluation

You will have an opportunity to evaluate the course near the end of the session. Course evaluations will open on Sunday of Week 5 and will remain open until Thursday of Week 7. A link will be sent to your CougarMail that will allow you to access the evaluation. Be assured that the evaluations are anonymous and that your instructor will not be able to see them until after final grades are submitted.
Additional Resources

Orientation for New Students

This course is offered online, using course management software provided by Desire2Learn and Columbia College. The Student Manual provides details about taking an online course at Columbia College. You may also want to visit the course demonstration to view a sample course before this one opens.

Technical Support

If you have problems accessing the course or posting your assignments, contact your instructor, the Columbia College Helpdesk, or the D2L Helpdesk for assistance. Contact information is also available within the online course environment.

<table>
<thead>
<tr>
<th>Call: <a href="mailto:CCHelpDesk@ccis.edu">CCHelpDesk@ccis.edu</a></th>
<th>Call: <a href="mailto:helpdesk@desire2learn.com">helpdesk@desire2learn.com</a></th>
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<tbody>
<tr>
<td>800-231-2391 ex. 4357</td>
<td>877-325-7778</td>
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Online Tutoring

Smarthinking is a free online tutoring service available to all Columbia College students. Smarthinking provides real-time online tutoring and homework help for Math, English, and Writing. The Writing Center can be used for writing assistance in any course.

Smarthinking also provides access to live tutorials in writing and math, as well as a full range of study resources, including writing manuals, sample problems, and study skills manuals. You can access the service from wherever you have a Connection to the Internet. I encourage you to take advantage of this free service provided by the college.

Access Smarthinking through CougarTrack under Students->Academics->Academic Resources.