COURSE SYLLABUS

Tunxis Community College

Education That Works For a Lifetime

Course Title:	Calculus-Based Physics I	**Date submitted:**	May 2019 (AAC:19-25)
Department:	Mathematics and Science		
Curriculum:	Physics		

Course Descriptors: Make certain that the course descriptors are consistent with college and Board of Trustees policies, and the current course numbering system.

Course Code: (eg. ACC 101)	PHY*221
Course Type:	X

A: Clinical B: Lab D: Distance Learning
I: Individual/Independent L: Lecture N: M: Seminar Internship
P: Practicum U: Studio
X: Combined Lecture/Lab Y: Combined Lecture/ Clinical/Lab Z: Combined Lecture/Studio

Elective Type:	G/LAS/S

AH: Art History E: English FA: Fine Arts FL: Foreign Language
G: General HI: History HU: Humanities LAS: Liberal Arts & Sciences M: Math S: Science SS: Social Science

Credit Hours:	4
Developmental: (yes/no)	No
Contact Hours: Lecture:	3
Clinical:	0
Lab:	3
Studio	0
Other:	0
TOTAL:	6
Class Maximum:	20
Semesters Offered:	F

Prerequisites:

C- or better in Calculus I (MAT*254) or permission of Department Chair

Corequisites:

None

Other Requirements:

Scientific calculator, technology skills

Catalog Course Description:

Introductory physics course intended for science and engineering majors covering measurement, Newton's Laws of Motion, gravity, work and energy, momentum, rotational motion, static equilibria, fluids, oscillations, conservation laws, waves, sound, temperature, heat transfer and thermodynamics. Lecture and laboratory. This course is the first of a two-semester sequence.

Topical Outline: List course content in outline format.

Lectures:

1. Science and scientific method
2. Measurement, units, accuracy and significant figures
3. Motion, Galileo, Newton and the Laws of Motion
4. Force, energy, work, momentum and conservation laws
5. Statics and equilibria
6. Fluids: pressure and density, static and flow
7. Thermodynamics, heat and temperature, laws and thermodynamic cycles
8. Wave propagation and sound

Laboratory:

	1. Experimental uncertainty and data analysis 2. Measurement instruments 3. Uniformly accelerated motion 4. Addition and resolution of vectors 5. Conservation of momentum 6. Projectile motion 7. Work and energy 8. Centripetal force 9. Friction 10. Torque, center of gravity 11. Simple harmonic motion 12. Buoyancy and density 13. Elasticity; Young's Modulus 14. Thermal coefficient of linear expansion 15. Speed of sound
Outcomes: Describe measurable skills or knowledge that students should be able to demonstrate as evidence that they have mastered the course content.	Upon successful completion of the course, the student will be able to do the following: 1. resolve a system of forces as they relate to the dynamics of motion 2. given a system of forces applied to an object, solve problems pertaining to displacement, velocity and acceleration of the motion of the object 3. describe Newton's Laws of Motion and apply them in the analyses of problems involving uniformly accelerated motion 4. apply the principles of motion and conduct controlled experiments involving motion along a straight line, motion in a plane, circular motion and simple harmonic motion 5. given the system of forces applied to an object, calculate the work performed and relate this to the energy of the system 6. distinguish between the major types of energy, i.e., potential and kinetic, and relate to the various forms in which energy may manifest itself 7. solve problems on controlled experiments involving conservation of energy, work and momentum 8. apply Pascal's Law and Archimedes' Principle to the solution of problems involving pressure and density of fluids at rest 9. apply Bernoulli's Law to the solution of problems involving fluid flow 10. explain the concepts of temperature and heat as they relate to the mean-molecular kinetic energy and the total-molecular kinetic energy of a substance 11. solve problems dealing with phase changes, heat transfer and expansion properties of common substances 12. explain the conservation of energy in terms of the First Law of Thermodynamics, and conditions and restrictions imposed by the Second Law of Thermodynamics 13. calculate the efficiency of thermodynamic heat engines in terms of heat input and work output, and determine the thermodynamic properties of thermodynamic cycles
	PROGRAM: *(Numbering reflects Program Outcomes as they appear in the college catalog)* N/A
	COMPETENCY FULFILLED: Scientific Knowledge & Understanding (SCKX) OR Scientific Reasoning (SCRX)
Evaluation: List how the above outcomes will be assessed.	**Assessment will be based on the following criteria:** Quizzes Examinations Laboratory reports

Instructional Resources: List library (e.g. books, journals, on-line resources), technological (e.g. Smartboard, software), and other resources (e.g. equipment, supplies, facilities) required and desired to teach this course.	**Required:** Scientific calculator, physics laboratory **Desired:** Physics software
Textbook(s)	Giancoli, *Physics for Scientists and Engineers* 4th ed.; Pearson Education Wilson, *Physics Laboratory Experiments*, 6th ed.; Houghton Mifflin