Physics 310 (Mechanics) Spring 2008 Lewis Hall 109 MWF 1-1:50 Text: Analytical Mechanics, Fowles & Cassidy, 7th edition 915-7032 Instructor: Dr. Don Summers Lewis Hall Rm 221 Office Hours: TTh 2-3 Read Before Date Subject Class 16 Jan Vectors: Dot, Cross, and Triple Products. Rotations Chap 1 18 Jan Vectors: Derivatives. Cylindrical & Spherical Coordinates Chap 1 23 Jan Newtonian Mechanics and Rectilinear Motion Chap 2 Chap 2 25 Jan Kinetic and Potential Energy Chap 2 28 Jan Terminal Velocity 30 Jan Oscillations Chap 3 1 Feb Damped Harmonic Oscillations Chap 3 4 Feb Driven Harmonic Oscillations Chap 3 6 Feb FIRST HOUR EXAM 8 Feb 3D Motion, Del Operator Chap 4 11 Feb Air Resistance, Range, 3D Harmonic Oscillator Chap 4 13 Feb Charged Particle Motion in Electric and Magnetic Fields Chap 4 15 Feb Constrained Motion of a Particle Chap 4 18 Feb Noninertial Reference Frames Chap 5 20 Feb Rotating Reference Frames Chap 5 22 Feb Earth's Rotation Chap 5 25 Feb Foucault Pendulum Chap 5 27 Feb Gravity, Central Forces, and Spheres Chap 6 29 Feb Kepler's 3 Laws of Planetary Motion Chap 6 3 Mar Deriving Kepler's Third Law Chap 6 5 Mar Gravitational Potential Energy Chap 6 Radial Oscillations, Mercury Precession 7 Mar Chap 6 17 Mar Alpha Particles Chap 6 19 Mar SECOND HOUR EXAM Chap 7 24 Mar Dynamics of Systems of Particles, Angular Momentum, KE 26 Mar Reduced Mass. $2 \rightarrow 1$ Chap 7 Lagrange Points and Trojan Asteroids Chap 7 28 Mar 31 Mar Collisions. Lab and Center of Mass Frames, Rockets Chap 7 2 Apr Rigid Bodies and Moment of Inertia Chap 8 4 Apr Perpendicular and Parallel Axis Theorems Chap 8 7 Apr Pendulums and Elliptic Integrals Chap 8 9 Apr Rollings Balls and Baseball Bats Chap 8 11 Apr Motion of Rigid Bodies in 3D Chap 9 14 Apr Euler Equations and Angles Chap 9 16 Apr Precession and Nutation of the Earth, Bicycles Chap 9 18 Apr Lagrangian Mechanics. Hamilton's Variational Principle Chap 10 21 Apr Generalized Coordinates. Kinetic and Potential Energies Chap 10 23 Apr Harmonic Oscillator, Central Force, Atwood Machine Chap 10 25 Apr Euler's Eqns, Generalized Momenta, Ignorable Coordinates Chap 10 28 Apr Lagrange Multipliers, Generalized Forces, Hamiltonians Chap 10 30 AprDynamics of Oscillating Systems, Stable EquilibriumChap 112 MayWave EquationChap 115 MayCOMPREHENSIVE FINAL EXAM, 4:00pm, Monday, not earlier!Chap 11

Grading: Homework 25% Midterms 35% Final 40%

Reasonable accomodations will be provided.

Learning Objectives: To learn how about the linear motion of single particles and rigid bodies and rotating bodies. Systems will include harmonic oscillators and central forces. Methods will include those of Newton, Lagrange, and Hamilton.