MAE 3360: Engineering Analysis (Fall 2009)

Instructor: Xinyuan (Yuan) Tan, WH 323 F, (817) 272-0596
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Office Hours: Monday-Thursday 11-12 noon, or by appointment
Time and Place of Class Meetings: SH 332, MWF 10-10:50 AM

Description of Course Content:
Mathematical analysis with emphasis on solution techniques and engineering applications. Topics include ordinary differential equations (ODE), Laplace Transformation, numerical solution of ODE, boundary value problems, Fourier series, Sturm-Liouville problem and vector calculus.

Prerequisite:
MATH 2326 Calculus III; MAE 2360 Numerical analysis and programming (or concurrent enrollment).

Required Textbooks:
"Advanced Engineering Mathematics," Zill, Dennis G. and Cullen, Michael R., 3rd Edition, Jones and Bartlett Publishers, 2005.
Other Course Materials:
"Differential Equations," Bronson, Richard and Costa, Gabriel, Schaum's Outline Series 3rd Edition, McGraw-Hill, 2006.

Instructor Policy:
The outlined lecture schedule and midterm dates are tentative, depending on the pace of class. Please inform (and remind) me in advance if you are not able to make it for the midterms or finals so we can arrange for make-ups appropriately. The 11/25 Wed class before Thanksgiving will be a review class for vector calculus. You are free to make travel arrangements for the holiday, noting that there is no midterm on vector calculus and the material will be covered more extensively in the cumulative final.
Attendance in class is not mandatory but it is a good time for you to get exposed to the course material, interact with your classmates and a great opportunity for you to keep asking me questions and see if I can answer them. Class represents a platform where I present to you a story but you are free to interrupt constructively and modify the ending. Naturally, we conform to certain rules and regulations. The one I subscribe to is independence and responsibility on your part.

Student Learning Outcomes:
You will develop an understanding of different mathematical methods used to model engineering applications. You will also be able to implement and solve mathematical models for simple engineering problems.

Grading Policy:
Learning is an interesting phenomenon. Initially, we might seem to be putting in a lot of effort but still not get anywhere. If we persevere and continue on, things will eventually fall in place and our pace will take flight.
The grading policy is setup to allow you to demonstrate your understanding of the course material either continuously, which is the conventional and my preferred style of learning, or at your own pace. There will be **ten** homework assignments to provide you with the opportunity to practice, **two** midterms to remind you of the results of your efforts, and a **cumulative** final for

you to demonstrate your proficiency in all the course material. We will also have up to 5 **bonus problems**, given during class and due the following class. Submission of these bonus problems will give you additional advantage should you fall on the borderline of grade distributions or simply more fun for you and/or more work for me.
As always, A =100-90%, B =89-80%, C =79-70%, D =69-60%, F =below 60%.

	Set 1: Continuous Learning	**Set 2: Self-set Learning Pace**
Homework	10 x 3.0%	10 x 1.0%
Midterm	2 x 25%	2 x 30%
Cumulative Final	20%	30%
Bonus Problems	A boost in grade when final grade lies on the border.	

Description of Course Content:

Date	**Course Description**	**Assignments**
Week 1: 8/24-8/28	Introduction: Differential Equations (DE)	Textbook: 1.1-1.3, 2.2-2.3 **Homework 1 due 9/4 Fri**
	1st order DE: Separation of variables	
	1st order DE: Linear equations	
Week 2: 8/31-9/4	1st order DE: Solutions by substitutions	Textbook: 2.5-2.9, 3.1 **Homework 2 due 9/11 Fri**
	1st order DE: Numerical Method 1st order DE: Model examples	
	Higher order DE: Linear equations	
Week 3: 9/7-9/11 ***Mon- Labor Day Break***	Higher order DE: - Constant coefficients - Undetermined coefficients - Variation of parameters	Textbook: 3.3-3.5 *Extra: 3.6-3.7
Week 4: 9/14-9/18	Homogeneous linear equations	Textbook: 3.5, 3.8-3.9 *Extra: 3.10 **Homework 3 due 9/21 Mon **KEY**
	Higher order DE: Linear models - Initial value problems - Boundary value problems	
Week 5: 9/21-9/25	Higher order DE: Linear model problems	Textbook: 4.1
	9/23 Wed Midterm Exam #1: Chapters 1-3	
	Laplace transforms	

*Extra are sections that might be covered, depending on pace of class.
**KEY are designated key assignments. In order to pass this class, students must submit and pass all key assignments. If any key assignment is not submitted and passed, the student will not pass the class even if he/she scores perfectly on all exams and other assignments.

Date	Course Description	Assignments
Week 6: 9/28-10/2	Inverse Laplace transforms	Textbook: 4.2-4.4 **Homework 4 due 10/7 Wed**
	Translation theorems	
	Laplace transforms properties - Differentiation	
Week 7: 10/5-10/9	Laplace transforms properties - Differentiation - Integration	Textbook: 4.4-4.5 *Extra: 4.6 **Homework 5 due 10/14 Wed**
	Dirac delta function	
Week 8: 10/12-10/16	Series solution of linear DE - Power series - Singular points - Special functions	Textbook: 5.1-5.3, 6.1 **Homework 6 due 10/21 Wed**
	Numerical Methods - Euler method & error analysis	
Week 9: 10/19-10/23	Numerical Methods - Euler method & error analysis - Runge-Kutta method	Textbook: 6.1-6.2
	10/23 Fri Midterm Exam #2: Chapters 4-6	
Week 10: 10/26-10/30	Introduction: Vector calculus	Textbook: 9.1-9.4 **Homework 7 due 11/6 Fri**
	Vector calculus - Curvature & acceleration - Partial derivatives	
Week 11: 11/2-11/6	Vector calculus - Directional derivative - Tangents & normals - Divergence & curl	Textbook: 9.5-9.7 **Homework 8 due 11/13 Fri **KEY**
Week 12: 11/9-11/13	Double integrals - Cartesian coordinates - Polar coordinates	Textbook: 9.10-9.11 **Homework 9 due 11/20 Fri**
Week 13: 11/16-11/20	Double integrals - Green's theorem - Surface integral - Stokes' theorem	Textbook: 9.12-9.16 **Homework 10 due 11/30 Mon**
	Triple integrals - Formulation - Divergence theorem	

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Date	Course Description	Assignments
Week 14: 11/23-11/27 ***Fri Thanksgiving Break***	Divergence theorem	Textbook: 9.16
	Review on vector calculus (11/25 Wed)	
Week 15: 11/30-12/4	Orthogonal functions	Textbook: 12.1-12.5
	Fourier series	
	Sturm-Liouville problem	
12/7 Mon: Cumulative Final 8:00-10:30 AM		

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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. Contact the Financial Aid Office for more information.

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 must provide the instructor 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.

Academic Integrity:

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. 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."