Course MAE 3316-001/4314-001

Fall 2016

TTh 12:30-1:50

NH Room 109

Instructor: Kent L. Lawrence **Office:** 300D Woolf Hall

Office Hours: 2:00-3:00 TTh or by appointment or other times I'm in the office & free. **Phone:** 817.272.2019

Academic Office: Room 204 Woolf Hall**,** PO Box 19023, UTA, 76019 **Email:** lawrence@uta.edu

Web sites:

https://www.uta.edu/profiles/kent-lawrence

http//:mae.uta.edu/~lawrence

GTA: Office: Hours: MW 12-1

Course Prerequisites: C or better in each of the following: MAE 2312, MAE 2323, MAE 3360, and MATH 3330.

Required Textbook: *Fundamentals of Structural Dynamics, 2nd Ed*, Roy R. Craig & Andrew J Kurdila, John Wiley, 2006.

Additional material will be placed on the course web site and Mavspace to supplement text material.

Course Description: Natural frequencies, steady harmonic and transient response of complex structures are studied using traditional and finite element methods. Computational aspects of these problems are discussed.

Course Learning Goals/Objectives: Course goals include development of an understanding of: the basics of mechanical vibration and structural dynamics and the application to mechanical and structural systems.

Attendance: Students are **expected to arrive on time and to attend all classes and exams.** Attendance will be recorded. Please advise the instructor by email if you must miss a class and provide the reason. The Drop Policy is consistent with the University drop schedule; the student must be passing to receive a W/P. See the UTA Undergraduate Catalog and paragraph below.

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/aao/fao/).

Disability Accommodations: UT 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), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. 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 disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD) www.uta.edu/disability or call 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or call 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: *The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos*

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the

Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity: Students enrolled all UT Arlington courses 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.

Per UT System Regents' Rule 50101,ï¿½2.2 , 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. Additional information is available at https://www.uta.edu/conduct/.

Tentative Schedule

Week 1 - Introduction, Free Vib SDOF, Chapters 1,2,3: 1.1-1.6, 2.1-2.3, 3.1,3.2

Week 2 - Harmonic Response, Chapter 3: 3.1-3.2

Week 3 - Harmonic Response, Transient Response, Chapters 3,4,5: 3.5, 4.1-4.3, 4.6, 5.1, 5.2, 5.5

Week 4 - Transient Response, Chapter 6: 6.2-6.3, See also Appendix E & MATLAB on course web site. **Exam 1**

Week 5 - Two Degree of Freedom Systems, Chapters 8 & 9: 8.1, 8.3; 9.1,9.2,9.4,9.5,9.6.

Week 6 - MultiDegree of Freedom Probs, Chapter 10: 10.1-10.3

Week 7 - Multi DOF Systems, Chapter 15:15.1, MATLAB.

Week 8 - Continuous Systems, Chapters 12&13: 12.1,12.2; 13.1-13.3
Exam 2

Week 9 - Finite Element Methods, Chapter 14.1

Week 10 - Mode Superposition, Chapter 11: 11.1-11.3

Week 11 - Direct Integration of MODF, Chapter 16: 16.1-16.5

Week 12 - Frequency Domain Methods, Chapter 7, Divergence & Flutter.
Exam 3

Week 13 - Experimental Modal Analysis, Chapter 18: 18.1-18.4

Week 14 - Applications

Week 15 - Applications - Project Documentation (10-15 ppt slides)

Week 16 - Review **Final Exam**

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. – Kent L Lawrence

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Specific Course Requirements

Quizzes: throughout semester
Examinations: Exam 1, Exam 2, Exam 3, Final
Major Assignments
Homework: Assigned weekly
Woksheets: Assigned irregularly
Labs: None
Research Papers: Project Documentation Slides
Excused Missed Exams & Quizzes: See instructor to schedule.

Makeup Work: HALF credit will be deducted for unexcused late homework. Late work that is excused can receive up to full credit if submitted within 72 hrs of due date.

FULL credit will be deducted for sloppy, results only, no units, scribble in the margins papers. This applies to exams as well.

Do not engage in separate homework submissions, grade evaluations or negotiations with our Teaching Assistant.

Course Evaluation & Final Grade:

Final Grade Average: Homework & Worksheets & Quizes - 25%, Exams - 25%, Project 25%, Final Exam- 25%

All grades will be posted on **Blackboard.**

Letter Grades A >= 90% of full credit, B >= 80%, C >= 70%, D >= 60%, F below 60%.

The **semester project** involves 2 person teams performing analytical and experimental determination of natural frequencies of an instructor approved test specimen and the subsequent documentation of the results in slide-set format (examples on Mavspace). This project assignment is designated as a **key assignment**. Key assignments are used for assessment in order to collect input for improvement of the MAE program.

Home Work and Exam Procedures

Homework submissions

Submit your homework unfolded, stapled in the upper left corner. Include the following information in the upper right quadrant of the first page:

Your Name - Last, First
MAE 3316 / 4314
Date
Course Assignment Number and, if applicable, text problem number(s).

Each assignment should be considered an engineering task and documented accordingly. Work neatly, using one side of the paper only. Number, date, and put your initials in the upper right hand corner of each page. When the assignment calls for computer solution of problems, be sure to use the computer generated output to support your results not as a substitute for a report of your effort.

Provide a problem statement indicating what is known and what is to be found. Include a good sketch that shows dimensions, units, materials and their properties, loadings, supports, axis systems used, and when appropriate, member cross section shapes and dimensions.

FEM models should show loadings, boundary conditions, the type of element(s) used, the FEM program used, important node and element numbers.

The results should be summarized separately from the supporting calculations and any relevant conclusions drawn. If you are comparing an FEM solution to another known solution, make a clear statement of how the results compare using per cent error or per cent difference calculations. Be sure to include the input data you used. If you are solving a series of problems, one set of input data is probably sufficient.

Remember, your work should stand alone; that is, another engineer should be able to reproduce your results using only the write-up you prepare. See also Home Work Format on Mavspace.

Worksheets are short in-class problems solved by a two-person team.

Quizes are short individual in-class exams.

Worksheets & Quizes are each worth **3 times as** much as one homework problem.

Schedules

Unless otherwise noted, homework is due at the **beginning of the class period on the due date.**

Exams

All exams will be closed book, closed note exams. One sheet of formulas may be brought to exams. Makeup exams due to excused absences will be scheduled before the last week of the semester.

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

If you also wish to receive mail for this class at another email address, join the mae4314 LISTSERVE See menu item 'Join Mail List'. (http://mae.uta.edu/~lawrence/mae4314/me5311.htm)

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey: At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are 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 via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

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.

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 found by turning right upon exiting NH 109. Another exit is located to the left. 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.

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial **911**. Non-emergency number 817-272-3381