

KENNESAW STATE UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING
COURSE SYLLABUS

ENGR 3125 – Machine Dynamics & Vibrations

Instructor: Dr. Simin Nasser, *Professor of Mechanical Engineering*
Office: Q-150
Email: snasser1@kennesaw.edu (best way to reach me)
Office Hours: Please see my website

Suggested Texts:

- Mechanical Vibrations by William J. Palm, 2007. ISBN: 9780471345558
- Dynamics and Vibrations, An introduction, by Magd Abdel Wahab, Wiley (2008) ISBN 978-0-470-72300-5.
- Engineering Mechanics, Dynamics, Hibbeler, any edition, and
- Design of Machinery, Robert L Norton, any edition.

Pre-Requisite: ENGR 3122, *Dynamics*, and ME 1311 MATLAB for Engineers with Application (or CSE 1301 *Programming*)

Grading policy:

20%	Homework, Computer Project(s), Discussions
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.

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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 (Partially taught)(a, e, l, m).
6. Synthesize linkages to generate prescribed motions (Omitted) (a, c, m).
7. Kinematic analysis of geartrains and cams (cams Omitted) (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 (Might get omitted)
- Homework assignments, Computer Project(s), Discussions (Might be included)

Topics Covered

1. Review kinematics and kinetics of particles.
2. Vibration for mass-spring system, natural frequency.
3. Rotational vibration (Systems involving pendulums).
4. Finding the stiffness of complicated systems and real life components.
5. Equation of motions for complicated vibratory systems.
6. Damping in 1-DOF systems.
7. Forced vibration (Applied force and also unbalanced rotation), and resonance.
8. Forced vibration (Base Excitation)
9. Fixed axis rotation kinematics and kinetics – wheels and gears.
10. Geartrain kinematics, gear ratio.
11. Kinematics of linkages – calculating instantaneous velocity – vector and scalar methods.
12. Definition of linkages, mechanisms and machines.
13. Mobility of links, and joints, and mechanisms.
14. 4-bar mechanisms and Grashof condition.
15. Velocity, and acceleration in linkages.

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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. There might be only tests from 5 chapters taught.

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.
- 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. 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 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

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misconduct procedure may be found at <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.

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ACADEMIC HONESTY:

The high quality of education at Kennesaw State University is reflected in the credits and degrees its students earn. **All assignments must be your own work and original for this course.** The protection of these high standards is crucial since the validity and equity of the University's grades and degrees depend upon it. Any student found to have violated any KSU academic honesty regulation after a hearing before a university hearing panel or before the Vice President for Student Success and Enrollment Services (or his/her designee) shall be suspended for at least one semester, unless the student persuades the deciding body that the circumstances of his or her behavior substantially mitigate the gravity of the violation. These regulations are designed to assist students in (1) developing appropriate attitudes about, and (2) understanding and following the university's standards relating to academic honesty. The regulations protect students by helping them avoid committing infractions that may compromise the completion of their KSU degrees or damage their reputations.

Student Conduct Pledge/Statement: As a member of the Kennesaw State University community of scholars, I understand that my actions are not only a reflection on myself, but also a reflection on the University and the larger body of scholars of which it is a part. Acting unethically, no matter how minor the offense, will be detrimental to my academic progress and self-image. It will also adversely affect all students, faculty, staff, the reputation of this University, and the value of the degrees it awards. Whether on campus or online, I understand that it is not only my personal responsibility, but also a duty to the entire KSU community that I act in a manner consistent with the highest level of academic integrity. Therefore, I promise that as a member of the Kennesaw State University community, I will not participate in any form of academic misconduct.

Types of Academic Misconduct:

1) **Cheating:** Receiving, attempting to receive, knowingly giving or attempting to give unauthorized assistance in the preparation of any work required to be submitted for credit (including examinations, laboratory reports, essays, themes, term papers, etc.) is considered cheating, as is engaging in any behavior that a professor prohibits as academic misconduct in the syllabus or class discussion. Unless specifically authorized, using and/or having access to electronic devices during an examination, quiz, test or other assessment is automatically considered cheating, regardless of the student's reason for using/accessing the device;

2) **Plagiarism:** Including direct quotations from other sources into work required to be submitted for credit without indicating them as such by quotation marks, block quotes or other appropriate formatting. Incorporating the work of someone (e.g. ideas, theories, data, figures, graphs, programs, electronic based information, illustrations, etc.) into a paper or project without due acknowledgement;

