

Course Syllabus and Policies

ME 563: Mechanical Vibrations

MWF 8:30-9:20 am
Wang 2555

Instructor: James M. Gibert
Phone: 494-5970

Office Hours: **In-person:**
Wednesday 2:00-3:00 pm
1236 Lambertus
Online: Sun 8:30-9:30 pm
or by appointment

1002 Herrick Labs
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TA: Qianyu Zhao: zhao482@purdue.edu Office Hours: TBD

Link to office hours and live lecture: <https://purdue-edu.zoom.us/j/7691547035>

Link to live lecture can also be found in Brightspace under Course Tools, Kaltura Media Gallery but you will not be able to post comments or ask questions.

Course Description:

The course will cover fundamental concepts on the vibration of mechanical systems including, but not limited to, review of systems with one degree for freedom, Lagrange's equations of motion for multiple degree of freedom systems, introduction to matrix methods, transfer functions for harmonic response, impulse response, and step response, convolution integrals for response to arbitrary inputs, principle frequencies and modes, applications to critical speeds, measuring instruments, isolation, torsional systems, introduction to nonlinear problems

Learning Outcomes:

1. Develop equations of motion for single degree of freedom, multiple degree of freedom and continuous systems through Newton's Methods and Lagrange Equations.
2. Analytically solve the equations of motions for a lumped parameter and continuous system.
3. Analyze and understand the time and frequency dependent behavior of a mechanical system.

References (Not Required)

Inman, Daniel J., and Ramesh Chandra Singh. *Engineering vibration*. Vol. 3. Englewood Cliffs, NJ: Prentice Hall, 1994.

Meirovitch, Leonard. *Fundamentals of vibrations*. Waveland Press, 2010.

Singiresu, S. Rao. *Mechanical vibrations*. Boston, MA: Addison Wesley, 1995.

Textbook: "Mechanical Vibrations: A lecturebook", Chuck Krousgrill and Jeff Rhoads. The course lecturebook is required and will be available for purchase at <https://purdueu.com> (typically available two weeks before class).

Course Topics: Dynamics of Single Degree Of Freedom (SDOF) systems; Dynamics of Multiple Degree Of Freedom (MDOF) systems; Damping; Fundamentals of analytical dynamics; Numerical techniques for the response of dynamical systems; Dynamics of continuous systems; Analytical and approximate solutions of continuous systems; Intro to the dynamics of discrete nonlinear systems and perturbation techniques; Static and dynamic reduction.

Prerequisites/ Co-requisites: ME 274 or equivalent, Differential Equations

Course Blog: <https://www.purdue.edu/freeform/me563/>

Course Grading:

Homework	=20%
Midterm	=20%
Midterm	=20%
Final Exam	= 30%
Other Activities/Quizzes	=10%
Total	= 100%

Grading Policy:

Grades will be assigned based on all of the work you have completed during the semester $A+ \geq 97$; $97 > A \geq 93$; $93 > A- \geq 90$; $90 > B+ \geq 87$; $87 > B \geq 83$; $83 > B- \geq 80$; $80 > C+ \geq 77$; $77 > C \geq 73$; $73 > C- \geq 70$; $70 > D+ \geq 67$; $67 > D \geq 63$; $63 > D- \geq 60$, $F < 60$. This may be modified by the instructor but only in the student's favor.

AI Policy: AI- Generated content needs to be cited and will otherwise be considered a breach of academic integrity.

Homework:

HW's will be turned in through Gradescope by 11:59 PM on the due date. I don't care if you work together in groups on homework as long as it is a learning experience, not a copying experience. The work you turn in must be your own. Homework should be neat and well-organized. Late HW will not be accepted except in case of a university excused absence. HW is submitted in Gradescope.

Instructions for creating a PDF file for HW submittal.

Option 1: Your scanner may have a scan-to-pdf option; if so, you're done!

Option 2: Scan the pages as usual, then use a free online converter, such as <http://www.convert-jpg-to-pdf.net/> to change the image file to a pdf.

Option 3: Scan the pages as usual, then, download a free pdf creator, such as PrimoPDF, and install it. "Print" the photo file, and select PrimoPDF as the printer.

Exam Policy:

There will be two midterm exams. The timing of the exam will be announced in class two weeks prior to the exam date ^[1]_{SEP}. However the class schedule gives tentative exam dates.

E-mail:

I often send email with important information (clarifications, hints, changes) on homework, projects, and the course in general to the class roster of record, and you are responsible for making sure you get these. If your forward your official purdue.edu email to somewhere else (yahoo, hotmail, etc) makes sure that your emails don't bounce back for any reason. I expect you to check your e-mail regularly! Please include "ME563" in the subject line of any e-mail.

Academic Honesty:

Faculty and students working together can promote a fair and positive work environment. All students are expected to conduct themselves in an ethical manner. Students are permitted to discuss homework assignments together, but should do their own work when preparing a problem solution (i.e., copying of a solution manual or another student's work is explicitly prohibited). Exams are to be completed without unauthorized assistance. Any student caught cheating on an assignment or exam will receive disciplinary action, up to and including receiving a grade of "F" for the course. In addition, documentation of the infraction will be forwarded to the Office of the Dean of Students, which may result in additional disciplinary action, up to and including expulsion from the University. All of us are equally responsible for ensuring a fair and positive environment. If you become aware of any dishonest activities, please report the

infractions to me (anonymously if you prefer) and I will investigate the concerns. If there is sufficient evidence of academic dishonesty, I will take disciplinary action. Finally, remember that, if you are complicit in assisting a peer to cheat, you are equally guilty.

