EMEC 445: MECHANICAL VIBRATIONS

(Revised ____)

CATALOG DATA:
EMEC 445 – MECHANICAL VIBRATIONS: F, S 3 credits (3 lecture). Prerequisites: EMEC 303. Requires completion of all 100-200 level courses (except Core). Vibration problems of single and multiple degree of freedom systems. Introduction to vibration of continuous bodies. Analysis of free and forced vibration problems. Effects of damping.

TEXTBOOK:

INSTRUCTOR:
Dr. C. H. Jenkins, Roberts 220, 994-2203, 994-6292 (fax), cjenkins@me.montana.edu
Office Hours: Any time my door is open. If you have trouble meeting with me, please see the M&IE office staff for an appointment, or phone or email me.

ENTRANCE EXPECTATIONS:
As this is a senior-level course, the student is expected to bring together foundational knowledge from a number of course in their undergraduate experience. Specifically, the student is expected to apply:
1) Principles of mechanics, including basic statics, dynamics, and strength of materials
2) Engineering mathematics, including differential equations and Fourier series
3) Written and oral communication skills
4) Problem solving skills
5) Basic principals of modern engineering design

COURSE OBJECTIVES:
The objective of this course is to study the oscillatory nature of mechanical systems so that we may design such systems with knowledge of their vibratory response. Upon completion of this course, the student will:
1) Perform detailed analysis of the response of one and two degree of freedom systems in both free and forced vibration regimes
2) Perform basic free vibration analysis of multi- and infinite-degree of freedom systems.
3) Demonstrate knowledge of simple methods of vibration control
4) Explain the interaction of mechanical vibrations with humans
5) Effectively communicate engineering work by oral and/or written means
6) Perform vibration design of simple mechanical systems that can be approximated by one, two, or infinite degree of freedom systems.

CLASS SCHEDULE:
Sections meet M, R, F 3:10 – 4:00 pm, Reid 101.

COMPUTER AND LABORATORY USAGE:
At various times, students will be required to use computers to better understand vibration phenomena, solve problems, and analyze results. Brief laboratory exercises will support the in-class lectures.
COURSE OUTCOMES:
Upon completion of this course, students will have demonstrated the ability to:
1. Use basic problem solving skills
2. Apply analytical tools from a variety of their technical courses
3. Perform free-vibration analysis of one, two, and infinite degree of freedom systems
4. Perform forced-vibration analysis of one and two degree of freedom systems
5. Design simple mechanical systems for vibrations
6. Explain the basic effects of vibration interaction with humans
7. Make oral presentations and/or deliver written communications effectively
8. Work effectively in a team environment

SPECIAL NEEDS INFORMATION:
Students with special needs or requiring special accommodations should contact the instructor or the campus Disabled Student Services Office at the earliest opportunity.

STUDENT CONDUCT
Students are expected to conduct themselves in accordance with the MSU Student Conduct Guidelines (http://www2.montana.edu/policy/student_conduct/), including the areas of academic honesty, behavior, and responsibilities.

For each class period, the student may reasonably expect to spend at a minimum between two and three hours in preparation for class and in solving homework problems. The student is expected to read the course notes and textbook. The student is expected and encouraged to ask questions regarding course material that is not clearly understood.

Use of electronic communication devices during class, labs, exams, etc., is prohibited unless otherwise expressly permitted.

ASSESSMENT AND EVALUATION:

Course objectives
The course objectives will be assessed by the following methods:
1. FE exam
2. Exit interview
3. Alumni survey

Course outcomes
Final letter grades will be based on a curve using the following:
- Quizzes = 12.5%  (i-clickers required, see below)
- 3 unit exams @ 25% = 75%
- Optional comprehensive final exam (may be used to replace 1 unit exam)
- Lab exercises = 12.5%  (more details will be provided later during the course)

Note: Late assignments will be penalized, or may not be accepted, at the discretion of the instructor unless prior communication regarding the lateness has occurred. No make-up exams or assignments are planned.
Unless otherwise specified, homework assigned during any week is expected to be completed by the following Friday. A weekly homework review will be provided. Homework problems will not be turned in nor graded.

Homework effort and course participation will be measured using i-clickers. Questions will be presented in class and your grade will be based on a combination of participation and answering questions correctly. The lowest 3 i-clicker grades will be dropped. Any instances of students cheating by acts including but not limited to bringing another student’s i-clicker to class will result in a zero on the quiz grade for the semester for all parties involved.

I-CCLICKER HELPFUL INFORMATION:

1. Register your iclicker at the MSU student i-clicker registration site (https://www3.montana.edu/iclicker/). Use the MSU registration site only - no other registration site will get your clicker information into the MSU database. The registration site is also found by going to the MSU home page> Current Students> in the Academic Info column find the i-clicker Registration link.

i-clickers must be registered every semester. The database is reset at the end of every semester since clickers get traded and sold.

Can’t tell what your i-clicker ID is? It is on the back of your iClicker on the UPC bar code. The ID is hexadecimal so they only contains numbers or letters A-H. In most models the ID is also printed on a label inside the battery case. If all else fails, you can take your i-clicker to the MSU Bookstore and they can read it electronically.

2. MSU strongly advises all students using clickers to change the batteries at the start of each school year. The i-clicker takes three “AAA” batteries – you may have to shake it hard to get the last battery out! You should do this even if you are “not yet seeing a “Low Battery” indicator light – sometimes the clicker cannot reach the instructor’s base station even with a battery that has some life left.

3. Use your i-clicker in class to receive participation points. Be sure to check D2L regularly to make sure your clicker participation points are being counted.

4. If you have any questions about registration of clickers or if your receive a solicitation to register your i-clicker via text message or email, you should contact the MSU ITC Helpdesk at: helpdesk@montana.eduor 994-1777

COURSE WEB SITE: For complete course information, see the EMEC 445 D2L site at https://ecat.montana.edu/
### EMEC 445 SCHEDULE FOR FALL 2013

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**NOTES:**

¹The instructor may not lecture on all topics; the student is expected to study some topics independently, and to discuss questions about the material with the instructor during class or at other times as may be appropriate.

² See D2L for details.