3) **Self-Plagiarism:** Submitting any work for credit which was not authored specifically and originally for the assignment in question without the prior permission of the professor receiving that assignment. Most commonly, this means submitting the same, or substantially the same, paper or other assignment for credit in more than one class;

4) **Misrepresentation and/or Falsification:** Knowingly providing false information in completing University forms or applications (including admissions forms, scholarship applications, time sheets, false or counterfeit transcripts, etc.) or in any work submitted for credit. This includes providing fabricated/altered documents to substantiate an excused absence (such as to meet attendance requirements or have the chance to make-up a missed exam). Signing in for another student or having another individual sign in on a student's behalf on an attendance sheet also constitutes a violation of this code section.

5) **Unauthorized Access to University Materials:** Taking, attempting to take, stealing or in any unauthorized manner otherwise procuring, gaining access to, altering or destroying any material pertaining to the conduct of a class (including tests, examinations, grade change forms, grade rolls, roll books, laboratory equipment, University

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grade records in written or computerized form, etc.).

6) **Malicious/Intentional Misuse of Computer Facilities/Services:** Maliciously or intentionally misusing university-controlled computer facilities and services. This includes violations of state and federal laws (e.g. copyright violations, unauthorized access to systems, alteration/damage/destruction, or attempted alteration/damage/destruction, use for profit, etc.) or a department's rules for computer usage (e.g. account violations, damage, or destruction of the system and/or its performance, unauthorized copying of electronic information, use of threatening or obscene language, etc.).

7) **Malicious Removal, Retention or Destruction of University Resource Materials:** Misplacing, taking, destroying any item or part of an item belonging to or in the protection of the University (or the attempt thereof) with the intention of bringing about an undue disadvantage in the academic pursuits of other Kennesaw State University students.

These examples of academic dishonesty shall not be construed to be comprehensive, and infractions will be dealt with on an individual basis according to university policies and procedures. It is the obligation of each student to assist in the enforcement of academic standards.

See: **The KSU Student Code of Conduct at KSU Codes of Conduct-2015.pdf**

Enforcement: This policy is strictly enforced. Please note, **I reserve the right to select any paper and/or assignment that are turned in for a grade for plagiarism review. Plagiarism review consists of running your paper/assignment through various search engines and databases at my disposal in order to check for “borrowed” or “bought” information. Students will be required to use TurnItIn.Com to have their papers reviewed for plagiarism.** If you are found in violation of academic dishonesty, then you will be subject to the enforcement policies and procedures, as outlined by the University and the Department.

Turnitin

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Terms and Conditions of Use posted on the Turnitin.com site.

WEB ACCESSIBILITY:

Kennesaw State University follows the guidelines of the Universal Design for Learning standard of web accessibility. Faculty use Word, PDF, and HTML formats when communicating electronic information to students whenever possible and appropriate in light of the goals of the course. Faculty are trained to use Web Accessibility Evaluation tools, e.g., WAVE (www.wave.webaim.org), and make adjustments as possible and appropriate in light of the goals of the course. For free resources available to students on web accessibility, please visit the Web Accessibility Resources page at the Distance Learning Center:

<http://www.kennesaw.edu/dlc/facultyresources/index.php#>

Kennesaw State University provides program **accessibility** and reasonable accommodations for persons defined as disabled under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) please contact the Office for Student Disability Services (SDS). Kennesaw Campus, 470-578-2666 or Marietta Campus, 678-915-7244. Please do not request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services (SDS).

Also check Accessibility Statements for Technologies:

<https://softchalkcloud.com/lesson/serve/jV10GKPfztZwQn/html>

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For additional information see:

<http://digitalcommons.kennesaw.edu/accessibility.html>
<http://commencement.kennesaw.edu/guests/accessibility.php>

KSU SEXUAL MISCONDUCT POLICY:

Kennesaw State University adheres to KSU's policy prohibiting sexual misconduct both in and out of the classroom. Questions about this policy should be directed to the KSU Equal Employment Opportunity (EEO) and Title IX officer by telephone at (470) 578-2614. You may also visit the University's EEO website <http://www.kennesaw.edu/eo/index.html> for more information.

