COWLEY COLLEGE
& Area Vocational Technical School

COURSE PROCEDURE FOR

ENGINEERING PHYSICS I
PHS 4560 5 Credit Hours

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

Catalog Description:
PHS4560 - ENGINEERING PHYSICS I (N) (5 hrs)
KRSN PHY 1030/1031/1032
This class is designed for students needing five hours of physics with calculus applications. Topics include mechanics—linear motion, rotational motion, force, work, energy, momentum, and conservation principles; heat—temperature, ideal gas, thermodynamic systems, heat as a form of energy, first law of energy, first law of thermodynamics, second law of thermodynamics and entropy; wave motion—simple harmonic motion, elasticity, and the wave equation.

Prerequisite:
MTH 4435 Calculus I

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

Learner Outcomes:
Students who complete this course with a grade of A or B should have sufficient background for more advanced study in science and engineering programs requiring 5 credit hours of physics.

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.

CHAPTER 1: PHYSICS AND MEASUREMENTS

Outcomes: The student will acquire knowledge an understanding of the measurements and mathematics of physics.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Describe physical properties in terms of fundamental and derived units of measure.
						Utilize the concept of significant figures and error in solving problems.
						Understand and describe physical environments in terms of vector space coordinates.
						Solve spatial problems by addition and multiplication of vectors.

CHAPTER 2: MOTION ALONG A STRAIGHT LINE

Outcomes: The student will acquire knowledge and understanding of motion in a straight line.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Understand and apply the concepts of average and instantaneous speed and acceleration.
						Understand and apply the graphical interpretation of motion.
						Produce applicable equations of motion from the calculus.

CHAPTERS 3 & 4: MOTION IN TWO DIMENSIONS & VECTORS

Outcomes: The student will acquire knowledge and understanding of two dimensional motion.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Apply vector analysis to velocity and acceleration vectors.
						Understand and apply concepts of circular motion.
						Understand and apply concepts of projectile motion.

CHAPTER 5: FORCES: NEWTON=S THREE LAWS OF MOTION

Outcomes: The student will acquire knowledge and understanding of Newton=s force laws.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Understand the fundamental concept of inertia and solve applications by Newton=s first law.
						Solve applications of static and dynamic systems with Newton=s second and third laws.
						Analyze several force models for weight force, spring forces, frictional and normal forces.
						Understand and apply Newtonian gravitational models to falling objects, mass, and field strength.

CHAPTER 6: ADDITIONAL FORCE MODELS AND CIRCULAR MOTION

Outcomes: The student will acquire knowledge and understanding of additional force models.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Understand and solve applications relating to coefficient of friction models.
						Solve applications of force models for circular motion.
						Understand and solve applications of the Universal Gravitation model.
						Apply models for motion through resistive mediums.

CHAPTER 7: WORK AND KINETIC ENERGY Outcomes: The student will acquire knowledge and understanding of work and kinetic energy.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Apply concepts of constant force, constant direction work.
						Apply concepts of variable force, constant direction work.
						Apply concepts of variable force, variable direction work.
						Understand the relationship between work and kinetic energy.
						Solve applications of power.

CHAPTER 8: CONSERVATION OF ENERGY Outcomes: The student will acquire knowledge and understanding of the conservation of energy.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Understand and solve applications of conservative forces. Apply the concept of potential energy as the negative integral of conserved work.
						Apply the concept of potential energy as the negative integral conserved work.
						Apply the law of Conservation of Mechanical Energy to isolated systems.
						Evaluate systems with non-conservative forces.

CHAPTER 9: IMPULSE AND LINEAR MOMENTUM Outcomes: The student will acquire knowledge and understanding of impulse and momentum concepts.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Interpret and apply Newton=s Second Law momentum statement.
						Solve applications of conservation of momentum.
						Apply the conservation of momentum concept to collisions in one and two dimensions.

CHAPTER 10: MOMENTUM, ENERGY, AND THE CENTER OF MASS Outcomes: The student will acquire knowledge and understanding of momentum, energy, and center of mass.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Analyze and solve applications of center of mass concept for particulate systems.
						Solve applications of center of mass for symmetrical objects.
						Solve applications of center of mass by integration.
						Evaluate the kinetic energy, potential energy, momentum, and gravitation for center of mass systems.

CHAPTER 11: ROTATION ABOUT A FIXED AXIX Outcomes: Students will acquire knowledge and understanding of rotating systems about a fixed axis.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Evaluate systems in terms of rotational kinetic energy.
						Evaluate systems in terms of torque.
						Utilize Newton=s= Second law to analyze rotating systems for work.
						Determine the angular momentum or rotational systems.

CHAPTER 12: STATIC EQUILIBRIUM AND ROLLING OBJECTS Outcomes: Students will acquire knowledge and understanding of static equilibrium and rolling objects.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Apply the first and second condition for static equilibrium in systems of mass.
						Evaluate systems of rolling mass without slipping.
						Evaluate systems of rolling mass with slipping.

CHAPTER 19: 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.

CHAPTER 20: THERMODYNAMICS I: PROCESSES AND THE FIRST LAW Outcomes: Student will acquire knowledge and understanding of thermodynamic processes and the first law.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Understand systems in thermodynamic equilibrium by the Zeroth law.
						Evaluate thermodynamic systems for work.
						Apply the First Law to thermodynamic applications.
						Evaluate and solve applications of isochoric, isothermal, isobaric and adiabatic processes.
						Solve applications involving cyclic processes.

CHAPTER 22: THERMODYNAMICS II: THE SECOND LAW Outcomes: Students will acquire knowledge and understanding of second law processes.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Understand and apply the Second Law of thermodynamics to heat energies.
						Utilize the Carnot Cycle in evaluating heat engines.
						Solve applications for heat pumps and refrigerators.
						Understand and utilize the Absolute temperature scale and the Third Law of thermodynamics.
						Evaluate the efficiency of heat engines.
						Utilize the concept of entropy in application of thermodynamic systems.

Projects Required:
Five labs will be written formally for grading

Text Book:
Contact the Bookstore for current textbook.

References:
CRC Handbook of Chemistry & Physics

Materials/Equip:
IBM microcomputer with interface software, Data analysis software, Air Track with electronic and optic timing gates; projectile, rotational, and gravitational motion equipment.

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

Grading Policy:
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.