Course Syllabus

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Sample Syllabus

Contents

Instructors

Instructor

Dr. Anne Martin

Email: aem34@psu.edu (mailto:aem34@psu.edu)

Office: 338B Reber

Office hours:

- Monday 6:30-8:00 pm over Zoom (https://psu.zoom.us/j/97183696797) (will need to log in with PSU account)
- Thursday 2:00-4:00 pm in 214 Reber

TA

Rachael Kate Yanalitis

Email: rky5073@psu.edu (mailto:rky5073@psu.edu)

Office hours:

- Wednesday 4:30-6:30 pm in E302 Paterno Library

Schedule

Class time: Monday, Wednesday, Friday from 1:25-2:15 pm

Class location: 060 Willard

Exams:

- Exam 1: Wednesday, February 14 during class
- Exam 2: Friday, March 29 during class
- Exam 3: Monday, April 29 from 6:50 - 8:40 pm in 101 Chambers

Tentative schedule: **Schedule - ME 370 Spring 2024.pdf (https://psu.instructure.com/courses/2309522/files/157871310?wrap=1)**

Class attendance is not required but is strongly encouraged.

Assignment Types and Grading

Grading

Exam 1	16%	Project 1	16%
Exam 2	16%	Project 2	16%
Exam 3	16%	Homework	16%
		In class Activities	4%

Homework

Homework must be **submitted electronically through Gradescope (https://help.gradescope.com/article/ccbpppziu9-student-submit-work#submitting_a_pdf)** . You must correctly label all problems within Gradescope. Work that is not correctly labeled may not be graded.

Homework must show all work. If you use Matlab, submit the code you used/wrote as well as the output. See additional details at **Homework Directions (https://psu.instructure.com/courses/2309522/pages/homework-directions)** .

You may work in groups but you must be able to completely explain everything you turn in. Simply copying a solution, or part of a solution, is not acceptable and is a breach of academic integrity. Similarly, any Matlab code you submit should be distinct; your entire study group should not submit identical code.

Your homework score will be the sum of the homework points earned divided by the total possible homework points minus the average number of points per homework. There will be about 10 homework sets. Each homework set will have approximately 6 problems worth 10 points each. Thus, the denominator will be approximately 540. Your homework score may be above 100%.

In-Class Activities

The in-class activities will be divided between long answer collaborative problems and **Top Hat questions (https://psu.instructure.com/courses/2309522/pages/top-hat)** .

If you do not have a working phone or computer with you in class for whatever reason, you may answer the Top Hat questions on paper, being sure to clearly indicate the problem and your answer. You are responsible for providing your own paper. Dr. Martin will provide hard copies of the collaborative problems.

The collaborative problems are to be done **in class**. You may only submit the problems if you attend the class session it was completed (or office hours if you have an excused absence). If you do not attend a class session, you may not submit any associated collaborative problems.

All in-class activities will be graded on completion. If you are in class and actively working on the assigned in-class problem, you will receive full credit. If you answer the Top Hat question, you will receive full credit.

Absences and Unexpected Events

Short Excused Absence

If you have an excused absence (illness, job interview, official university activity, research conference, etc.), you may make-up collaborative problems within one week during office hours. If office hours are not too busy, you may also make up Top Hat questions. Before coming to office hours, watch the appropriate videos on Canvas (see **Schedule - ME 370 Spring 2024.pdf (https://psu.instructure.com/courses/2309522/files/157871310?wrap=1)**). You do not need advance permission for this, but Dr. Martin may require documentation of the excuse, particularly if you have already had many absences.

These absences do not change when homework and projects are due. If needed, you can submit the assignment late with the late penalty - there are bonus points built into the homework grade to account for things like this.

Long Planned Excused Absence

If you expect to miss a week or more of classes due to a University approved reason, email Dr. Martin as soon as possible to work out alternative arrangements. All arrangements must be finalized before the absence begins.

Unexpected Event Causing Significant Disruption

If something unexpected happens that is likely to significantly and negatively impact you for more than a few days (illness, unplanned significant family obligations, …), email Dr. Martin as soon as possible to let her know. As appropriate, assignment due dates can be adjusted for you. However, only homework, projects, and exams due after you contact her will generally be adjusted so you must contact her before you miss the first assignment. Note that the event must be both unexpected and significant – poor planning and/or time management does not count as unexpected.

Similarly, if something unexpected occurs that could significantly and negatively impact your performance on the day of an exam, email Dr. Martin before the exam to discuss accommodations. Until you and Dr. Martin have agreed on accommodations, assume that you must take the exam as scheduled.

