

# MIS 430

## Business Simulation and Modeling

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**Office Hours:** MW 10:00 – 11:00 a.m., MW 12:30 – 1:30 p.m; M 6:30 – 7:30 pm and by appointment.

**Catalog Description:** Introduction to the uses of computers and microcomputers in creating models of business systems and simulations of business systems outcomes. Covers the use of management gaming and the development of heuristic models. Introduces the use of simulation languages, such as GPSS.

**Prerequisites:** MIS 301 and STAT 362. The student should be very comfortable with Windows based spreadsheet packages and be able to design a spreadsheet from scratch (without step-by-step instructions).

### Textbooks:

*Required* - Ragsdale, Cliff T. Spreadsheet Modeling and Decision Analysis. A Practical Introduction to Management Science. Cambridge, MA: Course Technology, 1998.

*Optional* - Hayen, Roger. Comprehensive Excel 97. Cambridge, MA: Course Technology, 1997, or other Excel Reference textbook.

**Overview:** Deals with the methodology for designing and conducting computer based decision analysis (Management Science) tools with a special emphasis on Simulation and gaming experiments. The course will expose students to the basic concepts of model choice and formulation including heuristic models and management games. Emphasis will be placed on the setup of problems and interpretation of outputs of the models. A significant portion of the course will be devoted to developing models using a spreadsheet program (Excel).

**Performance Objectives:** Upon completion of the course, the student will:

1. Be able to formulate models to represent business problems and situations
2. Understand various basic approaches to designing models and conducting experiments with them in order to study business problems.
3. Be capable of deciding whether a simulation or other analytic tool is appropriate for a particular problem situation.
4. Understand the use of special purpose simulation languages.
5. Have the ability to create macros and use special functions with multiple pages in a spreadsheet program.
6. Be able to interpret the outcome of various analytic tools.
7. To be able to implement all stages of the simulation process: Gather original data, analyze that data, design and implement a simulation using the results of this analysis, and discuss the results of the analysis.

### Syllabus Statement for Persons with Disabilities:

It is the intention of the institution to support full participation of all students, regardless of physical ability level. Therefore, if any student needs consideration of his/her physical abilities in order to complete the course, please notify the instructor as soon as possible.

**Application Reviews:** Each student will research/review/summarize two articles which detail the use of decision analysis techniques in a business environment. (PRODUCT REVIEWS & ADVERTISEMENTS ARE NOT ELIGIBLE ARTICLES.) These cases may illustrate any of the decision tools that will be covered during the trimester. The reviews should be a min of one (entire – 1" margin to 1" margin) and a max of four pages each.

**Procedure:** Do library or Internet search on the business use of the Management Science topic of your choice. (For example: You could search on Simulation or computer simulation, on Linear Programming (LP), etc.) Choose an article that sounds interesting to you. Make a copy of the article for attachment. Each article must be a minimum of two single spaced pages in length. Read the article and write the summary/review. (Note: If using the Internet, use a deep search engine such as Alta Vista.)

**Format of summary/review:** (Note: Reviews not using this format will be returned ungraded.)

1. Must be word-processed, single-spaced with one inch margins. Must be minimum of one entire single spaced page with a maximum of four single spaced pages.
2. Type your name, class period, and date on the first three lines, the right-hand side, top of first page.
3. Below your name, class, and date, give the full reference to the article. (Authors name, title of article, title of journal, number or date of journal, and page number of article.)
4. Type review/summary. This should include all pertinent information such as: what company/service organization used what technique, their objectives (why did they use this particular technique), and the results. Lastly, include a paragraph stating your personal feelings about the article and the benefits/problems of using this particular Management Science technique.
5. Attach (staple or clip) a copy of the full article to the back of your review.

