1-1-2009

# (2) Sample Syllabus: Econ 4065

Peter Toumanoff

**ECON 4065-101 INTRODUCTION TO MATHEMATICAL ECONOMICS FALL 2009**
**SYLLABUS**


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**OFFICE HOURS:** TTh: 12:30-2:00, W: 2:30-6:00 (and by appointment)
**TEXT:** Toumanoff and Nourzad, *A Mathematical Approach to Economic Analysis*

**COMPUTER RESOURCES:** ***Scientific Notebook*** is optional for this class. This software is available on CD-ROM from website http://www.mackichan.com/, and is accessible in the Business Administration Computer lab in DS 116. The class has a site in D2L which will be used to post assignments, answers to homework questions, and other class materials.

**COURSE OBJECTIVES:** The purpose of this course is to show you how mathematical tools can help you to understand and use economic theory, and to integrate mathematical tools with the geometric and logical tools you have already been exposed to in classes of microeconomic and macroeconomic theory. I hope that learning the mathematical tools will have two effects: 1) economic theory will seem more coherent and organized to you; and 2) you will become more adept at using mathematical techniques and you will enjoy mathematics more. When you have finished the course you will know how to express familiar concepts in mathematical language; you will be able to use differential calculus to construct and solve optimization models; you will learn how to handle functions and models with many variables using matrix algebra; you will understand how empirical econometric work is linked to economic theory. You will see applications of this course to all the economics you have studied in the past or will study in the future.

**GRADING:** Grading will be based on performance on four take-home quizzes ($\boldsymbol{X_i}$), a mid-term exam (***ME***), a final exam (***FE***) and weekly homework assignments ($\boldsymbol{HW_j}$). The Final Grade (***FG***) is determined by the following formula:

$$FG = \sum_{i=1}^{4} X_i + \left( \sum_{j=1}^{n} HW_j \right) \frac{10}{n} + ME + FE \qquad \boldsymbol{0 \le X_i \le 100,\ 0 \le HW_j \le 10,\ 0 \le ME,\ FE \le 200}$$

[765 ≤ FG] = A; [630 ≤ FG < 765] = B; [540 ≤ FG < 630] = C; [450 ≤ FG < 540 = D; [FG < 450] = F. I reserve the right to adjust borderline grades upwards by 1/2 grade.

**TAKE-HOME QUIZZES:** Long experience with this course has convinced me that the best method of examining student progress is through frequent take-home quizzes. However, take-home quizzes can only be effective if students follow the rules. Please read and understand these rules, which will be repeated for you with your take-home quizzes.

1. **Show <u>all</u> work**. Every step of your answer must be plainly evident to me. Failure to show every step will result in no credit for the answer. If you use Scientific Notebook or other mathematical software to help you answer the questions, provide a print-out of all work that used the software.
2. **Do not discuss or show your work to anyone!** Your work must be yours, and only yours. Questions regarding the quizzes can be directed to me, either in person, by phone, or via e-mail.
3. **Observe all deadlines.** You are responsible for turning in each quiz at the beginning of the class the day it is due. Absence, either the day the quiz is handed out or the day it is due, does not relieve you of this responsibility. If you must be absent, discuss alternative arrangements with me. Take-home quizzes will be handed out and posted on D2L at the end of class the meeting before they are due.

**EXPECTATIONS:** I expect that every student will prepare for and attend every class session. Students are responsible for the material covered in classes that are missed. In addition to class time, students are expected to spend ***at least six hours*** each week studying course material. I am ready and eager to help students individually during office hours or by appointment. ***Please bring all notes and other work with you when you come for help***.

**ACADEMIC HONESTY:** It is not feasible to attempt to develop a list of all conceivable examples of academic dishonesty, but it may be helpful to note that they all involve an attempt to deceive, to distort perceptions of reality, to gain a record of academic accomplishment greater than earned. All who are parties to the deceit are involved in academic dishonesty. Most acts of academic dishonesty involve cheating on examinations or reports in one way or another, improperly obtaining examination questions, plagiarism, forgery, falsification of records or impersonation of a candidate taking an examination.

Students who engage in academic dishonesty, whenever that may be, shall be subject to appropriate university penalties. Penalties ranging up to an F in the course in which the dishonesty occurs can be imposed by the dean of the college or school in which the course is offered. Additional penalties, if they are warranted, ranging up to expulsion from the university, can be imposed by the dean of the college or school in which the affected student is enrolled. If an appeal against the imposition of a penalty for academic dishonesty is taken beyond the college or school in which it was imposed, it should be directed to the Office of the Provost.

