

Syllabus **ME 470-3** Mechanical System Vibrations.

Spring 2014

Instructor: Dr. Marek L. Szary, ENGB-0120, ph. 453-7833, szary@enr.siu.edu,
Office hours: 10:00 -11:00 on M-W-F and 15:00 – 16:00 on Tu and Th.

Course Information

Overview of the course:

Linear vibration analysis of mechanical systems. Design of mechanical systems to include effects of vibration. Introduction to and understanding of basic vibration of one and multi-degree-of-freedom systems, transverse and torsional vibration, damping and controlled damping, electrical analogy, response to input signal, vibration isolation and damping treatments, active and semi-active vibration control, measurements, basic signal processing and hardware.

Prerequisites: Engineering 260b (ME261) and 351 and Mathematics 305.

Textbook: “Engineering Vibration”, by Daniel J. Inman, Prentice Hall, Last edition, ISBN: 0 -13 - 228173-2

Grading: There will be two tests and one final exam. Homework assignments and quizzes are also graded and counted toward the final grade.

Distribution is as follows:

2 tests – 20% each.....	40%
1 final exam.....	25%
Homework assignments.....	15%
Quizzes.....	20%
Total.....	100%

The final grade will be assigned based on the standard SIU distribution:

100%-90% = A

89%-80% = B

79%-70% = C

69%-60% = D

Below 60% = F

Rules:

* All necessary free body diagrams and calculations must be clearly shown on all graded work in order to receive full credit.

*All written material must be legibly hand-written or double-spaced type written.

*No makeup exams will be given. If you know ahead of time that you will miss an exam for some reason, let me know and I may give you an exam early.

*The final exam will be comprehensive.

*Students are expected to be regular and punctual in class attendance. The University believes that students themselves are primarily responsible for attendance, however, excessive or extended absence from the class and/or low grades are sufficient reason for the instructor to advise student to drop the course.

TENTATIVE TOPIC OUTLINE

No.	Class time allotted (weeks)	Topics
I.	1.5	Introduction to Vibration. Equation of motion
II.	3.0	Mass, Moment of Inertia and Stiffness, Equilibrium of Forces
III.	2.5	Stress and Strain in Vibrating Transverse and Torsional Systems
IV.	3.5	Resonances, Electrical Analogy
V.	2.5	Linear and Non-linear Spring Reactance. Mass Reactance
VI.	2.0	Review and TEST #1
VII.	3.0	Models of Damping System. Damping Controlled by External Fields
VIII.	5.5	Mechanical Oscillator, Forced Vibration under Harmonic Excitation
IX.	4.5	Response of Vibrating System to the Arbitrary and Random Inputs
X.	2.0	Review and TEST #2
XI.	3.0	Two-Degree-of-Freedom: Transverse and Torsional Systems
XII.	5.5	Multi-Degree-of-Freedom Systems, Measurements

XIII.	4.5	Distributed Parameter System. Beams and Plates Vibration.
XIV.	2.0	Review and FINAL.

The allotted time during the Summer Semester should be reduced by the factor of 2.