**MAE 3319-001**

**Spring 2016**

**Tues. & Thurs. 8:00-9:20 am**

**Room WH 402**

**Instructor: David Hullender**

**Office: Woolf Hall 304B**

**Office Hours: T-TH 9:30 am-11:00 am and by appointment**

**Phone: Office and Cell (817) 272-2014**

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**Course website for resources** : <https://elearn.uta.edu/>

**Course Prerequisites: MAE 3360**

**Instructor website:** [www.uta.edu/profiles/david-hullender](http://www.uta.edu/profiles/david-hullender)

**Required Textbook: *Dynamic Systems Modeling and Simulation-11th Edition****,* a notebook of lecture materials and solved problems by Professor Hullender, available on Blackboard; a hard copy available at Birds Copies, 208 S. East St., Arl. 817-459-1688

**Recommended additional materials:** *Student Ed. of MATLAB with Control Tool Box*available at the UTA Bookstore. Note, UTA does have the license for MATLAB.

**Recommended library reference**: ***Modeling and Simulation of Dynamic Systems, Robert Woods and Kent Lawrence***, Prentice Hall, 1997

**Course Description:** This course pertains to mathematical modeling, simulation, and analysis of the dynamics of engineering systems.

**Student Learning Outcomes:** This course is intended to teach the students how to formulate simple lumped parameter models for the dynamics of engineering systems and then apply common sense to checking the accuracy of the equations by checking the boundary conditions. Common sense is also used to evaluate the meaning and solution to the differential and algebraic equations representing the models. Emphasis is placed on learning MATLAB algorithms for solving equations and presenting results. Professional methods for reporting results will be taught and required.

**Requirements:**  Class and exam attendance is mandatory. Reasons for absence must be documented in writing to the instructor. 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 and to seek help from the teaching assistant or Professor Hullender for proper guidance and overcoming difficulties.

**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. Unless stated otherwise, all exams are closed book and only a calculator provided by the exam monitor may be used. Key Assignments will be included as part of the exams but these key assignments no longer must be passed in order to receive a passing grade for the course. **A ten minute quiz over a previous lecture will be given at the beginning of almost every class**. At the end of the semester, two of the quiz grades will be dropped when computing the quiz grade average; this is to assist the students in case of a necessary absence or late arrival to class.

**Final Grade Computation at the End of the Semester**: There will be 3 in-class exams (75%), quizzes (15%), and homework (10%). All exams are comprehensive; there will not be a final exam during finals week. Letter grades at the end of the semester will be determined by the distribution of the averages of the students in the class. For example, in the case of several high averages, the distribution might be 93-100 for A, 83-92 for B, etc. If the highest averages are in the low 90’s, then the distribution might be 86-94 for A, 76-85 for B, etc. Typically it works out to: 90-100 for A, 80-89 for B, 70-79 for C, 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>). **The last day to drop is April 1, 2016.**

**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:** 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](mailto:resources@uta.edu), or visiting [www.uta.edu/resources](http://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.

**Teaching Assistant: TBD**

**MAE 3319**

**Spring 2016**

**Tentative Lecture Schedule and Reference Reading Assignments**

Page No.

Jan. 19 Objectives of course and math review assignment 6-17

21 Basic math concepts including linearization 6-17

26 Laplace transforms and solving differential equations 22

28 Using MATLAB to solve diff. eqn’s & Z transform

Feb. 2 Expressing diff. eqn’s and transfer functions in state var. format 68

4 State variables continued

9 Lumped parameter models for mechanical systems 78

11 Mechanical systems continued including rotation 82

**16 Exam #1, closed book and no personal calculators allowed**

18 Modeling mechanical systems with linear translation and rotation 82

23 Transfer functions for mechanical systems 85

25 Modes of a system and ‘pfract’ 35

Mar. 1 MATLAB solution techniques using numerical integration 41 3 Using MATLAB to obtain the frequency response for a system 46

8 Frequency response continued

10 Using MATLAB to obtain lower order transfer function approx.’s 51,54

15 Spring Break

17 Spring Break

12 Lumped parameter models for liquid systems 106

**24 Exam #2, closed book and no personal calculators allowed**

29 Examples of liquid systems

31 Lumped and distributed parameter models for fluid lines 121

April 5 Lumped parameter models for gas systems 149

7 Lumped parameter models for gas systems, continued

12 Models for linear valve controlled actuators 167

14 Lumped parameter models for thermal systems 175

19 Modeling electrical circuits with passive components 181

21 Modeling electrical circuits containing operational amplifiers 188

26 Models for mixed systems

28 **Exam #3, closed book and no personal calculators allowed**

May 3 No class

5 No class

No final exam; first three exams were comprehensive