COWLEY COLLEGE

COLLEGE

COURSE PROCEDURE FOR

GENERAL PHYSICS I **PHS 4550   5 Credit Hours**

Student Level:
This course is open to students on the college level in the freshman year.

Catalog Description:
PHS4550 - GENERAL PHYSICS I (N) (5 hrs)
[KRSN PHY1010/1011/1012]
Topics include mechanics—linear motion, rotational motion, force, work, energy, momentum, and conservation principles; heat-temperature, ideal gas, heat as a form of energy, first law of thermodynamics, second law of thermodynamics, and entropy; wave motion-simple harmonic motion, elasticity, and the wave equation. This class is designed for students needing five hours of physics without calculus.

Prerequisite:
MTH4425College Trigonometry

Course Objectives:
To provide a study of the mechanical and thermodynamic universe by theoretical derivation and practical applications in problem solving, laboratory study, and demonstration

Learner Outcomes:
Students completing this course with an A or B should have sufficient background for pre-professional studies or a liberal arts study requiring 5 credit hours of general physics.

Core Outcomes:
The learning outcomes and competencies detailed in this course procedure meet, or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Project for this course, as sanctioned by the Kansas Board of Regents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:
The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

    Evaluation Key:

    A   =   All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.

B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.

C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.

D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.

F = Failing, will be computed in GPA and hours attempted.

N = No instruction or training in this area.

PART 1, SECTION A: MECHANICS - INTRODUCTION
Outcomes: Solve measurement problems by unit dimensional analysis and obtain numerical solutions with the correct number of significant digits.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Recognize, manipulate, and convert units of measure
						Determine the correct number of significant digits in a solution.
						Use dimensional analysis to predict a correct formulation for a solution.

PART 1, SECTION B: MECHANICS - MOTION IN ONE DIMENSION
Outcomes: To recognize manipulate, and solve applications in linear motion with constant acceleration both numerically and graphically.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Derive fundamental relationships for displacement, velocity, and acceleration.
						Solve applications involving displacement.
						Determine the average velocity of a particle.
						Graphically interpret the average velocity of particles.
						Determine the instantaneous velocity of a particle.

PART 1, SECTION B: MECHANICS - MOTION IN ONE DIMENSION

Outcomes: To recognize manipulate, and solve applications in linear motion with constant acceleration both numerically and graphically.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Graphically interpret the instantaneous velocity of particles.
						Find the acceleration of a particle.
						Analyze particles in one dimensional motion with constant acceleration.
						Determine the behavior of freely falling bodies.

PART 1, SECTION C: MECHANICS - VECTORS AND TWO DIMENSIONAL MOTION

Outcomes: Upon completion of this chapter the student will be able to describe and analyze two dimensional motion with vector algebra.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Add, subtract, multiply, and divide vectors in two dimensions.
						Represent velocity and acceleration of a particle as vector components and resultants.
						Decompose vector resultants into components.
						Describe projectile motion as a function of time, distance; velocity vectors, graphs.
						Derive fundamental equations of two dimensional motion from linear kinematic expressions.
						Solve application problems involving two dimensional motion.

PART 1, SECTION D: MECHANICS - LAWS OF MOTION
Outcomes: Upon completion of this chapter, the student will be able to describe, analyze and solve application of force on a particle and the resulting motion.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Rationalize the behavior of physical systems with Newton's first law.
						Understand the concept of mass and inertia, and apply these concepts to correct formulations of physical systems.
						Rationalize the behavior of physical systems based upon Newton's third law and solve applications and correct formulations with this concept.
						Rationalize the behavior of, and solve correct formulations and applications of mechanical systems with the concept of frictional forces, and the coefficients of static and kinetic friction.

