

ME1020 – MECHANICAL VIBRATIONS**2021-2022 Spring**

(Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on the course website and announced in class)

Catalog Description and Objective

Vibrations in engineering systems are associated with noise and rapid wear of machine parts. The course introduces the foundations of vibration theory and its applications to the analysis and design of mechanical systems. Computer tools will be utilized by students to develop programs for the vibration analysis. (3 credit hours).

Prerequisites:

- MATH 290 Differential Equation or equivalent
- ME 1014 Dynamic systems or equivalents

Schedule: Lecture, Room 3-104 Friday 8:15 – 11:00

Instructor: S.C. Fok, Office: Room 222 (Zone 4)

Office Hours: Monday 4.30pm – 5.30pm, Wednesday & Thursday 1:00pm – 5:00pm

For consultation outside office hours, please send an email to make an appointment

Email: saicheong.fok@scupi.cn

Teaching Assistant: Jin Liuchao (contact: windbirdman@stu.scu.edu.cn, ph: 18258525750)

Textbook

Engineering Vibration 4th Edition, D.J. Inman, Pearson Higher Ed., ISBN–9780273768449

Additional references and supplementary materials will be posted on Blackboard.

Learning Outcomes

After the successful completion of this course students should be able to:

- Model mechanical systems for vibration analysis.
- Evaluate the free and forced responses of single and multiple degree of freedom systems.

- Develop solutions to suppress the vibrations
- Utilize computer tools to analyze mechanical vibrations

Grading Policy

Grade will be based on overall performance in all assessment items as follows (note: the assessment items and percentages may be subjected to change):

ACTIVITIES	PERCENTAGES
Quizzes	10%
Project	15%
Midterms	40%
Final	35%

Submission requirements (including due dates) for all assessments will be announced to students in class or on Blackboard. Students who need to complete the course early will take a special exam to replace the final exam. Letter grades are based on SCUPI standard policy.

Tentative Course Schedule (changes will be announced):

Week	Text	Topic
1	Chap. 1	Introduction and review of basic mathematical concepts
2	Chap. 1	Mechanical elements and review of system modelling
3	Chap. 1	1 DOF system free vibration
4	Chap. 2	1 DOF harmonic excitation
5		Midterm
6	Chap. 2	Base excitation
7	Chap. 2	Rotating imbalance
8	Chap. 5	Balancing rotating machines
9	Chap. 5	Vibration isolation
10		Midterm
11	Chap. 4	2 DOF undamped free vibration
12	Chap. 5	2 DOF undamped vibration absorber
13	Chap. 3, 7	2 DOF harmonic excitation & modal analysis
14	Chap. 3, 7	Applications
15		Public Holiday
16	Chap. 3, & 4	General force response
17		Revision

The course will cover the analysis of mechanical vibration and suppression of vibration through guided learning, discussions, quizzes, and project(s). Class exercises involve student participation. Project(s) will enable students to apply the knowledge in the analysis of mechanical vibration and

suppression of vibration. Quizzes will focus on fundamentals so that students can better understand basic concepts. Formative exercises would help students to better understand the learned concepts.

Class Policies:

- Regular class attendance is expected.
- Assessments will evaluate the student's understanding of material covered in lectures and reading assignments. The submission requirements are clearly stated in the assessment items. No marks will be awarded for failure to meet the submission requirements.
- Late submissions will not be accepted unless you have made prior arrangements with Instructors. However, if a student has a valid reason and cannot submit an assessment item by the deadline, the student must contact the instructor immediately. Failure to do so will result in a zero for that assessment item. If the reason stated is consistent with University Policy, arrangements can be made for the student to resubmit the assessment item (or for alternate assessment).
- Once the graded assessment item has been returned to the student (or solution to the assessment item has been released; no makeup of the assessment will be allowed even if there is a valid reason.
- Challenge to the grading must be made within 7 days after the returned of the assessment item or after the release of the solutions. No challenges to the grading will be entertained after the 7-day period.
- Academic misconduct will not be tolerated. All misconduct will be reported and dealt with by SCUPI.

Honesty Policy: All students admitted to the SCUPI have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a SCUPI student.

ACADEMIC INTEGRITY

Students in this course will be expected to comply with the Sichuan University's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.