If you would like additional information, please consult the Academic Integrity Brochure and the Code of Student Conduct.

Academic Integrity Statement: http://www.purdue.edu/purdue/about/integrity_statement.html

Code of Student Content: http://www.purdue.edu/studentregulations/student_conduct/regulations.html

Learning Disabilities:

Any student with an official recognized learning disability must inform the instructor within the first week of class meetings so that arrangements can be made to meet the student's needs. Failure to provide the instructor with official University notification, i.e., the Disability Resource Center (<http://www.purdue.edu/drc>) of this situation within one week will cause the forfeiture of any special requests made by the individual student during the semester.

Grief Absence

Occasionally, students experience a death in their family and are entitled to a time of bereavement according to University regulations. In such cases, students are strongly encouraged to contact the Office of the Dean of Students for assistance in documenting the incident and contacting all of their instructors.

Campus Emergencies

In the event of a major campus emergency (e.g., severe weather, active shooter, etc.), course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. The School of Mechanical Engineering will provide details regarding access to information online and any additional procedures that may be needed as soon as they are available or can be obtained by contacting the instructors or TAs via mail or phone. You are expected to read your @purdue.edu email on a regular basis.

Please review the following items:

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, and to sign up for Purdue Alert text messages, view www.purdue.edu/ea.
- There are nearly 300 Emergency Telephones outdoors across campus and in parking garages that connect directly to the Purdue Police Department (PUPD). If you ever feel threatened or need help, push the button and you will be connected immediately.
- If we hear a fire alarm, we will immediately suspend class, evacuate the building, and proceed outdoors away from the building. Do not use the elevator.
- Emergency assembly area for ME building occupants – Primary: Purdue Mall area outside MSEE – Secondary (in case of inclement weather): Atrium of the MSEE building, located in center of building on 1st floor.
- If we are notified of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in the lowest level of the ME building away from windows and doors.
- If we are notified of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the door, and turning off the lights.
- If you are directed to shelter in place, but you are unaware of the specific reason, proceed to the lowest level of the building but continue to seek additional information by all possible means to determine the type of incident. Once you have determined the type of emergency, follow the below chart:

Emergency	Emergency Assemble Area EAA
Weather-Related – Tornado Warning	Basement corridors, basement offices, basement restrooms or the lowest level of the building (stay away from windows and doors)

Hazardous Materials (HAZMAT) Release	Remain or find an unaffected office or work area and close windows and doors.
Civil Disturbance – Active Shooter	Seek a safe location, preferably a room without windows that can be locked or secured by barriers.

Please review the Emergency Preparedness website for additional information:
http://www.purdue.edu/epps/emergency_preparedness/index.html

Violent Behavior Policy

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent behavior impedes such goals. Therefore, violent behavior is prohibited in or on any University facility or while participating in any university activity.

Quarantine or Isolation

If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center, you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at acmq@purdue.edu and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email or Brightspace. We will make arrangements based on your particular situation. The Office of the Dean of Students (odos@purdue.edu) is also available to support you should this situation occur.

Attendance Policy

Students should stay home and contact the Protect Purdue Health Center (496-INFO) if they feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus. In the current context of COVID-19, in-person attendance will not be a factor in the final grades, but the student still needs to inform the instructor of any conflict that can be anticipated and will affect the submission of an assignment or the ability to take an exam. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency conflict, when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, through Brightspace, or by phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via [email](#) or phone at 765-494-1747. Our course Brightspace includes a link on Attendance and Grief Absence policies under the University Policies menu.

Protect Purdue

The [Protect Purdue Plan](#), which includes the [Protect Purdue Pledge](#), is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines. Required behaviors in this class include: staying home and contacting the Protect Purdue Health Center (496-INFO) if you feel ill or know you have been exposed to the virus, properly wearing a mask [in classrooms and campus building](#), at all times (e.g., mask covers nose and mouth, no eating/drinking in the classroom), disinfecting desk/workspace prior to and after use, maintaining appropriate social distancing with peers and instructors (including when entering/exiting classrooms), refraining from moving furniture, avoiding shared use of personal items, maintaining robust hygiene (e.g., handwashing, disposal of tissues) prior to, during and after class, and following all safety directions from the instructor.

Students who are not engaging in these behaviors (e.g., wearing a mask) will be offered the opportunity to comply. If non-compliance continues, possible results include instructors asking the student to leave class

and instructors dismissing the whole class. Students who do not comply with the required health behaviors are violating the University Code of Conduct and will be reported to the Dean of Students Office with sanctions ranging from educational requirements to dismissal from the university.

Any student who has substantial reason to believe that another person in a campus room (e.g., classroom) is threatening the safety of others by not complying (e.g., not wearing a mask) may leave the room without consequence. The student is encouraged to report the behavior to and discuss next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities](#). See also [Purdue University Bill of Student Rights](#).

Nondiscrimination Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. More details are available on our course Brightspace table of contents, under University Policies.