**ATTENDANCE:** Attendance will be observed. A student missing 5 or more classes is subject to expulsion from the course, however such expulsion will not be automatic. Students who notify me in advance of an absence will be treated sympathetically. Cell phones, pages, PDAs and other electronic devices should be switched off or on quiet mode when in the classroom. Anyone observed texting, web-surfing, or otherwise engaged in activities unrelated to the class will be asked to leave the classroom.

**DOCUMENTED DISABILITIES:** Students with documented disabilities are entitled to reasonable accommodations if needed. If you believe you need accommodations, please see the Coordinator of Disability Services (288-3270) before the end of late registration. Accommodations will not be granted retroactively.

**COURSE OUTLINE AND ASSIGNMENTS:** Weekly homework assignments are due at the beginning of class on Tuesday of the following week. Therefore, the assignment for week 1 is due on Sept. 8, the assignment for week 2 is due on Sept. 15, and so on. Homework assignments will not be accepted late. Homework assignments are not graded according to the correctness of the answers. They will be assigned up to 10 points according to completeness. ***Always show all your work***. Answers will be provided after each due date so that you can check your own homework for correct answers.

Week 1: Sept. 1-3 Topic: Method of Comparative Statics. Reading: Chapter 1
Examples: 1. Demand/Supply Model
2. National Income Model

Week 2: Sept 8-10. Topic: Mathematical Functions. Reading: Chapter 2
Examples: 1. Polynomials
2. Logarithmic functions
3. Exponential functions

Week 3: Sept 15-17. Topic: Differential Calculus. Reading: Chapter 3
Examples: 1. Derivatives

2. 2nd and higher order derivatives
3. Applications of Differential Calculus

***Note: first quiz handed out Sept 17, due Sept 22.***

Week 4: Sept 22-24. Topic: Optimization with One Independent Variable. Reading: Chapter 4.
Examples: 1. Profit maximization in output markets
2. Profit maximization in input markets
3. Comparative statics analysis of the profit-maximizing firm.

Week 5: Sept 29-Oct. 1. Topic: Differentiation of functions with many variables. Reading: Chapter 5.
Examples: 1. Partial derivatives
2. Total differentials and implicit differentiation
3. Isoquants and indifference curves

***Note: second quiz handed out Oct. 1, due Oct. 6.***

Week 6: Oct. 6-8 Topic: Optimization with two independent variables. Reading: Chapter 6.
Examples: 1. Price-taker firm with two inputs

Week 7: Oct. 13-15. Optimization with two independent variables (continued). Reading: Chapter 6.
Examples: 1. Price-taker firm with two inputs

***Note: Oct 15. Mid-term Exam***

Week 8: Oct. 20. Topic: Matrix Algebra. Reading: Chapter 8, Sections 8.1 through 8.4.
Examples: 1. Linear models and matrix operations

Week 9: Oct. 27-29. Topic: Matrix Algebra. Sections 8.4.1, 8.5, skip 8.5.1, and read 8.6.2
Examples: 1. Linear independence and determinants
2. Solving linear models and Cramer's rule

Week 10: Nov. 3-5. Topic: Matrix Algebra and Constrained Optimization. Reading: Chapter 8, Sections 8.7 and 8.7.1. Also Chapter 7, Sections 7.1, 7.2, skip 7.2.1, read 7.2.2 and 7.2.3
Examples: 1. Second-order conditions in determinant form
2. Constrained Utility Maximization

***Note: third quiz handed out Nov 5, due Nov 10.***

Week 11: Nov. 10-12. Topic: Consumer Behavior. Reading: Chapter 9, Sections 9.1 through 9.5.2
Examples: 1. Behavioral postulates and indifference curves
2. Consumer demand functions
3. Slutsky Equation

Week 12: Nov. 17-19. Topic: Consumer Behavior. Reading: Chapter 7, Sections 7.3 and 7.4
Examples: 1. Labor-Leisure Choice
2. The Envelope Theorem

Week 13: Nov 24. Topic: Production. Reading: Chapter 10, Sections 10.1, 10.2, and 10.6.
Examples: 1. The production function

***Note: fourth quiz handed out Nov. 24, due Dec. 1***

Week 14: Dec. 1-3. Production. Reading: Chapter 10, Sections 10.3, 10.4, and 10.7 through 10.8.
1. Homogeneous functions and returns to scale
2. Elasticity of Substitution

Week 15: Dec. 8-10. Topic: Cost of Production. Reading: Chapter 11.

Examples: 1. Constrained cost minimization

2. Profit maximization and cost minimization compared.

**Wednesday, December 16: 8:00 – 10:00 AM** ***Final Exam***