Instructor: Dr. Aaron Smallwood

Office Location: COBA 327
Phone: (817) 272-3062
Email: smallwood@uta.edu
Course Webpage: http://www.uta.edu/faculty/smallwood/ECON4323fall14.html

Time and Location: T, Th 5:30 - 6:50, COBA 140.

Office Hours: Tuesday 4:00 - 5:00 (p.m.)
Thursday 4:00 - 5:00 (p.m.)
And by appointment.

Required Textbook

Recommended Textbook

Other Resources

Course Description and Objectives:
Mathematics has increasingly become the “language” of economics. Having a solid mathematical foundation is necessary to understand both theoretical models and empirical estimators that you will encounter in economics. Economics 5301/4323 is designed to upgrade mathematical skills for graduate work in economics and business. We will study certain basic mathematical concepts and methods and relate them to various types of economic analysis. The mathematical techniques that we will explore include those used in static and comparative-static analysis, optimization problems and simple dynamic analysis. Upon successful completion of the course, you will be able to,

1. Comprehend and explain much of the mathematical analysis in the economics literature.
2. Identify one or more appropriate mathematical tool(s) to use when faced with an economic/mathematics problem.
3. Apply mathematical tools used by economists to solve economic/mathematics problems.

Prerequisites (ECON 5301):
MATH 1302 (College Algebra)

Prerequisites (ECON 4323):
MATH 1316 (Math for economics and business)
ECON 3310 (Intermediate microeconomics)
ECON 3312 (Intermediate macroeconomics)
Grading: Course grades will be based on the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments (9 pts each)</td>
<td>27%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>24%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>24%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>25%</td>
</tr>
</tbody>
</table>

I. Exams:

Exam 1: Tentatively scheduled for September 23, 2014
Exam coverage: determined by pace of the course.

Exam 2: Tentatively scheduled for October 28, 2014
Exam coverage: determined by the pace of the course

Final Exam: December 9, 2014: 5:30-8:00 p.m.
Exam coverage: Again determined by the pace of the course.

Exam Policies: Scantrons are not required for the exams, and you are permitted to bring a scientific non-programmable calculator to the exam. Makeup exams will not be given, except in instances where you are forced to miss class on the above dates because of a necessitated and documented emergency. Please note that students are required to be on time to class on each exam date. Also note that students are not permitted to leave and re-enter the class during administration of the exam.

II. Assignments:

Problem sets will be posted to the course website at the end of each week. After every third week, I will randomly collect one of the previously posted assignments. Please note the assignments are due at the very beginning of the class period. The assignments will be carefully graded and must be completed individually without any group effort. Therefore, you must complete every assignment. I can not accept late assignments. If you are unable to make it to class on time (or at all), we can make arrangements for you to turn in your problem sets early via email or in person. The dates upon which the assignments will be collected are as follows:

Assignment #1: September 16
Assignment #2: October 21
Assignment #3: November 25

III. Attendance:

At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, formally, attendance is not mandatory. You may have been successful in previous courses with intermittent attendance supplemented by reading the textbook. Unfortunately, this course will not lend itself well to that strategy. Due to the dynamic nature of the course and it’s difficulty, I don’t anticipate that you will be successful without attending each class period. I understand the complexities that go along with a college schedule, especially for those that have significant responsibilities outside the classroom. However, if you feel that you miss class occasionally, then I suspect you will find yourself struggling accordingly. Please feel free to discuss any specific concerns you may have.
Course Outline:
The following is a general schedule of the topics to be covered, as well as the readings in Dowling that go along with the topics. Please note that this is a very tentative time table and is subject to change.

1). **Review** (Chapter 1, part Chapter 2, Chapter 7)
   - Exponents (1.1)
   - Polynomials (1.2)
   - Linear and Quadratic Equations (1.3)
   - Simultaneous Equations; Supply and Demand (1.4, 2.2)
   - Functions; Utility Functions and Production Functions (1.5)
   - Graphs; Budget Constraints and Isocosts (1.6, 2.1)
   - Exponential and Logarithmic Functions (Chapter 7)

2). **Single Variable Calculus: Differentiation and Optimization** (Chapter 3, Chapter 4)
   - Limits and Continuity (3.1-3.2)
   - Slope of a Nonlinear function and the Derivative (3.3-3.5)
   - Rules of Differentiation (3.7, 9.1, 9.5)
   - Higher-Order Derivatives (3.8, 9.2)
   - Implicit Differentiation (3.9)
   - Increasing and Decreasing Functions, Concavity and Convexity (4.1-4.2)
   - Relative Extrema and Inflection Points (4.3-4.4)
   - Optimization of Functions and Second Derivative Tests (4.5-4.6, 9.4)
   - Economic Applications of the Derivative: Marginal Concepts, Profit Maximization under Perfect Competition and Monopoly, Elasticity, Relationship Among Total, Marginal, and Average Concepts (4.7-4.9)

