COWLEY COLLEGE
& Area Vocational Technical School

COURSE PROCEDURE FOR

GENERAL PHYSICS II
PHS 4551 5 Credit Hours

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

Catalog Description:
PHS4551 - GENERAL PHYSICS II (N) (5 hrs)
[KRSN PHY2020/2021/2022]
A continuation of PHS4550 General Physics I. Topics include electricity and magnetism—electric field, electric potential, current electric power, magnetic field, and induction; optics—nature of light and wave optics; modern physics—special relativity, atomic structure, quantum mechanics and radioactivity.

Prerequisite:
PHS4550 General Physics 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:
The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved 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.

UNIT 1 CHAPTER 15: CHARGES & ELECTRICAL FIELDS Outcomes: The student will acquire an understanding of the properties of charges and electrical fields.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Illustrate and describe the attractive and repulsive electrical forces.
						Describe insulators and conductors.
						Solve applications of Coulomb's Law.
						Solve applications with the Principle of Superposition.
						Analyze the forces between two or more point charges in electric fields.
						Describe electrical field lines and illustrate by example.

UNIT 1 CHAPTER 16: ELECTRICAL ENERGY & CAPACITANCE Outcomes: The student will acquire knowledge and understanding of electrical energy and capacitance.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Solve the potential of an electrical field.
						Evaluate the potential difference expression for the change in potential and velocity of charged particles.
						Calculate the electrical potential due to point charges.
						Determine the work in moving point charges in a potential gradient.
						Solve expressions for capacitance in applications.
						Determine the charge of capacitor surfaces.
						Analyze series and parallel capacitive circuits.
						Determine the energy in capacitive circuits.

UNIT 1 CHAPTER 17: ELECTRICAL CURRENT AND RESISTANCE Outcomes: The student will acquire knowledge and understanding of Electrical Current and Resistance.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Interpret the expression the expression for current based on quantity of charge.
						Apply the drift-velocity concept to applications of conductors.
						Propose expressions for variables given Ohm's law expressions.
						Solve applications of Ohm's law in circuits.
						Determine the resistance and resistivity of components at various temperatures.
						Solve applications of power in circuits.

UNIT 2 CHAPTER 18: DIRECT CURRENT CIRCUITS Outcomes: The student will acquire knowledge and understanding of Direct Current Circuits						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Determine expressions for series and parallel resistance circuits.
						Solve expressions for resistance and current in direct current circuits.
						Solve applications of direct resistive circuits utilizing Kirchoff's Law.
						Employ properties of circuits to solve applications of RC Circuits.
						Utilize the wheatstone bridge concept to solve resistance measuring applications.

UNIT 2 CHAPTER 19: MAGNETISM Outcomes: The student will acquire knowledge and comprehension of magnetism and the applications to circuits and measurement						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Determine an expressions for the parameters of magnetic fields.
						Evaluate magnetic field parameters in applications.
						Solve applications utilizing torque in a loop of current carrying wire.
						Calculate the motion and charge of charged particles in magnetic and electric fields.
						Determine the forces on parallel current carrying conductors.
						Apply Ampere's Law to magnetic fields of conductors.

UNIT 2 CHAPTER 20: INDUCED VOLTAGE AND INDUCTANCE Outcomes: The student will gain knowledge and understanding of Induced Electrical Fields and applications to Generators and Circuits						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Express the relationship between magnetic flux and induced current.
						Define Faraday's Law of induction.
						Calculate the magnitude of a motional EMF.
						Evaluate Faraday's law for current, magnetic flux, or motion of a conductor.
						Apply Lenz's and Farady's Laws to coils and generators.
						Evaluate circuits for self-inductance.
						Determine the time constants, resistance, and inductance in circuits.
						Calculate the energy stored in a magnetic field.

