Semester: Spring 2016, CRN: 12516
Instructor: Dr. Simin Nasseri, Associate Professor of Mechanical Engineering
Office: Q-231
Email: snasser1@kennesaw.edu (best way to reach me)
Office Hours: M/W: 11 AM-12 PM and 3:30 to 4 PM
T/R: 12:30-1:30 PM

Suggested Texts:
- Engineering Mechanics, Dynamics, Hibbeler, any edition, and

Supplies: Basic drawing tools for drawing on Engineering Paper, such as mechanical pencil, red pen, blue pen, ruler, triangles, protractor, and compass.

Pre-Requisite: ENGR 3122, Dynamics, and ME 1311 MATLAB for Engineers with Application (or CSE 1301 Programming)
Grading policy: 20% Homework, Computer Project, Binder Assembly
55% Tests and Quizzes
20% Final Exam
5% Attendance
Nominal Grading Scale: 90-100 A, 80-89 B, 70-79 C, 60-69 D, below 60 F

Catalog COURSE DESCRIPTION
(3-credits) The analysis of motion, velocity, acceleration, and forces in mechanisms and machines. Emphasis is placed on the analytical methods suitable for computerized analysis as well as graphical methods for visualization and preliminary design studies. Also an introduction to vibration theory, including the modeling and analysis of oscillatory phenomena found in linear discrete and continuous mechanical systems.
General LEARNING OUTCOMES

Upon the completion of this course, you should be able to:
1. Compute the natural frequency and predict the response for a one-degree-of-freedom system undergoing translational vibrations, with or without damping (a, l, m).
2. Compute the resonant frequency and predict the response for a machine with a rotating unbalance (a, e, l, m).
3. Calculate the mobility of planar mechanisms (e, m).
4. Calculate positions, velocities, and accelerations, of any point or link in a linkage (a, e, l, m).
5. Determine forces and moments in linkages, mechanisms, or machines (a, e, l, m).
6. Synthesize linkages to generate prescribed motions (a, c, m).
7. Kinematic analysis of geartrains and cams (a, e, m).

Note: letters in ( ) above correlate to ABET a-k requirements and ME Learning Outcomes.

COURSE OUTCOME MEASURES and ASSESSMENT

Measures and assessment of the outcomes will be made by:
• Exams and Quizzes
• 2-hour Final Exam
• Homework assignments, Computer Project
• Student survey(s).

Topics Covered
1. Review kinematics and kinetics of particles.
2. Vibration for mass-spring system, natural frequency.
3. Rotational vibration.
4. Damping in 1-DOF systems.
5. Forced vibration due to rotational unbalance, resonance.
7. Geartrain kinematics, gear ratio.
9. Definition of linkages, mechanisms and machines.
10. Mobility of links, and joints, and mechanisms.
11. 4-bar mechanisms and Grashof condition.
12. Synthesis of 4-bar for prescribe motions, such as crank-rocker.
13. Velocity, acceleration, force and moments in linkages.
14. Cam-follower mechanisms - analysis and design.

**QUIZZES & EXAMS**

- Make-up exams or quizzes will be allowed *only* for excused absences. It is the student’s responsibility to contact the Professor *prior* to the exam if s/he cannot attend the exam at the regular scheduled time.
- Quizzes may be announced or unannounced.

**HOMEWORK**

- Homework will be assigned but may or may not be graded.
- Late homework will be accepted but with a late penalty, 10-20% per weekday off. Plan to turn in all the problems, stapled together, even if only one problem was collected on the day it was due. If unable to go to class due to illness, etc., then can scan and email, then turn in originals when possible--my office: Q231.
- It is your responsibility to do and understand the homework problems and concepts. Collaboration with other students is allowed, but copying is not. Seeing someone else’s solution will not help you on the quizzes and exams.
- Homework will not be accepted unless it is printed neatly, in pencil, on the front side only (non-grid side) of engineering greenish paper, using the following steps (Given, find, solutions) prepared by Dr Richard Ruhala. Typing is acceptable but not necessary. Another engineer should be able to follow your problem solution without the textbook, but it does not have to be a work of art.
  - **Given**: Summarize the textbook problem statement, what is the problem about/for, redraw sketch in textbook if any, data
  - **Find**: what are you trying to find/solve for
  - **Solution**: draw model if needed, write equations first in variable form, any theory/assumptions, show your math. Include FBDs, MADs, Velocity Diagrams, etc., as needed. Cross out or erase mistakes.
  - **BOX final numerical answer**: Include units. Don’t have to box if “answer” is a graph or model/sketch.

**EXPECTATIONS**

- You are expected to check your email and D2L *daily*. I will communicate with you via your kennesaw.edu email account only.
- It is in your best interest to attend every class. Attendance records are required by the University (first 3 weeks) and excessive absences must be reported to the Office of the Registrar. Active class participation is also expected.
KENNESAW STATE UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING
COURSE SYLLABUS

ENGR 3125 – Machine Dynamics & Vibrations

- **Kennesaw State has an Honor Code** and a procedure relating to when academic misconduct is alleged. All students should be aware of this. Information about the Honor Code and the misconduct procedure may be found at [http://scai.kennesaw.edu/docs/KSU%20Codes%20of%20Conduct-2015.pdf](http://scai.kennesaw.edu/docs/KSU%20Codes%20of%20Conduct-2015.pdf)

- Questions regarding the grading of an exam, quiz, or assignment must be submitted *in writing* to the professor within **one week** from the date that the work was returned. Explain on post-it or cover sheet or on HW in different color pen where you think the grading error was made.

**RECOMMENDATIONS**

- Use a 3-ring binder for notes and homework. This will allow you to organize your lecture notes, homework, quizzes and handout materials. Sometimes I will handout supplemental notes – in 3-hole punch when possible.

- As in every class, take comprehensive notes. Everything that the professor writes down, you should write in your notes. You should additionally take notes on some things that the professor verbalizes but does not write down. *Writing notes helps you learn!*

- Read the assigned readings *before* class and keep up with the homework problems.

- Visit the course website for important announcements, documents, reading and homework assignments, and other helpful information.

**AMERICANS WITH DISABILITIES ACT COMPLIANCE**

Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the ATTIC counselor working with disabilities at 678-915-7316, located in the Basement of the Student Center, as soon as possible to better ensure that such accommodations are implemented in a timely fashion. Accommodations are best implemented at the beginning of the semester. I will work with you to provide reasonable accommodations to ensure that you have a fair opportunity to perform and participate in class.