Department of Systems Engineering
Donaghey College of Engineering and Information Technology

SYEN 3371 Engineering Dynamics

Instructor: Dr. Andrew Wright EIT 522

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Prerequisite: SYEN/CNMG 2370. Engineering Statics

Course Description: Kinematics and kinetics of particles, systems of particles, and rigid bodies; energy and momentum methods; mechanical vibrations and resonance; introduction to structural dynamics due to time-varying loads, such as wind and seismic loading. Three hours lecture. Three credit hours

Course Topics:

1. Kinematics
2. Dynamics of Single Rigid Bodies
3. Dynamics of Multiple Rigid Bodies
4. Moment of Inertia
5. Angular Momentum

Learning Outcomes:

When you complete this course with a grade of C or better, you should be able to:

Manipulate coordinate transformation matrices

Apply velocity and acceleration formulae for vectors in one rotating coordinate system

Apply Newton's second law to a rigid body

Apply Newton's third law to several rigid bodies

Manipulate rudimentary moments of inertia

Apply Euler Newton equations for planar systems

Texts, Readings, and Instructional Resources
Required Text: Bedford, Fowler, Engineering Mechanics: Dynamics, Fifth edition, Pearson Publishing, 2008.

Assignments, Evaluation Procedures, and Grading Policy

The course requirements consist of:

1. **Homework assignments (10 points):** Homework assignments will be given periodically to supplement the reading material and lectures.
2. **Written Problems (6-8) (50 points):** in-class written problems (mini-exams, roughly 15 minutes long) will be given throughout the semester (ideally every other week). The best 80% (rounded down) of these problems will be averaged to determine the percentage for this category. If 8 problems are given, then $0.8*8 = 6.4 \rightarrow 6$ problems will be averaged.
3. **Final Exam (40 points):** A closed book, closed notes final exam will be given on the university scheduled final exam date. Students may bring a calculator.

Grades (points gained/100 points)

$$A >= 90 > B >= 80 > C >= 70 >= 60 > F$$

Attendance will be taken periodically. If a student misses 15% of classes his/her final grade will be reduced by one letter grade (i.e., from A to B or B to C). Students who do not attend more than 50% of classes during the first eleven days of class may be administratively dropped from the course at the discretion of the instructor.

A student who misses more than 25% of classes will receive a final course grade of an F and may be administratively withdrawn at the discretion of the instructor.

Tardiness is disruptive, so please be respectful of your peers and instructor and get to class on time. If you are tardy, please come into the room quietly and sit in the nearest available seat to the door.

Cell phones can be disruptive. Please turn off your cell phone (i.e. airplane mode) before class. If you forget and receive a call in class, please immediately disable your ringer/buzzer and terminate the call. Do NOT answer the call and have a conversation as this may classified as disruptive behavior.

Disruptive Behavior may result in your being administratively dropped from the class, especially if it is persistent.

Sickness or Emergency is a legitimate excuse to make up a graded assignment (attendance or exam). The student should notify the instructor in advance or provide an independent written excuse (e.g., a doctor's note) after the fact.

Make up policy: There will be no make-up exams or assignments, except in the event of Sickness or Emergency.

Mid-Term Grades are not required by this course. Blackboard's grade book will be used to inform students of their grades throughout the semester.

Late assignments will not be accepted. Due date for all assignments will be at the end of the class period one week after the assignment was made.

Electronic delivery of assignments: Assignments will be uploaded into blackboard. Only in the event of a blackboard malfunction will assignments be accepted, either as hard-copy or as email. For hand-written homework, the student will be responsible for scanning or taking a picture of the assignment so as to upload.

Modifications to Syllabus may be made to improve delivery of the course content. The instructor will provide an updated syllabus at least one week prior to any changes taking effect and no modifications will be done within two weeks of the final exam.

Students with Disabilities: Per academic policy 501.2, the following statement must be included in all syllabi (see http://ualr.edu/policy/index.php/5012/)

> "Students with Disabilities: Your success in this class is important to me, and it is the policy and practice of the University of Arkansas at Little Rock to create inclusive learning environments consistent with federal and state law. If you have a documented disability (or need to have a disability documented), and need an accommodation, please contact me privately as soon as possible, so that we can discuss with the Disability Resource Center (DRC) how to meet your specific needs and the requirements of the course. The DRC offers resources and coordinates reasonable accommodations for students with disabilities. Reasonable accommodations are established through an interactive process among you, your instructor(s) and the DRC. Thus, if you have a disability, please contact me and/or the DRC, at 501-569-3143 (V/TTY) or 501-683-7629 (VP). For more information, please visit the DRC website."

This statement has <u>not</u> been prepared by the instructor of this course, but is an academic policy, so please excuse the colloquial wording (use of first and second person).