**PHYS 141 – Introductory Mechanics**

**Designation:** Required

**2009-10 catalog description:** A first course in Newtonian mechanics; introduces freshman-level students to the statics and dynamics of point particles, rigid bodies, and fluids. 4 credits.

**Prerequisite(s):** MATH 124 or MATH 125; Concurrent registration, MATH 129. Credit will be allowed for only one of the following sequences of courses; PHYS 102-103-181-182, 131-132-181-182, 141-142:241-242, 151-152-251-252.

**Textbook(s) and/or other materials:**
- Sears and Zemansky’s University Physics, 12th Edition (Vol. 1) by H. D. Young & R. A. Freedman (Pearson Addison-Wesley)
- Physics 141 Lab Manual (available at ASUA Bookstore)

**Course learning outcomes:** A calculus-based introduction to simple motions, mechanical Energy and fluids.

**Topics covered:**
- Dimensional analysis: one dimensional motion and acceleration
- Vectors; two-dimensional motion; projectile motion
- Circular motion (kinematics); moving reference frames.
- Newton’s Laws and applications.
- Circular motion (dynamics)
- Work; kinetic energy; potential energy
- Conservation of momentum
- One and two dimensional collisions: center of mass
- Motion of a system of particles.
- Angular velocity and acceleration.
- Moments of inertia; torque; rotational energy and rolling motion.
- Angular momentum; conservation of angular momentum.
- Statics
- Simple harmonic oscillator; pendulums.
- Damped and forced oscillators.
- Newton’s Law of Gravity
- Kepler’s Law
- Gravitational energy.
- Fluid statics; fluid dynamics.
- Traveling waves; standing waves; sound.

**Class/laboratory schedule:** Three 50-minute classes and one 2-hour 50-minute lab session per week.

**Contribution to criterion 5 (curriculum):**
- Math and basic science: 4 units
- Engineering topics: 0
- General education: 0
- Other: 0

**Relationship to program outcomes:** Department Inputs Data