EM 202 - Engineering Mechanics: Dynamics

1998 Catalog Data:	**EM 202: Engineering Mechanics: Dynamics. 3(3,0)**. Continuation of EM 201. Principal topics are kinematics and kinetics of particles and rigid bodies of finite size. Techniques of vector mathematics are employed. *Preq*: EM 201, MTHSC 206.
Textbook:	R. C. Hibbeler, Engineering Mechanics, Dynamics, 8th Ed., Prentice Hall, 1998
Reference:	None
Coordinator:	S. B. Biggers, Professor of Mechanical Engineering and Engineering Mechanics

Objectives[1]:

1. To develop the fundamental equations that characterize the kinematics and Newtonian dynamics of a particle, systems of particles, and rigid bodies. [B]
2. To develop the students' abilities to model and analyze the dynamic behavior of a particle, systems of particles, and rigid bodies. [B]
3. To provide experience in the application of dynamic analysis to elementary problems in engineering practice. [B]

Prerequisites by Topic:

1. Statics: equilibrium of particles and rigid bodies. (EM 201)
2. Calculus: real-valued functions of several variables, multiple integration, differential calculus of functions of several variables, vector field theory. (MTHSC 206)

Topical Outline:

1. Introduction. (1 hour)
2. Kinematics of particles: Coordinate systems, relative and dependent motion. (6 hours)
3. Kinetics of particles: Newton's Second Law. (4 hours)
4. Kinetics of particles: Work and energy methods. (5 hours)
5. Kinetics of particles: Impulse and momentum methods. (5 hours)
6. Kinematics of rigid bodies: Absolute and relative motion. (6 hours)
7. Review of mass moment of inertia. (1 hour)
8. Planar kinetics of rigid bodies: Newton's Second Law. (6 hours)
9. Planar kinetics of rigid bodies: Work and energy methods. (3 hours)
10. Planar kinetics of rigid bodies: Impulse and momentum methods. (3 hours)
11. Tests. (3 hours)

Computer Usage:

None

[1] Letters in brackets refer to the ME Program Educational Objectives.

Evaluation Methods:

1. Homework = 10%
2. Design Projects = 0%
3. Tests = 60%
4. Final Exam = 30%
5. Laboratory Reports = 0%

Student Learning Outcomes[2]:

Course Objective 1

1. Students will demonstrate the ability to choose analysis methods that are appropriate to given situations, e.g. work-energy vs. impulse-momentum or force-acceleration approaches; cylindrical vs. rectangular or normal-tangential coordinates; particle vs. system or rigid body formulations. [1,3,4]

Course Objective 2

1. Students will properly formulate the equations governing the motion of particles and rigid bodies subject to given constraints and initial conditions. [1,3,4]

Course Objective 3

1. Students will solve the governing equations for the dynamic behavior of simple problems representative of those encountered in engineering practice. The dynamic behavior will include kinematics and kinetics of particles moving in 2-D and 3-D and rigid bodies experiencing 2-D motion. [1,3,4]

Engineering Topics:

Engineering Science: 3 credits
Engineering Design: 0 credits

Prepared by: S. B. Biggers Date: September 10, 1998

[2] Numbers in brackets refer to evaluation methods used to assess student performance.