Other Course Details

Required Material

Access to Matlab: students can obtain a free copy from Software at Penn State. See additional ways to access Matlab on the **Accessing Matlab (https://psu.instructure.com/courses/2309522/pages/accessing-matlab)** page.

Recommended Material

Engineering Vibration by Daniel J. Inman, Pearson, any edition.

Vibration of Mechanical Systems **(https://catalog.libraries.psu.edu/catalog/9019745)** by Alok Sinha, Cambridge.

Prerequisites

Required: E Mch 212, Math 220, Math 251, and Cmp Sc 200

Strongly recommended: E Mch 213

This course utilizes mathematical techniques covered in earlier mathematics courses such as ordinary linear differential equations with constant coefficients, Fourier Analysis, Laplace transforms, and functions of complex variables. This course also uses concepts covered in earlier engineering mechanics courses such as free body diagrams, Newton's laws, and deformation of beams. In addition, MATLAB software will be used, primarily to obtain numerical solutions and for plotting.

Course Objectives

This course covers vibration characteristics of mechanical systems and vibration control. Fundamental aspects of mechanical, single degree-of-freedom vibrations are studied first. The development of models using mass/inertia, spring, and damper elements are studied. The types and causes of various vibratory motions are described. Equations describing free vibrations of undamped and damped systems are derived. Natural frequency and damping ratio are defined and their physical significance discussed. Harmonically excited vibrations are studied with many practical application problems; resonance and its physical significance are emphasized. Methods to adjust the vibratory response are covered. The theoretical aspects of general periodic vibrations and non-periodic vibrations are formulated by means of Fourier analysis and Laplace transforms. The course also covers vibrations of multiple degrees-of-freedom systems. Mathematical models governing free vibrations are formulated and equations determining the natural frequencies are derived. Harmonically excited vibrations are analyzed with practical applications.

By the completion of the course, you will be able to

- Derive linear differential equations of motion for mechanical systems with multiple components,
- Solve the linear differential equations of motion for mechanical systems with no, harmonic, or arbitrary forces acting on the system,
- Analyze the response of the system,
- Design mechanical systems that meet given vibratory specifications and analyze the design using both numerical and analytical methods, and
- Use appropriate software to aid in solving and analyzing vibratory mechanical systems.

General University Policies and Resources

If you need course accommodations, please email Dr. Martin as soon as possible to work out the details.

See general information about academic integrity, course accommodations, reporting educational equity concerns, and counseling & psychological services on the **University General Policies and Resources (https://psu.instructure.com/courses/2309522/pages/university-general-policies-and-resources)** page.

Course Summary:

Date	Details	Due
Wed Jan 10, 2024	CP 1.1 (https://psu.instructure.com/courses/2309522/assignments/15703292)	due by 2:30pm
Wed Jan 17, 2024	CP 1.2 (https://psu.instructure.com/courses/2309522/assignments/15703291)	due by 2:15am

Date	Details	Due
Fri Jan 19, 2024	Homework 1 (https://psu.instructure.com/courses/2309522/assignments/15702712)	due by 1pm
	CP 2.1 (https://psu.instructure.com/courses/2309522/assignments/15703499)	due by 2:30pm
Mon Jan 22, 2024	CP 2.2 (https://psu.instructure.com/courses/2309522/assignments/15703498)	due by 2:30pm
Wed Jan 24, 2024	CP 2.3 (https://psu.instructure.com/courses/2309522/assignments/15703497)	due by 2:30pm
	CP 2.4 (https://psu.instructure.com/courses/2309522/assignments/15703496)	due by 2:30pm
Fri Jan 26, 2024	Homework 2 (https://psu.instructure.com/courses/2309522/assignments/15702721)	due by 1pm
Mon Jan 29, 2024	CP 3.1 (https://psu.instructure.com/courses/2309522/assignments/15703495)	due by 2:30pm
	CP 3.2 (https://psu.instructure.com/courses/2309522/assignments/15703494)	due by 2:30pm
Wed Jan 31, 2024	CP 3.3 (https://psu.instructure.com/courses/2309522/assignments/15703493)	due by 2:30pm
Fri Feb 2, 2024	Homework 3 (https://psu.instructure.com/courses/2309522/assignments/15702720)	due by 1pm
Wed Feb 7, 2024	CP 4.1 (https://psu.instructure.com/courses/2309522/assignments/15833465)	due by 2:30pm
Fri Feb 9, 2024	Homework 4 (https://psu.instructure.com/courses/2309522/assignments/15702719)	due by 1pm
Wed Feb 14, 2024	Exam 1 (https://psu.instructure.com/courses/2309522/assignments/15703145)	due by 1:25pm
Fri Feb 16, 2024	CP 5.1 (https://psu.instructure.com/courses/2309522/assignments/15925287)	due by 2:30pm

