

**Course Syllabus, Third Revision**  
**MAE 3360-001: Engineering Analysis**  
**Mechanical and Aerospace Engineering**  
**The University of Texas at Arlington**  
**Spring 2012**

**Instructor**

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**Schedule**

Class meets in Woolf Hall room 402, MWF, 10 to 10:50 AM. Instructor office hours are MW 11 to 12, or by appointment. TA office hours are MW 3 to 5 (tentative).

**Content**

MAE 3360, Engineering Analysis. 3 hours credit.  
Mathematical analysis with emphasis on solution techniques and engineering applications. Topics include: ordinary differential equations (ODE), Laplace Transform, numerical solutions of ODE, boundary value problems, Fourier series, Sturm-Liouville problems and vector calculus.

**Prerequisite**

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

**Textbook**

*Advanced Engineering Mathematics*, Zill, Dennis G. and Cullen, Michael R., 4<sup>th</sup> Edition, Jones and Bartlett Publishers, 2011.

## Course Website

Blackboard site at <https://elearn.uta.edu/>

## Attendance and Participation

Attendance to all classes is expected but not mandatory. You are responsible for information presented during lecture as well as the information treated from the text. The techniques taught in this class were developed by the brightest minds in mathematics over the span of two centuries. The role of class lecture is to distill these techniques as defined in the text into a form that is digestible. In class you can ask questions of the instructor and your classmates.

Two exams will be performed during class time in order to maximize student participation. If possible, please notify the instructor if you will not be able to attend class during an exam.

## Grading Policy

Homework (weekly)	20 %
Quizzes (weekly)	15 %
Midterm 1	20 %
Midterm 2	20 %
Final exam	25 %

Two homeworks will be designated as *key assignments*. If you do not pass the key assignment, you cannot pass the course. Which homeworks are key is TBD. You will be notified an assignment is considered key when it is assigned to you.

## Class Format

The vast majority of instruction will be communicated using lecture on a chalk- or whiteboard—the oldest information transfer technology, rubbing rock on rock. The majority of your work will be homework, on pencil and paper, the second oldest communication technology. However, sometimes we will employ the machine of the Information Age, the computer, to illustrate physical concepts through simulation. Also class communication and quizzes will be communicated through email and web protocols, respectively.

Quizzes will be given nominally every Monday. They will be brief, and designed to simply test your understanding. The quizzes will be assessed online using Blackboard. The quizzes are closed book and closed notes. These quizzes, though brief, can be completed anytime Monday through Wednesday. For each student, the lowest two quiz scores will be dropped. If for circumstances outside of your control you cannot take a quiz, notify the instructor and he can enable you to take the quiz over a different period.

The remainder of the class consists of traditional pencil-and-paper exams. The two midterms will be conducted during class time. The time and date of the final is TBD.

## **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](http://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."

## **Tentative Lecture and Exam Schedule**

The following tables are a tentative list of topics treated in the class by date. Where possible, the applicable book section is noted to the right in a separate column.

## Part I: Ordinary Differential Equations

Date		Topic(s)	Text
Jan	20	Definitions and Terminology	1.1
	23	Initial Value Problems, Mathematical Modeling	1.2 to 1.3
	25	Direction Fields	2.1
	27	Separation of Variables	2.2
	30	Linear Equations	2.3
Feb		Variation of Parameters	2.3
	1	Integrating Factors	2.3
	3	Exact Equations	2.4
	6	Exact Equations: gathering terms, integrating factors	2.4
	8	Solution by Substitution	2.5
		Method of Euler	2.6
	10	Linear Models	2.7 to 2.9
	13	Higher order DEs	3.1
	15	Homogeneous Equations	3.3
	17	Method of Undetermined Coefficients	3.4
	20	Systems of DEs	3.12
	21	Gravity and the N-body Problem	
	23	N-body Demonstration	
	27	<i>Review for Midterm 1</i>	
	29	<i>No class or makeup day</i>	
Mar	1	<i>Midterm 1</i>	

## Part II: Laplace Transform and Vector Calculus

Mar	5	The Laplace Transform	4.1
	7	Inverse Laplace, Partial Fractions	4.2
	9	Shifting Theorems	4.3
	12-16	<i>Spring Break</i>	
	19	Step and piecewise continuous functions	4.3
	21	Transform of an Integral	4.4.2
	23	Impulse Function	4.5
	26	Vector Functions	7
	28	Matrix Review	8
	30	Motion on a Curve	9.2 to 9.3
April	2	Partial Differential Equations	9.4
	4	Directional Derivative	9.5
	6	Line Integrals	9.7 to 9.8
	9	<i>Review for Midterm 2</i>	
	11	<i>No class or makeup day</i>	
	13	<i>Midterm 2</i>	

### Part III: Fourier Transform and DE Applications

April	16	Orthogonal Functions	12.1
	18	Fourier Series	12.2
	20	Fourier Cosine and Sine Series	12.3 to 12.4
	23	The Fourier Transform	
	25	Sturm-Louisville Problems	12.5
	27	Euler Buckling Problem	
May	30	General PDEs and Separation of Variables	13.1 to 13.2
	2	Example Application	TBD
	4	<i>Review for final</i>	

Final exam location and time are TBD.