

Mechanical Engineering/Engineering College

Theory of Vibration – ME 860 Fall 2017 Syllabus

Part 1: Course Information

Instructor Information

Instructor: Dr. Firas A. Khasawneh
Office: EB 2503
Office Hours: MWF 1:45-2:45, or by appointment
Office Telephone: (517) 432-0471
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Course Description

Discrete systems and continua. Analytical mechanics. Variational principles. Modal analysis. Function spaces. Eigenfunction expansions. Integral transforms. Stability. Approximations. Perturbations.

Class time/place:

Meeting place: 1202 Engineering Building

Time: MWF 12:40-1:30

Final Exam: Tuesday, Dec 12 2017 12:45pm - 2:45pm in 1202 Engineering Building

Textbook & Course Materials

Required Text

- L. Meirovitch, Analytical Methods in Vibrations, Prentice Hall, New York, 1967, ISBN 0-02-380140-9, paperback or hardcover available.

Recommended Texts & Other Readings

- L. Meirovitch, Fundamentals of Vibrations, McGraw-Hill, 2001.

Course Requirements

- Internet access
- Access to Desire 2 Learn (d2L)
- Latex typesetting software
- Matlab or Python

Course Structure

This course will be delivered entirely online through the course management system Desire 2 Learn (d2L) delivery platform. You will need your MSU NetID to login to the course from the d2L home page (<http://d2l.msu.edu>).

In *Desire2Learn*, you will access course materials, and additional resources.

Technical Assistance

If you need technical assistance at any time during the course or to report a problem you can:

- Visit the [Distance Learning Services Support Site](#)
- Visit the [Desire2Learn Help Site](#)

Part 2: Course Objectives

- *Analyze the response of discrete single- and multi-degree of freedom systems subject to harmonic, periodic, non-periodic, and random forces*
- *Solve for the response of discrete oscillatory systems which include different types of damping*
- *Utilize modal analysis and discretization techniques to study the response of continuous systems*
- *Describe methods for analyzing self-excited oscillations*

You will meet the objectives listed above through a combination of the following activities in this course:

- *Attending class lectures*
- *Completing the HW assignments*
- *Writing and presenting a group project*

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Part 3: (Tentative) Course Outline/Schedule

Important Note: Refer to the course calendar for specific meeting dates and times. Activity and assignment details will be explained in detail within each week's corresponding learning module. If you have any questions, please contact your instructor.

| Week | Topic | Readings |
|-------------|---|--|
| 1-2 | Newton Laws EOM Linearization | Ch2 |
| 2-5 | Vibration of single-degree-of-freedom systems | 1.2-1.10 |
| 6-8 | Vibration of multi-degree-of-freedom systems | 4.3, 4.7, 4.11, 7.6, 9.3, 9.6-9.9, 9.11, |
| 8-10 | Vibration of continuous systems | 5.2-5.7, 5.9, 5.10, 5.14, 7.7-7.10, 7.15, 7.16 |
| 12-13 | Self-excited vibrations | notes |
| | Project presentations | |

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Grading Policy

Graded Course Activities

| Points | Description |
|---------------|--|
| 5 | <i>Homework</i> |
| 15 | <i>Class project</i> |
| 25 | <i>Exam 1 (scheduled on Monday 10/9/2017)</i> |
| 25 | <i>Exam 2 (scheduled on Monday 11/13/2017)</i> |
| 30 | <i>Final (scheduled on Tuesday, Dec 12 2017 12:45pm - 2:45pm in 1202 Engineering Building)</i> |
| 100 | Total Points Possible |

Late Work Policy

Assignments must be submitted by the given deadline or special permission must be requested from instructor before the due date. Extensions will not be granted except under extreme circumstances.

Viewing Grades

My goal is to make grades available within 1 week for homework and exams, and within 2 weeks for the class project. The grades can be viewed via the gradebook in d2L.

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Letter Grade Assignment

| Letter Grade | Percentage | Points | Performance |
|--------------|------------|--------|-----------------------|
| A | 93-100% | 4.0 | Excellent Work |
| BA | 86-92% | 3.5 | Nearly Excellent Work |
| B | 78-85% | 3.0 | Very Good Work |
| CB | 72-77% | 2.5 | Good Work |
| C | 65-71% | 2.0 | Mostly Good Work |
| DC | 58-64% | 1.5 | Above Average Work |
| D | 50-57% | 1.0 | Average Work |
| E | < 50% | 0.0 | Mostly Average Work |

Part 5: Course Policies

Regrade requests

Errors, oversights, and misinterpretations may occur. If there is an error in your grade (e.g., the total number of points incorrectly added) or you feel that the grade you received is not commensurate for your solution then you may submit a regrade request.

For quizzes and programming assignments, you must return the assignment with an attached written request detailing why you think your grade should be reconsidered. This regrade request should occur within 7 days after the graded assignment in question has been returned to the class.

For exams, no regrade requests will be accepted until exactly one week after the graded exam has been returned. To submit a regrade request, you must: 1) review the posted exam solution, and 2) attach a written

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request explaining why I should reconsider your grade. You must hand me your exam with the attached request either before or after the class one week after the exams are returned. Note that by submitting a regrade request you understand that your whole work can be re-evaluated and not only the problems you requested.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that we can help you find a solution.

Complete Assignments

All assignments for this course will be submitted electronically through Desire2Learn unless otherwise instructed.

HW is extremely important for your success in this class. That being said, although I will be assigning homework, I will not be grading all of the homework assignments or all the different parts of an assignment.

Other behavior expectations

Students are expected to take a sincere interest in learning the classroom material and to abide by the university policies. Keeping with this expectation, students should: 1) not create distractions (i.e. turn cell phones off and put laptops away), 2) show up to class on time, and 3) be courteous to other students and the instructor. During class time, cell phones should be put out of sight so that you are not tempted to text or check your email.

Understand When You May Drop This Course

It is the student's responsibility to understand when they need to consider un-enrolling from a course. Refer to the [Michigan State University Office of the Registrar](#) for important dates and deadlines.

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Inform Your Instructor of Any Accommodations Needed

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. If you have a documented disability and verification from the [Resource Center for Persons with Disabilities](#) (RCPD), and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student's responsibility to provide documentation of disability to RCPD and meet with an RCPD specialist to request special accommodation *before* classes start.

Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation ("VISA") form. Please present this form to the instructor at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date will be honored whenever possible.

RCPD is located in 120 Bessey Hall, near the center of the Michigan State University campus, on the southwest corner of Farm Lane and Auditorium Road. RCPD may be contacted by phone at (517) 884-7273 (884-RCPD), or [via their website](#) (<http://www.rcpd.msu.edu>).

Commit to Integrity

Academic Honesty

Article 2.3.3 of the [Academic Freedom Report](#) states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the (insert name of unit offering course) adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See [Spartan Life: Student Handbook and Resource Guide](#) and/or the [MSU Web site: www.msu.edu](#).)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also <http://www.msu.edu/unit/ombud/dishonestyFAQ.html>)