SYLLABUS
MENG 4203-201: MECHANICAL ENGINEERING ANALYSIS
(Required Course)
Spring 2019

Instructor: Dr. Zeki Ilhan

Office: McCoy Hall 219E

Office Phone: (940) 397-4004

E-mail: zeki.ilhan@msutexas.edu

Office Hours: Monday: 11:00 am – 1:00 pm
Wednesday: 11:00 am – 1:00 pm
Thursday: 2:00 pm – 5:00 pm
Friday: 10:00 am – 1:00 pm

Teacher Assistant: Mr. Till Gebel (lteurlinx0531@my.msutexas.edu)

Course Schedule: Monday, Wednesday and Friday: 9:00 am – 9:50 am

Class Location: McCoy Hall 136

COURSE DESCRIPTION
Mathematical modeling, simulation, and statistical analysis of engineering systems and problems.

COURSE PRE-REQUISITES
MENG 4123 – Mathematical Methods for Engineers

TEXTBOOK
Schaum's Outline of Mechanical Vibrations by S. Graham Kelly, McGraw-Hill.

TOPICS COVERED
- Equivalent system analysis
- Lagrange's equations
- Single degree of freedom vibrations
- Harmonic, periodic, general excitation
- Rotation unbalance
- Vibration isolation
- Fourier series representation
- Multi degree of freedom vibrations
- Modal analysis
- Numerical solutions of systems of ODEs

Additional material may be covered as time permits.

GRADING
The overall grade for the course will be based on the scores earned on the homework assignments, exams, and the attendance. The homework assignments account for 10% of the course grade, exams account for 80% of the course grade, and attendance accounts for 10%. The overall score for the course is determined as follows.

Table 1: Percentage contribution of each assignment.

Assignments	Contribution
Test 1	25%
Test 2	25%
Final Exam	30%
Attendance	10%
Homework	10%
TOTAL	100%

FINAL EXAM
Monday, May 6, 8:00 am – 10:00 am

COURSE ORGANIZATION AND ASSESMENT

- **Course Format:**
  This course consists of three 50-minute sessions each week. Class meetings will contain lecture sessions that cover the relevant topics for that particular class. Not all material can be covered during the class session. Expect to spend an appropriate amount of time outside of class on assignments and projects.

- **Class Attendance:**
  You are expected to attend class regularly and are responsible for notes, homework assignments, quizzes and exams missed while absent. Attendance (or lack thereof) directly affects the course grade. ***Attendance is considered very important in this course, and counts for 10% of the grade.***

- **Student Attitude:**
  Once class starts, the use of cell phones, conducting private discussions, working on anything that is not directly related to the course, and making derogatory remarks about your classmates or instructor will not be accepted and may result in your dismissal from the class. Poor attitude directly affects the course grade.

- **Midterm Progress Reports:**
  In order to help students keep track of their progress toward course objectives, the instructor for this class will provide a Midterm Progress Report for at-risk students through their WebWorld account. Midterm grades will not be reported on the students' transcript; nor will they be calculated in the cumulative GPA. They simply give students an idea of where they stand at the midpoint of the semester. Students earning below a C at the midway point should schedule a meeting with the professor and seek out tutoring.

- **Homework Evaluation Method:**
  Your performance will be tested regularly throughout the semester by homework assignments. While several homework problems may be assigned as part of a homework assignment, it may be the case that only a subset of problems will be graded. However, you must attempt all problems. ***Do not try to guess which problems will not be graded.***

- **Late Assignments:**
  Homework assignments must be turned in ***on the due date, at the beginning of class.*** Once class starts, late assignments will ***NOT*** be accepted. However, depending on the overall class progress, ***one (or two) of the lowest graded homework assignments may not be included in the final grade.***

- **Exam Make-up:**
  You are expected to take all exams on the scheduled date and time. However, if for some acceptable reason you are not able to do so, then you must inform the instructor in advance. ***Make-up exams will be given only in case of an emergency (accompanied by a doctor's report) or a major conflict due to a scheduled athletic event or an academic conference.***

- **General Study Guidelines:**
  Plan on spending few hours outside of class each week to study the material and to work on homework assignments. Do not wait until the last day to start the homework or to prepare for exams. Utilize office hours throughout the semester whenever you need help about the assignments or the course material.

GENERAL EDUCATION STATEMENT
Students in this course must demonstrate their proficiency in oral and written communication through written homework assignments and exams.

ACADEMIC INTEGRITY POLICY
Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook regarding student responsibilities & rights, and the intellectual property policy information about procedures and what constitutes acceptable on-campus behavior.

DISABILITY SUPPORT SERVICES
If you have a documented disability that will impact your work in this class, please contact me to discuss your needs.

DISCLAIMER STATEMENT
Information contained in this syllabus, other than grading policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information, please refer to campus carry rules and policies

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

Table 2: Course learning objectives related to the ABET criteria (1-7)

COURSE OBJECTIVES	1	2	3	4	5	6	7
Given a complicated single degree of freedom mechanical system, students will be able to obtain its governing differential equation through equivalent system reduction techniques.	X						
Students should be able to obtain the response of single degree of freedom vibrating systems under harmonic excitation.	X						
Given the relevant scenarios, students should be able to perform vibration isolation and/or design against the rotation unbalance.	X	X					
Students should be able to use Fourier series approximation to approximate the response of a single degree of freedom system due to a periodic excitation.	X						
Students should be able to apply Lagrange's equations in conservative and non-conservative forms to generate the equations of motion of multi degree of freedom mechanical systems.	X						
Given a multi degree of freedom mechanical system with appropriate initial conditions, students should be able to apply modal analysis techniques to generate the system response.	X						
Given a dynamic system governed by a set of linear or nonlinear ODEs, students should be able to apply numerical (Runge-Kutta) methods to obtain and plot the numerical solution in MATLAB.	X						

Table 3: Detailed interpretations of the ABET criteria (1-7) listed in Table 2.

ABET Criteria	Interpretation
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2	an ability to apply engineering design to produce solutions that meets specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3	an ability to communicate effectively with a range of audiences.
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Prepared by Zeki O. Ilhan, January 2019.