MAE3360-002: Engineering Analysis
Fall 2015

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Course site for reference notes: ELEARN.UTA.EDU

Office Hours: Tue. & Thurs. 11 am – 12:15 pm and by appointment
Graduate Teaching Assistant: TBA
Section Information: MAE3360-002

Time and Place of Class Meetings: Tue & Thurs. 12:30 pm – 1:50 pm ERB 129

Description of Course Content: Solving algebraic and differential equations representing engineering systems

Student Learning Outcomes: The objectives of this course are to teach solution techniques for solving typical equations encountered in the analysis and simulation of engineering systems. When obtaining solutions to equations, it is very beneficial to focus on the common sense details associated with the performance of the actual engineering system for which the equations are written. Consequently, throughout this text, equations for actual engineering systems are utilized so that it is possible to apply common sense to the prediction and approximation of the solution to the equations before actually solving the equations. Knowing the approximate solution provides confirmation to the actual solution in the end. From the very beginning of the course, computer algorithms in MATLAB will be utilized to obtain and plot solutions for equations. Having taken a MATLAB course prior to this course is not necessary. This is the course for learning to program in MATLAB by seeing examples and asking the instructor or TA for assistance with challenges or matters not understood.

Requirements: Class and exam attendance is mandatory. Reasons for absence must be documented in writing to the instructor. A Key Assignment will be included as part of one of the exams and the results used to evaluate ways to improve the class; passing the Key assignment is no longer required. Homework assignments will be included in computing the final grade; unless otherwise stated, all assignments are due at the beginning of the class on the due date. Late homework submissions will not be accepted. Students are expected to do their own work.

Required Textbooks and Other Course Materials*: Application of Math Principles to Engineering Problems, 5th Edition, July 21, 2015*, by Professor David A. Hullender, Available at Bird's Copies, 208 S. East St., Arlington 817-459-1688. Also, it is recommended that each student purchase a student version of MATLAB. However, UTA does have a license for MATLAB for use on campus.

Descriptions of major assignments and examinations: In-class examinations will be given; all exams are comprehensive. There are no make-up exams. Should absence from an exam be excused, the final average for the course will be based on one less exam. Written documentation is required for an excused absence from an exam. Unless stated otherwise, all exams are closed book; only calculators provided by the exam proctor will be allowed to be used.

Grading:
Exams, Quizzes, and Homework: There will be 3 in-class exams; there are no make-up exams. Should absence from an exam be excused which requires written documentation, the final average for the course will be based on one less exam. Since all exams are comprehensive, there will not be a final exam given during finals week. There will be a 10 minute Quiz at the beginning of almost every class. Two of the quiz grades will be dropped; thus, missing an exam for whatever reason does not require proof of an excused absence. The final grade for the course will be based on a weighted average of the homework, quizzes, and exam grades: Exams 66%, Quizzes 24% Homework 10%. Letter grades will be assigned based on the distribution of all students' grades. For example, if there are students with very high averages, then an average of 94 might be required for an A, On the other hand, if the highest average is in the low 90's, then it may only require an average in the mid 80's for an A, etc.

Grade Grievances: 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**

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/ses/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 Dis. at (817) 272-3364.

Academic Integrity: At UT Arlington, academic dishonesty is completely unacceptable and will not be tolerated in any form, including (but 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” (UT System Regents’ Rule 50101, §2.2). Suspected violations of academic integrity standards 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 contact the Maverick Resource Hotline by calling 817-272-6107, sending a message to resources@uta.edu, or visiting 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.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory will be asked to complete an online Student Feedback Survey (SFS) about the course and how it was taught. Instructions on how to access the SFS system will be sent directly to students through MavMail approximately 10 days before the end of the term. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback data is required by state law; student participation in the SFS program is voluntary.

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. 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.

Tentative Lecture and Exam Schedule

Aug.	27	Organization and objectives of class
Sept.	1	Definitions, terminology (derivatives, differential eqn's, complex numbers), and differential equations representing mathematical models
	3	The 'D' operator: converting differential to algebraic equations, transfer functions
	8	Eigenvalues, damping ratios, natural frequencies, and time constants, MATLAB
	10	Linear and nonlinear eqn's, straight line approximations, Taylor series
	15	Working with simultaneous algebraic equations
	17	MATLAB and symbolic math
	22	MATLAB commands to get modes and other properties of a system
	24	**Exam #1, closed book, no personal calculators, phones, or writing paper allowed**
	29	Definition and properties of Laplace transform, final value, initial value, 0^+, 0^-
Oct.	1	Examples of Laplace transforms for systems with inputs and initial conditions
	6	MATLAB commands: 'tf', 'zpk', 'pfract', 'step', 'impulse', 'damp', 'eig', 'conv', 'parallel', and 'series'
	8	Inverse Laplace transform, using residue theorem to get partial fractions
	13	Using residue theorem to invert Laplace transforms in one step for real poles
	15	Using a shortcut for finding the combined residues for a pair of complex poles
	20	Using MATLAB to get a plot of inverse Laplace transforms
	22	Special considerations for systems with periodic inputs, frequency response analysis
	27	MATLAB command 'bode' for systems with periodic inputs
	29	**Exam #2, closed book, no personal calculators, phones, or writing paper**
Nov.	3	Converting continuous differential equations into discrete time equations
	5	Euler's numerical integration method, converting equations to state variable form
	10	State variables continued, Simulation diagram approach
	12	Numerical integration using ode45 in MATLAB
	17	Numerical integration continued, SIMULINK
	19	State variables continued, matrix format and obtaining from block diagrams
	24	Review and example problems
	26	Thanksgiving holiday
Dec.	1	**Exam #3, closed book, no personal calculators, phones, or writing pap**er
	3	No class
	8	No class
	15	No final exam since all exams were comprehensive