

AE 688A Dynamics and Vibration (3-0-0-0-9)

First Semester 2017-18

Schedule: Monday, Thursday, 12.00 - 13.15 hrs

Room: TA 112

Instructor: G.M. Kamath (gmkamath@iitk.ac.in)

TA: Avinash Shet (avinashs@iitk.ac.in)

Course Objectives

The course is intended to provide an introduction to the areas of rigid body dynamics and vibration with references to aerospace applications made as and when appropriate.

Course Contents

Rigid Body Dynamics: Newton's second law, impulse and momentum, moment of a force and angular momentum, work and energy, system of particles, rigid bodies, Euler's equations.

Analytical mechanics: Degrees of freedom, generalized coordinates, virtual work, Hamilton's principle, Lagrange's equations.

Lumped parameter systems: single degree of freedom system, two degrees of freedom system, multiple degrees of freedom system.

Linear system theory: frequency response, transform methods, transfer function, modal analysis.

Continuous system: introduction to vibration of continuous systems

Course Organization, Attendance and Grading Policy

The course evaluation will be based on assignments, quizzes, a mid-semester exam and an end-semester exam.

Assignments would be given every Thursday and would be due the following Thursday. The solutions would be provided the next day (Friday) and the graded assignments would be returned the subsequent Monday. **Assignments would carry a weightage of 20%.**

The mid-semester exam would be for a duration of 90 minutes for all the material covered until then. **The mid-semester exam would carry a weightage of 20%.**

The end-semester exam would be for a duration of 180 minutes for the material covered over the entire semester. **The end-semester exam would carry a weightage of 40%.**

There would be 2 Quizzes, Q1 & Q2. Each of the quiz would be for a duration of 45 minutes. Q1 would cover only the incremental portion covered between the last exam (if applicable) and the time of the exam. The quizzes would be held outside regular class hours. **Each of the quiz would carry a weightage of 10% (total of 20%).**

Attendance is not mandatory and carries no weightage for the grade. However, the attendance for every class would be recorded.

All communication for the course will be sent by email to the course email list.

Course Material

No specific text is prescribed. However, the following books could be used as reference.

1. Engineering Mechanics - Dynamics, JL Meriam & LG Kraige. 7th Edition (SI Edition), Wiley.
2. Theory of Vibration with Applications, WT Thomson, MD Dahleh & C Padmanabhan, 5th Edition, Pearson.