Math 270: Managerial Mathematics

Fall 2010, 3 credits, MWF 2:10-3:00, MRC 444
Instructor: Richard J. Maresh, Associate Professor and Chair, Department of Mathematics
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Hours: MWF 10-11 and 12-1, T 12-1, or by appointment
Final Exam: Tuesday, 14 Dec 2010, 9:50 – 11:50 a.m.

Catalog Course Description: Several topics applicable to the study of business are covered. In particular, the course considers systems of linear equations and linear programming, the mathematics of finance, and an introduction to probability. Emphasis in the course is on applications. This is a General Education course: G9.
Prerequisite: acceptable score on placement exam or a grade of C or higher in Math 112 (or MATH 110 in old system).

Text: *Finite Mathematics For the Managerial, Life, and Social Sciences (9th Edition)*, by S.T. Tan, Thompson Brooks/Cole Press, 2009. [ISBN: 978-0-495-38753-4]

General Education Core Skill Objectives

1. **Thinking Skills**: Students engage in the process of inquiry and problem solving, which involves both critical and creative thinking.
(a) The student understands the primary "big problems" this course addresses: paying off loans in a fixed number of equal payments (amortization), optimizing cost or profit functions subject to a set of linear constraints (linear programming), and understanding and being able to apply the basics of probability.
(b) The student demonstrates the ability to read a problem, set up an appropriate equation, and use appropriate methods to solve the problem. This course is very explicitly about thinking skills.
2. **Communication Skills:** Students communicate effectively orally and in writing in an appropriate manner both personally and professionally.
(a) The student does group work (labs and practice exams) throughout the course, involving both written and oral communication.
(b) The student uses technology - graphing calculators and *Excel* in the computer labs - to solve problems and to be able to communicate solutions and explore options.
(c) The student will improve his or her ability to write logically valid and precise mathematical solutions.
3. **Life Values:** Students analyze, evaluate, and respond to ethical issues from informed personal, professional, and social value systems.
(a) The student develops an appreciation for the intellectual honesty of mathematical reasoning.
(b) The student understands the need to do one's own work, to honestly challenge oneself to master the material.
4. **Cultural Skills:** Students understand their own and other cultural traditions and demonstrate a respect for the diversity of the human experience.
(a) The student develops an appreciation of the history of linear programming and probability and the role played by mathematics in business problems.
(b) The student learns to use the language of mathematics - symbolic notation - correctly and appropriately.

Specific Course Goals:

1. Students will participate in a formal assessment of their algebra skills and do appropriate work to improve their skill level to what this course requires.
2. Students will learn mathematical concepts that apply to business (as determined by the business school).
3. Students will learn how to apply mathematics to various types of business-related problems.
4. Students will improve their problem solving skills.
5. Students will learn to use technology, specifically graphing calculators and computer software, to solve a variety of problems.
6. Students will improve their mathematical reasoning skills.
7. Students will improve their ability to communicate, primarily in writing, mathematical ideas.

Brief Course Outline:

1. Systems of Linear Equations, Matrices.
2. Linear Programming – Graphical and Simplex Solutions.
3. Financial Mathematics – Annuities and Amortization.
4. Probability – Combinatorics, Bayes' Theory.

<u>**Course Details**</u>
<u>**Attendance:**</u>
   Very few students seem able to learn mathematical material independently, and it is therefore important to attend class and participate actively in these class meetings. I do not use attendance in a formal way as part of the grading process, but part of the commitment to success in the course is regular attendance. I include here a detailed schedule so that if you do have to miss a class you can keep up with the material, but it's not the same – you simply miss out on a key part of the learning process if you miss a class meeting.

<u>**Blackboard:**</u>
   Because we meet three times per week I do not make extensive use of *Blackboard*, but I will use it for several things. I will store a copy of the syllabus there, under *Course Documents*. I will make occasional announcements through *Blackboard*. I might also use it for old exams or notes on some topic. Finally, I will use it to make available your in-progress grade throughout the semester.

