COURSE NUMBER: Vp160	**COURSE TITLE:** Honors Physics I
CREDIT: 4	**PREREQUISITES:** 3 years high school math, strong background in high school Physics
TEXTBOOKS/REQUIRED MATERIAL: Hugh D. Young, Roger A. Freedman, *University Physics* (13th edition)	**INSTRUCTOR:** Mateusz Krzyzosiak **DATE OF PREPARATION:** Sep 27, 2012 **DATE OF UC APPROVAL:** Oct. 30, 2013
INSTRUCTOR(S):	**SCIENCE/DESIGN:** n/a
CATALOG DESCRIPTION: A rigorous introduction to particle mechanics and the motion of extended objects. Particular topics include vectors, one and two dimensional motion, conservation laws, linear and rotational dynamics, gravitation, fluid mechanics and thermodynamics.	**COURSE TOPICS:** • nature of physics, physical quantities, scalars and vectors (2 hrs) • kinematics: motion in one dimension (2 hrs) • kinematics: motion in two and three dimensions (3 hrs) • Newton's laws of motion and their applications (6 hrs) • non-inertial frames of reference (3 hrs) • periodic motion (5 hrs) • work and kinetic energy (2 hrs) • potential energy and conservation of mechanical energy (5 hrs) • elements of Lagrangian mechanics (3 hrs) • momentum, impulse, and collisions (3 hrs) • angular momentum, rigid body dynamics, tensor of inertia (8 hrs) • equilibrium and elasticity (3 hrs) • elements of fluid mechanics (4 hrs) • gravitation (5 hrs) • mechanical waves and sound (6 hrs)
COURSE STRUCTURE/SCHEDULE: lecture (twice per week, 90 minutes each)	

COURSE OBJECTIVES [Course Outcomes in brackets]	• To provide knowledge of principles governing the physical universe, and develop an understanding of the scientific method and its application to the advancement of knowledge [1-10]. • To develop conceptual and mathematical understanding of physics principles in modeling of real-world problems [1-10]. • To develop effective problem-solving skills, with emphasis on modeling, estimation, alternative representations, and critical analysis of results [1-10]. • To provide and a more in-depth understanding of physics in an interdisciplinary context and develop appreciation for physics as a discipline [4, 10].
COURSE OUTCOMES [Program Outcomes in brackets]	After completing this course, students should be able to: 1. use the scientific method to analyze real-world problems [a, e, g, h, i, k]. 2. identify and describe forces and torques acting on objects (particles and rigid bodies) which cause changes in their motion, quantify the description in terms of kinematic and dynamic physical quantities and differential equations [a, e, k]. 3. discuss periodic motion (simple harmonic, damped, and forced) and understand its importance in various areas of science and engineering [a, e, g, k]. 4. have an understanding of the origin and role of conservation principles in classical mechanics and be able to apply them to discuss and solve problems [a, e, g, k]. 5. understand the notion of work, kinetic energy and potential energy and use them to analyze physical phenomena [a, e, g, k]. 6. have a general understanding of concepts of stress, strain, elasticity and their importance in description of objects beyond the particle and rigid-body models [a, e, k]. 7. discuss fundamental properties of fluids both at rest and in motion [a, e, h, k]. 8. describe motion of objects in the universe using laws of gravitation [a, e, h, k]. 9. describe wave motion and relate it to basic phenomena in sound propagation [a, e, h, k]. 10. incorporate the use of computer-based technology (CAS, graphing software) in problem-solving and results presentation [a, e, g, h, i, k].
ASSESSMENT TOOLS [Course Outcomes in brackets]	paper homework [1-10] on-line homework [2-9] midterm and final exams [1-9]