MEGR 3121 – Dynamics Systems I

Catalog Data: Dynamics Systems I. (3)

The kinematics and kinetics of rigid bodies. Work-energy and impulse-momentum principles and conservation laws. Introduction to the kinematics of mechanisms.

Textbooks(s):   J. L. Meriam and L. G. Kraige, Engineering Mechanics: Dynamics, 5th Ed., John Wiley & Sons, 1997.

Goals: The goal of this course is to introduce students to the mathematical modeling of systems. Students will focus on the dynamic behavior of idealized particle and rigid body models for mechanical components and systems.

Prerequisites: Prerequisites: ESGR 2141 and MATH 1242, both with a grade of C or better.

Topics: Particle kinematics

Relative motion and acceleration

Particle kinetics

Work-energy methods

Impulse-momentum methods, impact

Plane kinematics, instant center

Fixed axis rotation and general motion in the plane

Angular acceleration

Plane kinetics

Gear and pulley systems

Four-bar linkages

Outcomes/Objectives: *As the conclusion of this course, the students will be able to*

1. Model various mechanical systems for dynamic analysis
2. Identify appropriate solution techniques for systems with various constraints (constant acceleration, conservation of energy, conservation of momentum, etc.)
3. Apply work-energy methods to different system states
4. Apply impulse-momentum methods to systems of interacting components
5. Model dynamic systems in a manner suitable for computer solution

Computer Usage: Matlab can be used for solution of simultaneous equations.

Mechanical Advantage may be used for some modeling assignments.

Grading: 3 one-hour exams in-class, each worth 21% of the final grade. One three-hour final exam, worth 21% of the final grade, with homework making up the final 16%.

Follow-up courses: This course is a prerequisite for MEGR 3122 (Dynamics Systems II) and MEGR 3114 (Fluid Mechanics) and a co-requisite for MEGR 3111 (Thermo I).

Coordinator:

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