COPYRIGHT LAW:

Kennesaw State University adheres to USG's policy to respect the right of copyright. Holders and comply with copyright laws as set forth in the United States Copyright act. For more information, see the following link to USG's policy: <http://www.usg.edu/copyright/>

STUDENT RECORDS/FERPA:

Kennesaw State University adheres to the Family Educational Rights & Privacy Act of 1974 – FERPA. See the following link for more information:

http://www.usg.edu/information technology handbook/section9/tech/9.5_privacy_and_security

Privacy Policies:

Desire 2 Learn - <https://www.d2l.com/legal/privacy/>
Blackboard Collaborate - <https://sas.illuminate.com/privacy.html>

ELECTRONIC RECORDING AND SOCIAL MEDIA:

Electronic recording performed without the consent of the people being recorded chills the free exchange of ideas. Academic freedom, free inquiry, and freedom of expression should not be limited by the fear that one's brainstorming, polemic discourse, speculative inquiry, or any other kind of expressed curiosity made within the space of a university classroom will be made public without one's consent. This fear is unacceptable regardless of whether one is in an online, hybrid, or face-to-face classroom setting. Accordingly, no person shall make public any electronically recorded class discussion without the written permission of the instructor. This policy is not intended to discourage electronic recording in the classroom or the use of social media when such actions are performed with the written consent of the instructor, and others as appropriate. Note: Faculty accommodate all reasonable requests to electronically record a class discussion; these requests must be documented by the Disabled Student Support Services available at: http://www.kennesaw.edu/stu_dev/dsss/prospect.shtml

DISRUPTION OF CAMPUS LIFE STATEMENT:

It is the purpose of the institution to provide a campus environment, which encourages academic accomplishment, personal growth, and a spirit of understanding and cooperation. An important part of maintaining such an environment is the commitment to protect the health and safety of every member of the campus community. Belligerent, abusive, profane, threatening and/or inappropriate behavior on the part of students is a violation of the Kennesaw State University Student Conduct Regulations. Students who are found guilty of such misconduct may be subject to immediate dismissal from the institution. In addition, these violations of state law may also be subject to criminal action beyond the university disciplinary process.

COURSE ENROLLMENT POLICY:

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Students are solely responsible for managing their enrollment status in a class; nonattendance does not constitute a withdrawal.

STUDENT SUPPORT RESOURCES

The following resources and policies are found under this link: <http://learnonline.kennesaw.edu/resources/index.php>

DISABLED STUDENT SUPPORT SERVICES

In compliance with applicable disability law, qualified students with a disability may be entitled to reasonable accommodation. Any student with a documented disability (hidden or visible) needing academic adjustments, including classroom or test accommodations is requested to notify the instructor within the first two weeks of the course. **Verification from KSU Disabled Student Support Services is required. All discussions and documentation will remain confidential.**

Disabled Student Support Services

James V. Carmichael Student Center Addition – 2nd Floor, Suite 267
470.578.6443

http://www.kennesaw.edu/stu_dev/dsss/prospect.shtml

Please visit the following Student Disabilities Services website for more information.

[//www.kennesaw.edu/stu_dev/sds](http://www.kennesaw.edu/stu_dev/sds)

Student Rights and Responsibilities

Students of Kennesaw State University are entitled to an environment that is conducive to learning and individual growth. To this end, students enrolling at Kennesaw State University assume a responsibility to abide by the policies and regulations expressed in this section. By doing so, students may fulfill their responsibilities and enjoy the exercise of their own rights while also respecting the rights of others.

All rights and responsibilities may be found in the University Catalog at

[//catalog.kennesaw.edu](http://catalog.kennesaw.edu)

Help Resources

Contacts to get Help

Student Help Desk studenthelpdesk@kennesaw.edu or call 470.578.3555

D2L FAQ's [click here](#)

D2L Student User's Guide [click here](#)

UITS Student Training Workshop Schedule [click here](#)

Additional Resources

Remote access to Library Resources: <http://library.kennesaw.edu/>

Student Support:

http://learnonline.kennesaw.edu/resources/student_support_resources.php

Tutoring and Academic Support: http://learnonline.kennesaw.edu/resources/tutoring_academic_support.php

Advising: <http://learnonline.kennesaw.edu/resources/advising.php>

Bookstore: <http://bookstore.kennesaw.edu/home.aspx>