<u>**Technology:**</u>
   You should have a reasonably good calculator – you will need exponents and logarithms, and combinations and permutations. I will frequently use the overhead display unit with a TI-84 as we work through the material. We will also make some use of the *Excel* spreadsheet program for the linear programming topic.

<u>**Homework**</u>:
   The homework assignments (by the way, the listed assignments are intended to be done *following* the material presented on the given day – not to be *due* that day) are in fact the **KEY** to learning the material and therefore to success in the course. I cannot overstate this – you cannot learn the material unless you practice. Here's an analogy: if you paid someone to give you piano lessons you would expect to have to practice, and you know that without practice your skills will never develop. Learning mathematics is just like that – ***Mathematics is NOT a spectator sport!*** I already know how to solve these problems, but the purpose of the course is not to convince you of that, but rather to put you in a situation in which you can, IF YOU PRACTICE ENOUGH, and if you are adequately prepared, succeed in learning the content and being able to do the problems.
   The problems I have listed in the daily assignments should give you a basic idea of the types of problems you will be expected to solve. If you can convince yourself that you understand the particular topic well enough to do all the problems listed, you might not have to actually work them, but you should at least work enough to test yourself. The single biggest mistake a math student makes is to look at a problem and say, "I think I can do this," without actually trying it. These are the students who say, "It looks easy when you do them in class, but on the exam I 'blanked'."
   At each exam you will be expected to show me that you can work problems that are very much like the ones you are supposed to have practiced. I know your program requires a "C" in a support course like this, and I can tell you that while the vast majority of students do earn the credit, there are always a few who don't. You simply will not be successful unless you work at it!
   My teaching style includes discussion and question-answering. You will only have questions to ask if you have put in the time trying to work the problems. Only then will you specifically know what you don't yet understand.
   As a rule of thumb, university students should expect to put in about TWO HOURS of study outside the classroom for every hour in the classroom. I know many students do not do this, but if you want to be successful here you should try to map out something like 6 hours per week to study mathematics.

<u>**Exams**</u>:
   When you take exams you may use your calculator and you may also construct a 1-page (both sides OK) set of notes. For the comprehensive final exam you may use the notes from all your previous exams. I usually encourage students to basically outline the material and to write down what you think will be useful to you.

<u>**Academic Honesty:**</u>
   Cheating will not be tolerated. Exam questions and problems will be open-ended rather than multiple-choice, so it is harder to get answers from your classmates, and I generally ask you to show your work to receive full credit on a problem, which again makes it harder to lift answers from another. If I detect cheating on an exam you will be given a score of ZERO for that exam – it's not worth it to cheat, and it is also unethical.

<u>**Grading System:**</u>
   The grades will then be assigned on the scale: A = 90%, B = 80%, C = 70%, D = 60%.
   In my courses, there is not such thing as "extra credit" – I think your grade should reflect how well you have demonstrated your understanding of the material by successfully working problems.

As a general rule your grade for the course will be computed by including the final exam at its face value. However, I will adjust your grade upward if your score on the final exam is higher than your overall average throughout the course – in this case you will receive as a grade what you earned on the final exam.

Getting Help:

The learning center makes tutoring help available, including drop-in math help (Monday through Friday at noon. If you seek tutoring help, make sure that you do not rely on it to the extent that you aren't working problems on your own. The tutor won't be at your side during an exam. Also feel free to come see me if you are having difficulty. Unfortunately, it is often only the strongest students who take advantage of the instructor's office hours.

Disability Statement:

If you are a person with a disability and require any auxiliary aids, services or other accommodations for this class, please see me and/or Jane Eddy, the campus ADA coordinator (Learning Center, 796-3094), within ten days to discuss your needs. I want to include taking exams in the learning center under this category; you will need a written request from Jane Eddy before I will allow you to take exams there.

Disclaimer:

I reserve the right to make adjustments to the schedule and the syllabus in general as we move through the course. This is a new edition of the text for me and it may turn out that some changes may be necessary.