**Homework Exercises:** Homework is assigned for each topic. While I will collect only particular problems, **YOU CANNOT PASS THIS CLASS WITHOUT WORKING THROUGH THESE EXERCISES.** *Simply watching me (or others) and reading the answers will not provide you with the needed experience to pass the exams.* This will be evidenced on your exams. If you do not work the exercises yourself, typical exam grades will be in the low 40's or 30's. Persons who have completed all of the exercises tend to do significantly better (many making 90+). The answers to all homework problems will be posted on my door. While these may be borrowed for copying, please return them ASAP so that others may have the same opportunity.

**Evaluations:**

Homework	50
Exams (2 @ 1 00 pts)	200
Project	100
Application reviews (2@ 25 points)	<u>50</u>
	400

Final letter grades are assigned according to total points using a flexible scale based on a number of factors. One factor will reflect the instructor's view of the students understanding.

**Extra Credit:** At the end of each semester, several students ask for extra credit for this class. In the interest of fairness to everyone in the class, the **ONLY** extra credit available for this course will be: turn in to the instructor, no later than the last class meeting for this class, **every** problem (NOT JUST THOSE ASSIGNED), worked and answered, from each chapter covered. Both the work and the solution write-up should be on a 3 1/2" floppy accompanied by the solutions and write-ups in a 3-ring binder, organized by chapter and in correct order. Further, each problem must be identified by chapter and problem number.

**Term Paper/Project:** Students will be expected to undertake a relevant trimester project. This should be a large simulation/modeling project. Project can be found through work or other experience. (As a last resort, you may check with the instructor for a more complex project.) It required that the students get the instructors approval of a project, by the date indicated. You will make a presentation of your project to the class.

**Requirements for Project:** Must include a description of the problem, why you chose this problem (your objectives), the data gathering technique you used, the data, the statistical analysis, the modeling technique chosen and explanation of why you chose this particular technique, the setup of the problem (copy of your spreadsheet with the variables written up as a word problem), a copy of the results, and analysis and discussion of the results.

Also, you must include recommendations you would make based on your experience. (The argument for your recommendations will count more than the correctness of your recommendations.) Total project should be no less than 10 double spaced word processed pages using a 10-12 point font and 1" margins.

**Topic Approval:** During the 3<sup>rd</sup> week, you must turn in a formal topic proposal paper. This will detail what you wish to study and your objectives in studying this topic. This must also include details as to how you will gather and analyze your data.

**NOTE:** All exam questions must be answered using complete sentences. It is best to practice this with your homework problems. All discussions must be written using a word-processor.

## *Tentative Course Schedule*

Week	Topic	Chapter	Homework
1	Introduction/Class Overview Modeling and Decision Analysis <b>Off Labor Day</b>	Ch 1	
2	Optimization & Linear Prog	Ch 2	p 110, 8,10,12,14,17,19
3	Modeling & Solving LP Problems in a Spreadsheet <b>***Project proposal due.</b>	Ch 3	
4	Sensitivity Analysis & Simplex Method Networks	Ch 4 Ch 5	p 149, # 9,10,11,13,15 p 192, #7,9,10,13,17
5	Integer Programming <i>First Article Review Due</i>	Ch 6	p 250 #5,6,7,11
6	Goal Programming <b>Catch-up -GET EXAM--</b>	Ch 7	p 290, # 8,9,10

*The Exam is a take home exam.*

**-WE WILL NOT MEET FOR ONE CLASS PERIOD IN ORDER FOR YOU TO WORK ON EXAM-**

8	Introduction to Simulation	Ch 12	p 527, # 3,5,7, 9,11
9	Add-in Assisted Simulation using @RISK <i>Second Article Review Due</i>	Ch 13	p 579, #6,7,10, 11
10	Queuing Theory	Ch 14	p 620, # 8, 11, 13, 14,16
11	Project Management	Ch 15	p 665, # 5,6,7,9, 11
12	Decision Analysis Exam 2 distributed	Ch 16	p 727, # 3, 4 5, 6
13	<b>EXAM 2—Take Home Exam (No class)</b>		
14	Project Presentations – Projects Due		
15	Catch up (if necessary)		