Analytical Mechanics (PHY3414) – Course Objectives
Created by Dr. Scott Schneider – Revised 01/24/05

- Convert the position, velocity, acceleration vector equations between different coordinate systems

- Investigate motion on an accelerating turntable using the equations of motion

- Calculate position and velocity equations for forces that vary with respect to height (gravity)

- Calculate position equations for models with "friction-type" forces related to distance or powers of velocity

- Calculate the position and velocity equations for damped, and forced motion of a mass on a spring

- Investigate the effects of air resistance on a projectile in a 3D space on Earth

- Investigate the harmonic oscillator in 2 and 3 dimensions – calculate equations of motion from initial starting conditions

- Calculate the deflection of a projectile fired from the surface of the rotating Earth (Coreolis effects, etc.) – Investigate firing from surface of a rotating cylinder

- Apply Kepler's laws and Newton's Gravitation to the study of objects in orbit (transfer orbits, stability of orbits)

- Investigate conservation of linear and angular momentum in collisions

- Apply Lagrangian mechanics principles to various models: harmonic oscillator, double Atwood's machines, mass on movable wedge

- Calculate equations of motion, using Lagrangians, for oscillating systems: double pendulums, two masses on three springs

- Calculate Fourier coefficients for non-sinusoidal driving forces