## MAE 3360–001: Engineering Analysis Fall 2013 Syllabus

Instructor:	Dr. Kathy J. Hays-Stang		
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Email Address:	haysstang@uta.edu		
<b>Office Hours:</b>	MWF 10 AM - 2 PM or by appointment.		
Website:	Blackboard (elearn.uta.edu)		
<b>Teaching Assistant:</b>	Prashanth Ravi		
C	Email address: prashanth.ravi@mavs.uta.edu		
	Office Hours; 2-3 PM TTh in WH 323D/WH123		
<b>Meeting Information:</b>	Lecture Monday, Wednesday, Friday PKH 105 9:00–9:50 AM		

**Description of Course Content:** Mathematical analysis with emphasis on solution techniques and engineering applications. Topics include ordinary differential equations (ODEs), Laplace transformations, initial and boundary value problems, Fourier series, Sturm-Liouville problems and partial differential equations.

## **Student Learning Objectives:**

- Develop an understanding of different mathematical methods used to model engineering applications
- Ability to implement and solve mathematical models for engineering problems

Course Prerequisites:	MATH 2326 (Calculus III), completion of MAE 2360 (Numerical Analysis and Programming) or concurrent enrollment
Required Textbook:	D.G. Zill and M.R. Cullen, Advanced Engineering Mathematics, 5 <sup>th</sup> ed., Jones and Bartlett, 2011. (An older edition is acceptable)
Recommended:	R. Bronson and G. Costa, Differential Equations, 3 <sup>rd</sup> ed., Schaum's Outline Series, McGraw-Hill, 2006. (563 fully solved problems)

Attendance: Attending the class is not mandatory. However, it is strongly encouraged due to high importance of the material covered to the general engineering education. You are welcome to ask questions in class. Pop quizzes will be given throughout the semester. Grades on pop quizzes will be averaged and be included in the students grade as 1% EC (added to the final average).

**Collaboration:** Collaboration in the form of discussing the formulation of solutions and results is encouraged for the homework. However, each student must work independently to create the final homework solution. Collaboration should only begin after each individual student has attempted to solve the problem by himself or herself. Collaboration in any form is not allowed on exams. Penalties ranging from point deductions on homework to disciplinary referrals will be assessed if there is evidence that a student is copying work from others or collaborating on exams.

Examinations:	Two midterms (coverage – first third, second third of semester) One final (coverage – cumulative) No calculators may be used for exams		
Assignments:	Homework assignments due on most Mondays and Fridays		
Grading:	20+ homework assignments 2 midterm exams 1 cumulative final exam	20% (~1% for each assignment) 55% (27.5% for each exam) 25%	

**Grade Scale:** The letter grade scale will follow university policies (e.g., an A requires a 90–100% cumulative numerical score).

**Expectations for Out-of-Class Study**: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend, on average, nine hours per week of their own time in course-related activities which include reading required materials, completing assignments, and preparing for exams. A general rule for UT Arlington courses is for every credit hour earned, a student should spend three hours per week working outside of class.

## Policies for Missed Exams, Late Homework Submissions, and Appeals:

- The outlined lecture schedule and midterm dates are tentative. Please inform me in advance and remind me via email if you are not able to attend the midterms or finals so a makeup exam can be scheduled.
- Homework is due *at the beginning of class*. A late homework assignment is penalized 15% each day and will not be accepted if it is more than three days late. You may not look at or remove homework assignments by other students that have been turned in before the lecture begins.
- Grade appeals must be made within one week after the return of the assignment by making an appointment with the instructor or GTA.
- Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog. (http://wweb.uta.edu/catalog/content/general/academic regulations.aspx#19)

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through selfservice 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 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: 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.

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'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.

**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 <a href="http://www.uta.edu/oit/cs/email/mavmail.php">http://www.uta.edu/oit/cs/email/mavmail.php</a>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" 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 <u>http://www.uta.edu/sfs</u>.

**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.

**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, which is located to the east of the classroom. 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 handicapped individuals.

**Course Schedule:** A tentative course schedule has been outlined on the next page. As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.

Tentative Lecture Schedule					
Date	Course Description	Reading Assignments			
Week 1.8/26	Introduction: differential equations (DEs)	Textbook: 1.1–1.3, 2.1			
	1st order DEs: Separation of variables				
	1st order DEs: Linear equations	Textbook: 2.2, 2.3, 2.5, 2.7–2.9			
Week 2: 9/2	Ist order DEs: Solutions by substitutions				
	Ist order DEs: Model examples				
Week 3: 9/9	Homogeneous linear equations	Textbook: 3.1, 3.3			
	- Constant coefficients				
	- Ondetermined coefficients				
Week 4: 9/16	Undetermined coefficients	Textbook: 3.4, 3.5			
	- Variation of parameters				
	Higher order DEs: Linear models				
Week 5: 9/23	- Initial value boundary value problems	Textbook: 3.8–3.9			
	Midterm Exam #1: Chapters 1-3				
Week 6: 9/30	Laplace transforms	Textbook: 4.1			
	Inverse Laplace transforms				
$W_{1} = 1 - 7 + 10 / 7$	Translation theorems	Textbook: 4.2–4.3			
week /: 10//	Laplace transform properties				
	- Differentiation				
	Laplace transform properties	Textbook: 4.4-4.5			
Week 8: 10/14	- Differentiation	Textbook. 1.1 1.5			
	- Integration				
	Dirac delta function				
$W_{aal} = 0, 10/21$	Laplace transform properties	Textbook: 5.1			
Week 9: 10/21	Series solution of a linear DE				
	- Fowel series Systems of linear differential equations				
Week 10: 10/28	- Theory of linear systems	Textbook: $10.1 - 10.2$			
course drop deadline	- Homogeneous linear systems	Textbook. 10.1–10.2			
	Systems of linear differential equations				
Week 11: 11/4	- Nonhomogeneous linear systems	Textbook: 10.2–10.4			
	Midterm Exam #2: Chapters 4,10				
	Fourier series	Taythack: 12.1.12.2			
Week 12: 11/11	- Orthogonal functions	Textbook. 12.1–12.5			
	- Cosine and sine series				
	Fourier series	Textbook: $124 - 125$			
Week 13: 11/18	- Complex Fourier series	Textbook. 12.4 12.5			
	- Sturm–Liouville problems				
Week 14: 11/25	Separable Partial Differential Equations	Textbook: 13.1–13.2			
	- Classical PDEs, classification				
Week 15: 12/2	Separable Partial Differential Equations	Toythook: 12.2, 12.5			
	- rical equation, wave equation, Laplace's equation	1ext000k. 15.5–15.5			
Final exam: 12/11	- Munici Icai niculous				
8:00–10:30 AM	Cumulative final exam				