Course Details
Time: TTH 5:30-6:50PM
Room: COBA 236

Instructor Details
Instructor: Christy Spivey
Office: COBA 328
Office Hours: TTH 3:30 – 5:00PM, or by appointment
Email/Phone: cspivey@uta.edu / 817-272-1218
Blackboard: elearn.uta.edu

Course Description and Student Learning Outcomes
Mathematics has increasingly become the “language” of Economics. Having a solid mathematical foundation is necessary to understand both theoretical models and empirical estimations that you will encounter in the Economics literature. 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.

The goal is that, upon completion of the course, you are able to:
- Comprehend and explain much of the mathematical analysis in the economics literature
- Identify one or more appropriate mathematical tools to use when faced with an economic/mathematics problem
- Apply mathematical tools used by economists to solve economic/mathematics problems

Prerequisites (ECON 5301)
MATH 1302 (College Algebra)

Prerequisites (ECON 4323)
MATH 1316 (Mathematics for Economics and Business Analysis), ECON 3310 (Intermediate Microeconomics) and ECON 3312 (Intermediate Macroeconomics)

Required Text

Recommended Text

Other Resources

**Assessment**
Your grade will be determined by 3 in-class exams and a Final Exam.

Highest Exam Grade  
Lowest Exam Grade  
Other Exam  
Final Exam  

Your letter grade will be determined by the percentage of total points earned as follows:

A 90% and above  
B 80 – 89.99%  
C 70 – 79.99%  
D 60 – 69.99%  
F below 60%

You may wonder over the course of the semester if there will be a curve. The answer is almost certainly no, but if there is one, it is likely to be very small. So, you should **absolutely not** depend upon it. I do not determine this until the end of the semester after the final exam. However, you will have an idea of how you are progressing as the semester goes along. Please DO NOT inform me that you need a certain grade in the course in order to graduate, keep your scholarship, keep from getting kicked out of school, etc. I consider this to be a form of harassment. You will receive the grade you earn. In addition, I only assign incompletes in the course for documented health/family emergencies.

**Homeworks**
Homework assignments (from Dowling workbook) and practice problems are not graded, but you are STRONGLY encouraged to work all problems BEFORE looking at the answers. If you know how to work the assigned problems and any practice problems I hand out, you should know how to work exam problems.

**Exams**
Exam dates are also listed below. Exam 1 will include questions regarding this syllabus. **No makeup exams will be given unless my permission is given at least 24 hours BEFORE the exam.** You can take the exam early, or later in the week ONLY if you have appropriate documentation (e.g., a doctor’s note, not simply verification you went to the health center). If
you do not contact me more than 24 hours prior to the exam you will receive a zero. Makeup exams must be taken before the next class meeting.

Please bring a pencil and non-programmable, scientific calculator to each exam. If you feel your exam has been graded incorrectly, please submit your issue in writing either on the front of the exam or on a separate sheet of paper attached to the exam. Please note the question number you are inquiring about and what you think is wrong. You have one week after the exam has been returned to submit this to me. After that, no grade changes will be made.

**Final Exam**
Due to the nature of the course, the Final Exam is cumulative, though more heavily weighted with material covered in the last section of the course. You must take the final exam at the university-scheduled time. It is my policy not to provide the day and time of the final exam. It is your responsibility to find the day and time online AND to confirm it with a classmate.

**Important Dates**
- Thursday, September 20    Exam 1
- Tuesday, October 16    Exam 2
- Thursday, November 8    Exam 3
- **Week of December 10**    **Final Exam**

**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. I have created a tentative timetable for the topics, subject to change, as a separate handout.

**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, notes)
- Graphs; Budget Constraints and Isocosts (1.6, 2.1)
- Exponential and Logarithmic Functions (Chapter 7)

**SPECIAL APPLICATION:** Expected Values, Risk Aversion, and Choice Under Uncertainty

**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)

Single Variable Calculus: Differentiation and Optimization (Chapter 3, Chapter 4, part Chapter 9)
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 (#1,2))
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, notes)

SPECIAL APPLICATION: Auctions

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 (#3), 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)

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)

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, notes)
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)
Economic Application of Separation of Variables: Finding Demand Function from Point Elasticity (notes)
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)

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)

SPECIAL APPLICATION: Search Theory (if time permits)

**Expectations**
Treat this syllabus as a contract that you have “signed” by enrolling in the course. I will try to remind everyone of upcoming deadlines, but you are responsible for remembering all important dates. I reserve the right to make changes to the syllabus during the semester, although I will try not to do so. Any changes will be communicated to you via email and/or during class. You are responsible for being aware of these changes.

**Communication**
I will post documents such as PowerPoint slides, practice problem answers, and old exams on Blackboard. I will also email you, so please check your university-provided email account
Please feel free to email me at the address listed above to ask a question or set up an appointment. I check email regularly Monday-Friday, but I cannot guarantee a quick response over the weekend or late at night. I will not be able to accommodate requests to call you on the telephone. I also request that you communicate with me if you have concerns about any aspect of the course. I appreciate feedback.

**Attendance**
You may notice that attendance is not a formal part of your assessment. However, you will undoubtedly do better in the course if you do not miss class. Moreover, I reserve the right to take attendance and use that information to give extra credit or when determining whether to “round up” when determining final grades. Thus, you are strongly encouraged to attend every class and arrive to class ON TIME (I understand there are legitimate reasons for being late, so please enter QUIETLY if you cannot help being late). You are also expected to silence your cell phone. You are responsible for all material covered in class whether you are present or not (including material not covered in the text). **If you miss a class, you should get notes from a classmate and review them BEFORE coming to me for help on that particular topic.** I will not provide you with class notes beyond what is contained in the PowerPoint slides.

**Keeping Up**
This course is challenging, especially if you do not keep up with the homework problems or have a weak mathematics background. This is a problem-based course, and that means you need to practice working lots of problems. Remember, you will not be happy if you postpone working on problems until shortly before the exams. This class does not lend itself to all-night cram sessions. However, if you are willing to work diligently, you are likely to succeed in this course. I want everyone to do well, and everyone is given that opportunity. **Please ask questions in class and come see me during office hours (or schedule an appointment) if you need further clarification.** I do not know if you don’t understand something unless you tell me!

**Academic Integrity**
All students enrolled in this course 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.*

According to the UT System Regents’ Rule 50101, §2.2, "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.” Per UT System Regents’ Rule 50101, §2.2, suspected violations of university’s 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.
More specifically related to this course, academic dishonesty includes communicating with other students during exams and referencing books, notes or “cheat sheets” during exams (except when authorized). In addition to the disciplinary action mentioned above, violators will automatically receive a grade of zero on the exam.

Administrative Policies

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 (Oct. 31 for Fall 2012). Note: I am unable to sign a drop form after the official deadline. 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. Contact the Financial Aid Office for more information.

Student Feedback Survey
At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a 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 the long sessions 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 no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

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.

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.

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). The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. Any student requiring an accommodation for this course must 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. 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. Please notify me no later than two weeks before the first exam concerning any academic accommodations you will need.

Inclement Weather Policy
In the event that the university cancels class due to inclement weather, any exam scheduled that day will automatically be scheduled during the next class period. Please check your university-provided email account regularly if bad weather is in the area.