MATH 270 Schedule: Fall 2010

Date	Material Covered	Suggested Minimal Assignment
30 Aug	<1.2> Graphing Linear Equations	p 18 # 1-59 odd
1 Sep	<1.3> Mathematical Models	p 33 # 1-11 odd, 15-23 odd, 31, 39
3 Sep	<1.4> Intersection of Lines	p 46 # 1-21 odd, 25
6 Sep	*- Labor Day -*	
8 Sep	<2.1> Systems of Linear Equations	p 73 # 1-23 odd
10 Sep	<2.2> Systems With Unique Solutions	p 85 # 1-29 odd, 35-47 odd, 51, 53
13 Sep	<2.3> Systems Without Unique Solutions	p 97 # 1-25 odd, 33
15 Sep	<2.5> Matrix Multiplication	p 120 # 1-31 odd, 49
17 Sep	<2.6> Inverses of Square Matrices	p 135 # 1-27 odd, 37, 39
20 Sep	<3.1> Graphing Systems of Linear Equations	p 161 # 1-35 odd
22 Sep	<3.2> Linear Programming Problems	p 168 # 1-17 odd
24 Sep	<3.3> Graphical Solution of Linear Programming Problems	p 179 # 1-29 odd
27 Sep	<3.4> Sensitivity Analysis	p 181 # 31-45 odd // p 195 # 1-15 odd
29 Sep	Review…	
1 Oct	**Practice Exam #1** (20 points)	
4 Oct	**Exam #1** (Chapters 1-3, 80 Points)	
6 Oct	<4.1> Simplex Method: Maximization	p 217 # 1-13 odd
8 Oct	<4.1> Linear Programming Using Excel	p 218 # 23-35 odd // p 226 # 1, 3
11 Oct	<4.2> Simplex Method: Minimization	p 234 # 1-9 odd // p 241 # 1, 3
13 Oct	Review …	
15 Oct	<5.1> Compound Interest	p 269 # 1-41 odd
18 Oct	<5.2> Annuities	p 283 # 1-23 odd
20 Oct	<5.3> Amortization, Sinking Funds	p 294 # 1-31 odd, 37
22 Oct	*- Mid-semester Break -*	
25 Oct	Review…	

27 Oct	**Practice Exam #2** (20 points)	
29 Oct	**Exam #2** (Chapters 4-5, 80 Points)	

1 Nov	<6.2> Counting Principles	p 327 # 11-33 odd
3 Nov	<6.3> Multiplication Principle	p 334 # 2-23 odd
5 Nov	<6.4> Permutations and Combinations	p 344 # 1-11 odd, 23-53 odd, 57, 59, 69, 73

8 Nov	<7.1> Sample Spaces	p 359 # 21-33 odd, 39, 41
10 Nov	<7.2> Probability	p 367 # 1-31 odd
12 Nov	<7.3> Rules of Probability	p 376 # 1-25 odd, 29, 33, 37

15 Nov	<7.4> Counting Techniques and Probability	p 386 # 1-39 odd
17 Nov	<7.5> Conditional Probability	p 398 # 1-31 odd
19 Nov	<7.6> Bayes' Theorem	p 406 # 1-29 odd, 33, 35

22 Nov	<8.1> Distribution of Random Variables	p 423 # 1-17 odd
24 Nov	*Thanksgiving*	
26 Nov	*Break*	

29 Nov	<8.2> Expected Value	p 436 # 1-11 odd, 19, 21, 27, 31, 33
1 Dec	<8.3> Standard Deviation of a Probability Distribution	p 446 # 1-11 odd, 21
3 Dec	<8.4> Binomial Distribution	p 459 # 1-43 odd

6 Dec	**Practice Exam #3** (20 points)
8 Dec	**Exam #3** (Chapters 6-8, 80 Points)
10 Dec	Review …

14 Dec   **Final Exam**: Tuesday, 14 Dec 09, 9:50 –11:50 a.m. [150 points]