Date	Details	Due
Wed Feb 21, 2024	CP 6.1 (https://psu.instructure.com/courses/2309522/assignments/15936087)	due by 1:25pm
	CP 6.3 (https://psu.instructure.com/courses/2309522/assignments/15936085)	due by 1:25pm
	CP 6.2 (https://psu.instructure.com/courses/2309522/assignments/15936086)	due by 2:30pm
Fri Feb 23, 2024	Homework 5 (https://psu.instructure.com/courses/2309522/assignments/15702718)	due by 1pm
Mon Feb 26, 2024	CP 6.4 (https://psu.instructure.com/courses/2309522/assignments/15936084)	due by 2:30pm
Fri Mar 1, 2024	Homework 6 (https://psu.instructure.com/courses/2309522/assignments/15702717)	due by 1pm
	CP 7.1 (https://psu.instructure.com/courses/2309522/assignments/15946431)	due by 2:30pm
Mon Mar 11, 2024	CP 8.1 (https://psu.instructure.com/courses/2309522/assignments/15956160)	due by 2:30pm
Fri Mar 15, 2024	Project 1 (https://psu.instructure.com/courses/2309522/assignments/15703020)	due by 1pm
	Project 1 Code (https://psu.instructure.com/courses/2309522/assignments/15703021)	due by 1pm
	CP 8.2 (https://psu.instructure.com/courses/2309522/assignments/15956159)	due by 2:30pm
	CP 8.3 (https://psu.instructure.com/courses/2309522/assignments/15956158)	due by 2:30pm
Fri Mar 22, 2024	Homework 7 (https://psu.instructure.com/courses/2309522/assignments/15702716)	due by 1pm
	Honor's Option Initial Deliverable	due by 1pm

Date	Details	Due
	(https://psu.instructure.com/courses/2309522/assignments/15948472)	
	CP 9.1 (https://psu.instructure.com/courses/2309522/assignments/15959943)	due by 2:30pm
Fri Mar 29, 2024	Exam 2 (https://psu.instructure.com/courses/2309522/assignments/15703146)	due by 1:25pm
Mon Apr 1, 2024	CP 9.2 (https://psu.instructure.com/courses/2309522/assignments/15959942)	due by 2:30pm
Wed Apr 3, 2024	CP 10.1 (https://psu.instructure.com/courses/2309522/assignments/15996088)	due by 2:30pm
Fri Apr 5, 2024	Homework 8 (https://psu.instructure.com/courses/2309522/assignments/15702715)	due by 1pm
Mon Apr 8, 2024	CP 10.2 (https://psu.instructure.com/courses/2309522/assignments/15996087)	due by 2:30pm
Wed Apr 10, 2024	CP 10.3 (https://psu.instructure.com/courses/2309522/assignments/15996086)	due by 2:30pm
Fri Apr 12, 2024	Honor's Option Second Deliverable (https://psu.instructure.com/courses/2309522/assignments/15948474)	due by 1pm
	Project 2 (https://psu.instructure.com/courses/2309522/assignments/15703022)	due by 1pm
	Project 2 Code (https://psu.instructure.com/courses/2309522/assignments/15703023)	due by 1pm
	CP 10.4 (https://psu.instructure.com/courses/2309522/assignments/15996085)	due by 2:30pm
Fri Apr 19, 2024	Homework 9 (https://psu.instructure.com/courses/2309522/assignments/15702714)	due by 1pm
Fri Apr 26, 2024	Homework 10 (https://psu.instructure.com/courses/2309522/assignments/15702713)	due by 1pm

Date	Details	Due
	Honor's Option Final Deliverable (https://psu.instructure.com/courses/2309522/assignments/15948473)	due by 1pm
	CP (https://psu.instructure.com/courses/2309522/assignments/15703149)	
	Exam 3 (https://psu.instructure.com/courses/2309522/assignments/15703147)	
	Top Hat Module 1 (https://psu.instructure.com/courses/2309522/assignments/15939480)	
	Top Hat Module 3 (https://psu.instructure.com/courses/2309522/assignments/15965333)	
	Top Hat Module 4 (https://psu.instructure.com/courses/2309522/assignments/15965334)	
	Top Hat Module 5 (https://psu.instructure.com/courses/2309522/assignments/15979369)	
	Top Hat Module 6 (https://psu.instructure.com/courses/2309522/assignments/15999366)	