AE 410 AEROSPACE STRUCTURAL DYNAMICS (3 credits)
FALL 2007
MW, 4:00 to 5:15 p.m.
Engineering Building, Room E-326

SYLLABUS & CLASS POLICY

Catalog description: Methods of structural dynamic analysis of problems encountered in aerospace vehicles.

Instructor: Dr. Satchi Venkataraman, Associate Professor of Aerospace Engineering, Room 309 Engineering Building, (619) 594 6660, satchi@mail.sdsu.edu

Office hours: MW 10:00 – 11:00 a.m. and TTh 4:00 to 5:00 p.m. and at other times by appointment.

Website: http://blackboard.sdsu.edu

Objectives: In this course:
1. You will develop the ability to apply the laws of motion to physical systems and write the resulting equations of motion for the systems.
2. You will develop a thorough understanding of free and forced responses of 2nd order single- and multi-degree-of-freedom linear systems.
3. You will be introduced to the vibration of continuous media.
4. You will learn to use MATLAB program for numerical and symbolic calculations.


References: The course lectures will occasionally borrow material from other sources such as texts, manuals, handbooks and internet sources. Instructor will make every effort to provide references and/or copies of those materials to students in class. Although it is possible to follow the course by using the class notes, textbook and class handouts, it is suggested that students also learn to refer to additional source materials. In many cases, a different presentation may enhance understanding or spark new ideas. The following is a list of other suggested references.


Course Topics:
1. Introduction and definitions
2. Free and force oscillations of one-DOF systems
3. Harmonic and general forced vibrations of one-DOF systems
4. Free and forced vibrations of two-DOF systems
5. Multi-DOF systems
6. Natural frequencies and mode shapes
7. Vibration control methods
8. Vibrations measurement methods
9. Continuous systems

Computer Usage: Students are introduced to the use of MATLAB in vibration analysis and get an overview of finiteelement procedures using NASTRAN in the analysis of continuous systems.
Course Outcomes & Assessment Methods indicated in parenthesis:
1. Demonstrate ability to reduce physical systems to abstract models composed of standard lumped-parameter components — free body diagrams (Homework and tests)
2. Demonstrate ability to develop and solve the governing systems of differential equations (Homework and Test).
3. Demonstrate knowledge of natural frequency and damping ratio as the basic measures of a single-degree-of-freedom physical system, and the ability to apply these measures to predict system performance (Homework, Tests and Project).
4. Demonstrate knowledge of the natural frequencies (eigenvalues) and mode shapes (eigenvectors) of a two-degree-of-freedom physical system, and the ability to apply these measures to predict system performance (Homework, Tests and Projects).
5. Demonstrate the ability to compute the natural frequencies and wavelengths of vibrating strings, beams and plates (Homework and Tests)

Grading: Grades will be determined using these weights:
1. Homework assignments and projects 30%
2. Two in-semester exams 40%
3. Final exam 30%

Grades are based on scale (e.g., A=91+, B+=86+, B=81+, C+=76+, C=71+, D+=66+, D=61+). The letter grade assignment will follow the following definition provided in the SDSU student catalog under university policies:
- A - outstanding achievement; available only for the highest accomplishment (4 points)
- B - praiseworthy performance; definitely above average (3 points)
- C - average; awarded for satisfactory performance (2 points)
- D - minimally passing; less than the typical undergraduate achievement (1 point)
- F - failing (0 points)

Plusses and minuses will be used to designate intermediate performance.

Assignments: Homework assignments will consist of problem solving exercises, design application exercises, small written papers and presentations. The problem solving exercises will use textbook problems designed to help students understand basic concepts in structural analysis. The design problems and projects are highly simplified versions of real life problems that are less defined than textbook problems and require you to develop a formal problem statement, a solution to the problem, and description of the limitation and scope of the solution proposed. You may discuss homework problems with your classmates, but work turned in for grading must be your own. Homework assignments are also intended to develop written communication skills. Provide detail descriptions of the solution process with all homework assignments. The clarity, completeness of the solution is as important as the correctness. This also allows the instructor and grader provide you with meaningful feedback.

In-Term Exams: In-class exams are closed book, except for one 8.5"x11" page of handwritten notes.

Final Exam: The final exam will be comprehensive and will be closed book and closed notes. A final project may be assigned as part or in lieu of the final exam.

Academic honesty: Plagiarism and cheating constitute violations of academic honesty whether perpetuated actively or passively. Verbatim copying of homework from others will be considered academic cheating. All violations and suspected violations will be reported in writing to the judicial office and will result in academic sanctions. Sanction may include no-credit ion the assignment in questions, course failure and formal charges of student misconduct. Formal charges can results in academic probation, suspension or expulsion.

Software Use: All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Miscellaneous: Only University approved excuses for absences will be accepted. Each student will be responsible for knowledge of all scheduling and announcements made in class.