

311 Syllabus—Spring 1994

Topics Covered:

I. Newtons laws of Motion in one dimension.

Solving simple differential equations for different forces, including velocity, position and time dependent forces.

Simple hamonic oscillator, Damped hamonic oscillator, Driven harmonic oscillator and resonances.

II. Energy conservation

Defininition of potential energy and relationship to force. Small Oscillations about stable points.

Three dimensional motion, vectors, and vector products.

Lagranges equations for obtaining equations of motion in generalized coordinates. Examples.

III. Momentum conservation.

Rocket motion with mass transfer.

Two body collisions, Center-of-mass and Laboratory systems elastic, and inelastic collisions.

Scattering Cross Sections.

IV. Angular Momentum Conservations.

Central Forces, Planetary Motion, Kepler's Laws, satellite orbits, Rutherford scattering (Coulomb Force).

V. Particle Systems and Rigid Bodies.

Center-of-Mass and two particle systems, Rotational motion, Rigid body equilibrium and motion, Gyroscope Effect, Moments and Products of Inertia, Impulse and Billiard collisions.

VI. Accelerated Coordinate Systems.

Transformations to Moving Coordinate systems, Fictitious Forces, Fictitious forces associated with the movement of the earth, Prinicpal Axes and Eulers equations, Dynamics of tops.

VII. Gravitation.

Attraction of spherical body, potentials and forces inside and outside of extended bodies. Tidal forces.

Text: "Classical Mechanics", Barger and Olsson (McGraw-Hill)

3/1/00

Course Format

Three lectures per week and one discussion session per week

Two one-hour exams during class time and Final exam during the exam period

About 11 problem sets which are graded.

Grade determination:

25% First exam

25% Second exam

35% Final exam

15% problem set performance