PART 1, SECTION E: MECHANICS - WORK AND ENERGY
Outcomes: Upon completion of the unit, the student will be able to relate mechanical motion and Newton's laws to work with energy concepts.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Comprehend and correctly formulate functions relating work to mechanical motion to solve applications of physical systems.
						Comprehend and correctly formulate functions relating kinetic energy to mechanical motion and to solve applications of the mechanical systems.
						Comprehend and correctly formulate functions relating potential to mechanical motion to solve applications of physical systems.
						Rationalize the behavior of mechanical systems and energy of the systems by the Law of Conservation of Mechanical Energy.
						Correctly formulate and solve applications of conservative and non-conservative forces in mechanical systems.
						Understand, correctly formulate, and solve applications for harmonic motion with Hook's Law.
						Rationalize, correctly formulate, and solve applications by the Work-Energy theorem.
						Comprehend, correctly formulate, and solve applications with the power concept.
						Solve applications of mechanical systems where work is done by a varying force.

PART 1, SECTION F: MECHANICS - MOMENTUM and COLLISIONS
Outcomes: Upon completion of this chapter, the student will be able to comprehend and rationalize the relationship of momentum of a particle and it's motion, and relate momentum to the conservation of energy.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Comprehend and correctly formulate functions relating momentum to mechanical motion to solve applications of physical systems in motion.
						Comprehend and correctly formulate functions relating impulse to a particle and to solve applications of physical systems.
						Rationalize impulse and momentum of a particle by the Law of Conservation of Momentum, and solve applications of physical systems.
						Comprehend and correctly apply the concepts involved in collisions to physical systems.
						Comprehend and correctly formulate functions relating center of gravity and center of mass to mechanical motion to solve applications of physical systems.

PART 1, SECTION G: MECHANICS - GRAVITATION AND CIRCULAR MOTION
Outcomes: The student will acquire knowledge and understanding of gravitation and circular motion.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Understand and solve applications of angular motion.
						Utilize the centripetal force concept in applications.
						Utilize Newton's law of gravitation in applications.
						Solve planetary motion problems utilizing Kepler's planetary laws.

PART 1, SECTION H: MECHANICS - ROTATIONAL DYNAMICS AND EQUILIBRIUM

Outcomes: The student will acquire knowledge and understanding of rotational dynamics and equilibrium.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Solve applications involving torque and equilibrium.
						Determine the center of gravity of objects and systems of objects.
						Employ concepts of torque, angular acceleration and momentum, and rotational kinetic energy to applications.

PART 1, SECTION I: MECHANICS - SOLIDS AND FLUIDS

Outcomes: The student will acquire knowledge and understanding of solids and fluids.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Identify the states of matter.
						Solve applications of density and pressure of liquids and gases.
						Apply Archimedes principle to buoyancy problems.
						Solve applications involving surface tension, capillarity and viscosity.

PART 2 SECTION A: TEMPERATURE, HEAT, AND THE EQUATION OF STATE

Outcomes: Students will acquire knowledge and understanding of temperature, heat and state equations.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Employ the concept of temperature for measurements.
						Evaluate solids for thermal expansion.
						Employ the concept of heat and heat transfer mechanisms in solving applications
						Employ the concept of heat capacity and latent heat in energy transformations.
						Evaluate perfect gas properties with equations of state.

PART 2, SECTION B: THERMODYNAMICS						
Outcomes: The student will acquire knowledge and understanding of thermodynamics.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Evaluate systems in terms of heat and internal energy.
						Solve applications of heat--work systems.
						Utilize the Fist Law of Thermodynamics in applications.
						Solve applications of heat engines and the Second Law.
						Evaluate systems in terms of entropy.

PART 2, SECTION C: VIBRATIONS AND WAVE						
Outcomes: The student will acquire knowledge and understanding of vibrations and wave motion.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Solve applications of Hook's Law.
						Evaluate materials for elastic potential energy.
						Simple harmonic and uniform circular motion solutions.
						Evaluate the motion of a pendulum.
						Evaluate applications of frequency, amplitude and wavelength.

Projects Required:
None

Text Book:
Contact the Bookstore for current textbook.

References:
CRC Handbook of Chemistry & Physics

Materials/Equip:
A scientific calculator is required; a graphing calculator is recommended. Access to a computer would be helpful.

Attendance Policy:
Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Course Grade:
The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:
Based on classroom occupancy

Course Timeframe:
The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

402.00 Academic Code of Conduct
263.00 Student Appeal of Course Grades
403.00 Student Code of Conduct

Disability Services Program:
Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.