Course MAE 3316 - MAE 4314

Fall 2014

TTh 12:30-1:50

WH Room 404

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

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GTA: **Office Hours** 2:00-3:30 MW, office 125 NH

Course Prerequisites: Undergraduate courses in mechanics

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 structural dynamics and the application to structural systems.

Attendance and Drop Policy: Students are **expected to arrive on time and to attend all classes and exams.** 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.

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 **Work Sheet**

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

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

Week 6: - MultiDegree of Freedom Probs, Chapter 10: 10.1-10.3, **EXAM 1**

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

Week 9: - Finite Element Methods, Chapter 14.1

Week 10: - Mode Superposition, Chapter 11: 11.1-11.3, **Exam 2**

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

Week 12: - Frequency Domain Methods, Chapter 7, Divergence & Flutter

Week 13: - Experimental Modal Analysis, Chapter 18: 18.1-18.4 **EXAM 3**

Week 14: - Applications

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

Week 16: - Review, **FINAL EXAM**

Specific Course Requirements

Quizzes: throughout semester
Examinations: Exam 1, Exam 2, Exam 3, Final
Major Assignments
Homework: Assigned weekly
Labs: None
Research Papers: Project Documentation Slides
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. Just don't let the dog eat your homework more than once during the semester.

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

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

Course Evaluation & Final Grade:

Homework & Worksheets - 25%, Exams - 25%, Project 25%, Final Exam- 25%

The semester project involves 2-3 person teams perfoming analytical and experimntal determination of natural frequencies of an instructor approved test specimen and the subsequent documentation of the results in slide-set (examples on Mavspace) format. 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.

Student Evaluation of Teaching: Conducted near end of semester.

Home Work and Exam Procedures

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1. 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.

2. Schedules

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

3. Exams

All exams will be closed book, closed note exams. One sheet of formulas may be brought to exams.

It is a course **REQUIREMENT** that you you join the mae4314 **LISTSERVE** See menu item 'Join Mail List'.

4. 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 found by turning right upon exiting WH 404. 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.
