MECH 236 - Engineering Mechanics: Dynamics **Spring 2017**

Text: 1. Hibbeler, R.C., Engineering Mechanics-Dynamics, 13th Edition, Prentice Hall, 2010, ISBN 978-0-13-291127-6 or 0-13-291127-2
2. NCEES, Fundamentals of Engineering Supplied-Reference Handbook, 8th Edition, (optional, or print pages free from: http://www.ncees.org/exams/study_materials/fe_handbook/)

Instructor: Prof. Yuan Ding, 235 Colton hall, 973-642-7046, ding@njit.edu

T A To be determined

Prerequisite: Mech 235 (or Mech 234 for EE, CoE, IE, ME majors). Provides an understanding of the mathematics of the motion of particles and rigid bodies, and of the relation of forces and motion of particles.

WEEK	TOPIC	ARTICLES
1	Kinematics of Particles	12.1 - 12.6
2	Kinematics of Particles	12.7 - 12.10
3	Force & Acceleration	13.1 - 13.3
4	Exam-1	Partial credit
5	Force & Acceleration	13.4 - 13.5
6	Energy & Work	14.1 - 14.6
7	Momentum, Impact	15.1 - 15.4
8	Exam-2	Partial credit
9	Kinematics of Rigid Bodies	16.1 - 16.4
10	Rigid body: relative velocity	16.5
11	Rigid body: Instant center	16.6
12	Exam-3	Partial credit
13	Rigid Bodies acceleration	16.7
14	Kinetics of a Rigid Body	17.1 - 17.5
15	Rigid body energy Vibrations	18.1 - 18.5, 22.1 - 22.2
16	Final exam	Multiple choice

TUTORIAL HELP:
Tutorial hours will be announced in class. Students with difficulties are encouraged to come during the tutorial hours.

GRADING:
The grade will be decided based on the following scheme:

Homework and Class Participation	20 % (Attendance will be taken during each class.)
3 Exams	60 % (20% each)
Final Exam	20%
Total	100%

The grade scheduling:

A	=	88 to 100	C	=	65 to 69
B+	=	82 to 87	D	=	60 to 64
B	=	76 to 81	F	=	59 or less
C+	=	70 to 75	W	=	Voluntary before deadline (school schedule)

Incomplete = given in rare instances where the student is unable to attend or otherwise do the work of the course due to illness, etc. The grade must be made up in the next semester by completing all of the missed work.

EXAMs:
Generally, calculator is need for all exams. No other electronic device, storage medium, or accessory of any kind, is allowed during any exam.

HOMEWORK:
Homework will be checked and returned the following week. To obtain full credit, you must submit the work on time and in the proper form. A minimum of 70% of the homework must be submitted to receive a passing grade in the course. Late homework will get reduced points.

The followings are required for homework. Failure to do so may result in deductions in the homework grade.

1. On the top of each page, PRINT your name (LAST, FIRST), class day and time (e.g. Tuesday 10am), problem number, date, and page number (1 of 7, 2 of 7, etc.).
2. The problems must be presented in numerical order as assigned. If more than one problem on the same page, a clear dividing line is required between problems. (Do not write one problem on two pages). Writings are to be neat, clear and legible.
3. Draw neat, clear free body diagrams as required. Use a straight edge if needed.
4. Box in the final answer accompanied by its units (and direction if needed).
5. Staple the problems in proper numerical order with a single staple at the upper left corner. Loose pages will not be accepted.

SPECIAL NOTES:

*The University Code on Academic Integrity (NJIT Honor Code) will be upheld in this course. Any violations will be brought to the immediate attention of the Dean of Students
*Students will be consulted on any substantial changes to the course syllabus.

Department of Civil and Environmental Engineering
MECH 236 - Dynamics

Description:

Students study the mathematics of the motion of particles and rigid bodies, and the relation of forces and motion of particles.

Prerequisites: Mech 234 or Mech 235

Textbook(s)/Materials Required:

Hibbbeler, R.C., Engineering Mechanics-Dyanamics, 11th Edition, Prentice Hall

Course Objectives:

1. To provide transition from Physics (science) to Dynamics (engineering).
2. To develop an understanding of the basic concepts of kinematics and kinetics of particles and rigid bodies in engineering dynamics.
3. To master the fundamental principles and how to formulate and structure problem solving techniques which is fundamental to solution of all engineering problems.

Topics:

Kinematics of a Particle: Rectilinear Motion and Curvilinear Motion
Kinematics of a Particle: Erratic Motion and Dependent Motion
Kinetics of a Particle: Newton's Equation
Kinetics of a Particle: Work and Energy
Kinetics of a Particle: Impulse and Momentum
Mass Moments of Inertia
Planar Kinematics of a Rigid Body: Relative Motion Analysis of Velocity and Acceleration
Planar Kinetics of a Rigid Body: Translation and Fixed Axis Rotation
Planar Kinetics of a Rigid Body: General Plane Motion

Schedule: Lecture/Recitation- 2 hour class, once per week
Laboratory- none

Professional Component: Engineering Topics

Program Objectives Addressed: 1

Prepared By: Prof. Hsieh **Date:** 9/25/06

Course Objectives Matrix – MECH 236 Dynamics

Strategies and Actions	**Student Learning Outcomes**	**Outcomes (a-k)**	**Prog. Object.**	**Assessment Methods/Metrics**
Course Objective 1: Provide transition from Physics (science) to Dynamics (engineering).				
Present engineering approach and problem solving techniques.	Learn problem solving techniques while building on engineering and science.	a, e	1	Homework, tests and success in future courses.
Course Objective 2: Provide basic concepts of kinematics and kinetics of particles and rigid bodies in engineering dynamics.				
Discuss the underlying concepts, principles and procedures of dynamics of particles and rigid bodies.	Learn to solve problems concerned with the dynamics of particles and rigid bodies.	a, e	1	Homework, tests and success in future courses.
Course Objective 3: Master the fundamental principles and how to formulate and structure problem solving techniques which is fundamental to the solution of all engineering problems.				
Require FBDs for all problems.	Learn the technique of translating a problem statement into FBDs by repetition of many problems.	a, e	1	Homework, tests and success in future courses.
Illustrate the problem solving process including FBD, equation formulation and mathematical solution.	Learn the techniques of problem solving based upon the use of FBDs.	a, e	1	Homework, tests and success in future courses.

CEE Mission, Program Objectives and Program Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program objectives are reflected in the achievements of our recent alumni.

1 – Engineering Practice: Recent alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, civic organizations, and

humanitarian endeavors.

Our program outcomes are what students are expected to know and be able to do by the time of their graduation:

(a) ability to apply knowledge of math, science, and engineering
(b) ability to design and conduct experiments, as well as interpret data
(c) ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) ability to use techniques, skills and modern engineering tools necessary for engineering practice

Revised 8/28/13