**ENG-262 DYNAMICS SPRING 2014**

**Textbook**: *Engineering Mechanics - Dynamics*, Thirteenth Edition, R. C. Hibbeler,

 Prentice Hall, 2013

**Reference**: *Vector Materials for Engineers - Dynamics*, Ninth Edition, Ferdinand P. Beer,

 E. Russell Johnson, Jr., Phillip J. Cornwell, McGraw-Hill Comp., 2010

**Instructor**: Shou Rei Chang, Ph.D.

**Educational Objectives:**

(What TCNJ engineers should be able to accomplish during the first few years after graduation )The School of Engineering at The College of New Jersey seeks to prepare its graduates:

* To contribute to the economic development of New Jersey and the nation through the ethical practice of engineering;
* To become successful in their chosen career path, whether it is in the practice of engineering, in advanced studies in engineering or science, or in other complementary disciplines;
* To assume leadership roles in industry or public service through engineering ability, communication skills, teamwork, understanding of contemporary global and socio-economic issues, and use of modern engineering tools;
* To maintain career skills through life-long learning and be on the way towards achieving professional licensure.

**Mechanical Engineering Program Outcomes**

*(What TCNJ Mechanical Engineering students are expected to know and be able to do at graduation. What knowledge, abilities, tools and skills the program gives the graduates to enable them to accomplish the Educational Objectives)*

The Program Outcomes listed below are expected of all graduates of the Mechanical Engineering Program.

**ME graduates will have:**

1. an ability to apply knowledge of mathematics, science and engineering;
2. an ability to design and conduct experiments, as well as to analyze and interpret data;
3. an 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;
4. an ability to function in multidisciplinary teams;
5. an ability to identify, formulate and solve engineering problems;
6. an understanding of professional and ethical responsibility;
7. an ability to communicate effectively;
8. the broad education necessary to understand the impact of engineering solutions in a global and societal context;
9. a recognition of the need for, and an ability to engage in life-long learning;
10. a knowledge of contemporary issues;
11. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice;
12. an ability to apply advanced mathematics through multivariate calculus and differential equations;
13. familiarity with statistics, linear algebra, and numerical methods;
14. a knowledge of chemistry and calculus-based physics with depth in at least one of them;
15. an ability to work professionally on both thermal and mechanical systems areas including the design and realization of such systems.

**Week** ***Section*** **Topics**

1 12.1-12.3 Kinematics of Particles - Rectilinear Kinematics

2 12.4-12.10 Curvilinear Motion of Particles:

 Normal and Tangential Components,

 Cylindrical Components

3 13.1-13.4 Kinetics of Particles -

 Newton’s Second Law of Motion,

 Equations of Motion

4 13.5-13.6 Equations of Motion in Terms of Normal and Tangential Coordinates,

 Cylindrical Coordinates

5 14.1-14.6 Kinetics of Particles -

 Principle of Work and Energy,

 Power and Efficiency

 **Examination I**

6 15.1-15.4 Kinetics of s Particle:

 Principle of Linear Impulse and Momentum,

 Conservation of Linear Momentum for a

 System of Particles, Impact

7 15.5-15.7 Angular Momentum, Principle of

 Angular Impulse and Momentum

8 16.1-16.6 Planar Kinematics of a Rigid Body -

 Translation, Rotation about a Fixed Axis,

 Instantaneous Center of Zero Velocity

9 16.7-16.8 Relative-Motion Analysis: -

 Acceleration, using Rotating Axes

10 17.1-17.3 Planar Kinetics of a Rigid Body: Force and

 Acceleration – Moment of Inertia,

 Equations of Motion: Translation

 **Examination II**

11 17.4-17.5 Equation of Motion:

Rotation about a Fixed Axis,

And General Plane Motion

12 18.1-18.3 Planar Kinetics of a Rigid Body:

 Work and Energy – Kinetic Energy,

 The Work of a Force, and the Work of a Couple

13 18.4-18.5 Principle of Work and Energy,

 Conservation of Energy

14 19.1-19.3 Planar Kinetics of a Rigid Body:

 Impulse and Momentum - Linear and Angular Momentum, Principle of Impulse and Momentum,

 Conservation of Momentum

15 22.1-22.3 Mechanical Vibrations

**Final Examination**

**SCHEDULE**

1. Discussion Lecture:
2. ENG-262-01 Tuesday/Friday 8:30 AM – 9:50 AM
3. ENG-262-02 Tuesday/Friday 10:00 AM – 11:20 AM
4. Fourth hour:

i.      Fourth hour educational activities for which the meeting is required for both students and instructor:  "The fourth 'design hour' for this class meets weekly.  In this class, students are engaged in one or more intensive design experiences that require the extended mentoring and contact time with the faculty"

ii.      Fourth hour educational activities for which the meeting is not required:  "This class contains one (or specified number) intensive design or analytical experiences or other appropriate activity that require each student to significantly increase out-of-class learning."

**GRADING POLICY**:

 Homeworks 10%

 Quizs 20%

 Examinations 40%

 Final Examination 30%

 **Total**: 100%

**OFFICE HOURS:**

 **Tuesday:** 2:00 AM – 3:00 PM

 **Tuesday/Friday:** 11:30 AM – 12:20 PM

 *Other hours by appointment*