3). **Multivariate Calculus: Differentiation and Optimization** (Chapter 5, Chapter 6, part Chapter 9, part Chapter 12, Chapter 13)
   - Functions of Several Variables and Partial Derivatives (5.1-5.3, 9.3)
   - Economic Applications: Production Functions, Marginal Productivity, and MRTS; Utility Functions, Marginal Utility, and MRS; Income and Cross-Price Elasticities of Demand (6.1, 6.3, notes)
   - Optimization of Multivariable Functions and the Hessian (5.4, 6.5, 9.4, 12.2, 12.4)
   - Constrained Optimization with the Lagrangian and Bordered Hessian (5.5-5.6, 12.5)
   - Economic Application of Lagrangians: Utility and Production Function Maximization (notes, 6.6, 6.9, 6.10, 9.8)
   - Differentials; Deriving the MRS (5.7-5.8, 6.4)
   - Total Derivatives (5.9)
   - Implicit and Inverse Function Rules (5.10)
   - Comparative Statics with One Endogenous Variable (13.1-13.2)
   - Comparative Statics with More than One Endogenous Variable (13.3)
   - Comparative Statics for Optimization Problems (13.4)
   - Comparative Statics for Constrained Optimization Problems and the Envelope Theorem (13.5-13.6)
   - Concave Programming with Inequality Constraints (13.7)

4). **Matrix Algebra** (Chapter 10, Chapter 11)
   - Basics, Definitions, Terms (10.1-10.2)
   - Addition, Subtraction, and Multiplications of Matrices (10.3-10.4, 10.6)
   - Some Algebraic “Laws” of Matrices and Special Matrices (10.7-10.8)
   - System of Linear Equations in Matrix Form (10.9)
   - Determinants, Nonsingularity, and Rank (11.1)
   - Higher-Order Determinants and LaPlace Expansion (11.2-11.4)
   - Properties of Determinants (11.5)
   - Cofactor and Adjoint Matrices (11.6)
   - Inverse of a Matrix and its Properties (11.7)
   - Solving Linear Equations with the Inverse (11.8)
   - Cramer’s Rule (11.9)
Applications of Matrices in Economics: Linear Economic Models (Supply & Demand, Keynesian Macro Model) and Econometrics (Chapter 3 in Turkington)

5). **Integral Calculus** (Chapter 14, Chapter 15)
   - The Indefinite Integral: The Basics and Rules of Integration (14.1-14.2)
   - Integration by Substitution (14.4)
   - Integration by Parts (14.5)
   - Economic Applications of the Indefinite Integral (14.6)
   - The Definite Integral: The Basics and the Fundamental Theorem of Calculus (15.1-15.5)
   - Improper Integrals (15.6)
   - L'Hôpital's Rule (15.7)
   - Economic Application: Consumer and Producer Surplus (15.8)
   - The Definite Integral and Probability (15.9)

6). **Differential and Difference Equations** (Chapter 16, part Chapter 17, part Chapter 18)
   - First Order Difference Equations: The Basics (16.1)
   - First Order Linear Differential Equations (16.2)
   - Economic Application of First Order Linear Differential Equations: Price Stability in a Supply and Demand Model (16.7, notes)
   - First Order Nonlinear Differential Equations: Separation of Variables (16.6)
   - First Order Nonlinear Differential Equations: Exact Differential Equations, Partial Integration, and Integrating Factors (16.3-16.5)
   - Phase Diagrams for Differential Equations (16.8)
   - First Order Difference Equations: The Basics (17.1)
   - First Order Linear Difference Equations and Stability Conditions (17.2-17.3)
   - Economic Application of First Order Linear Difference Equations: Lagged Income Determination Model (17.4)
   - Phase Diagrams for Difference Equations (17.7)
   - Second Order Differential Equations (18.1)
   - Second Order Difference Equations (18.2)

7). **Dynamic Optimization** (Chapter 20)
   - The Basics of Dynamic Optimization (20.1)
   - Euler’s Equations and Finding Candidates for Extremals (20.3-20.4)
   - Sufficiency Conditions for Dynamic Optimization (20.5)
   - Economic Application: A Firm’s Present Value Cost Minimization with Changing Inventory (20.8)
Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student’s responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course should provide me with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: The University of Texas at Arlington is committed to upholding U.S. Federal Law “Title IX” such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Academic Integrity: Students enrolled in UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

“I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.”

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents’ Rule 50101, §2.2, suspected violations of University standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact University-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Student Feedback Survey: Students enrolled in this class shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.
**Final Review Week:** A period of five class days prior to the first day of final examinations in this session shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and I will not assign any themes, research problems or exercises of similar scope that have a completion date during or following this week. During Final Review Week, I will not give any examinations constituting 10% or more of the final grade, except in the unlikely event of a makeup test. In addition, I will not give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, please note, instructors are not required to limit content to topics that have been previously covered; I will likely introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.