UNIT 3 CHAPTER 21: ALTERNATING CURRENT CIRCUITS AND ELECTROMAGNETIC WAVES Outcomes: The student will gain knowledge and understanding of Alternating Current Circuits and Electromagnetic Spectrum Wave Phenomena						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Determine the RMS values for current and voltage.
						Evaluate phase relationship dependant variables in capacitive, inductive and resistive circuits.
						Find the phase angle from the impedance statement for any circuit.
						Determine the resonance frequency or capacitance of a series RLC circuit.
						Calculate the step up and step down ratio=s for transformers.
						Recall the electromagnetic spectrum.
						Relate the properties of a moving charged particle in a conductor and an antenna.
						Determine an expression for the velocity of electromagnetic radiation for the magnetic and electric field magnitude.
						Calculate the average power for various surfaces absorbing radiation.
						Describe the properties of amplitude and frequency modulated radiation.
						Solve applications for the properties of electromagnetic radiation.

UNIT 3 CHAPTER 22: THE NATURE OF LIGHT Outcomes: The student will acquire knowledge and understanding of the nature of light and the properties of reflection and refraction of light						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Solve the expression for the energy of a photon.
						Describe the experimental determination of the velocity of light by Roemer and Fizeau.
						Solve applications of photon velocity in substances with an index of refraction.
						Calculate the relationships of reflected and refracted light with Snell's Law.
						Determine the properties of refracted light from prisms.
						Evaluate the total internal reflection of light with Snell's Law.

UNIT 3 CHAPTER 23: MIRRORS AND LENSES Outcomes: The student will acquire knowledge and understanding of applications of reflected and refracted light to mirror and lens systems						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Evaluate the properties of spherical and plane mirrors.
						Evaluate the properties of convex mirrors and their sign conventions.
						Determine the position, orientation, and magnitude of images produced by convex and concave mirrors.
						Determine the properties of images formed by refraction of light in then lenses.

UNIT 4 CHAPTER 24: OPTICAL WAVE PROPERTIES Outcomes: The student will acquire knowledge and understanding of the optical wave properties						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Express knowledge of necessary conditions for interference.
						Solve applications of Single and double Interference.
						Evaluate the expressions for double slit interference.
						Measure the wavelength of the light source by interference.
						Evaluate interference in thin films.
						Evaluate expressions for single and double slit diffraction in applications.
						Define polarization.
						Evaluate polarization angles from expressions of Brewster's Law.
						Describe polarization by scattering, double refraction, and reflection.

UNIT 4 CHAPTER 27: QUANTUM MECHANICAL PROPERTIES OF MATTER AND RADIATION Outcomes: The student will acquire knowledge and understanding of quantum mechanical properties of matter and radiation.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Solve applications of quantized energy with Planck's Hypothesis.
						Determine the expression and evaluate for applications of the photoelectric effect.
						Apply x-ray diffraction to atomic structure applications.
						Determine the momentum of photons by Comptom Scattering.
						Solve applications for DeBroglie waves to matter.
						Determine the uncertainty in a measurement application.

UNIT 4 CHAPTER 28: THE EARLY AND MODERN ATOMIC THEORY Outcomes: The student will acquire knowledge and understanding of the early and modern atomic theory						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Determine the wavelength and location of various line series in the spectrum of hydrogen.
						Evaluate expressions for the atomic spectra in applications.
						Evaluate the properties of the hydrogen atom with Bohr's atomic model.
						Determine the energy and radial changes in hydrogen with the modified Bohr model.
						Determine the electronic structure of atoms with quantum numbers.

UNIT 4 CHAPTER 29: THE PROPERTIES OF NUCLEAR PARTICLES Outcomes: The student will acquire knowledge and understanding of the properties of nuclear particles and their decay processes						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Describe or calculate the radius of density of nuclear particles.
						Determine the binding energy of nuclear particles.
						Describe the rules of nuclear stability and analyze examples for stability.
						Evaluate various nuclides for decay rate and decay constants.
						Determine the number of nuclear particles remaining after decay intervals.
						Illustrate alpha, beta, and gamma decay sequences in examples.
						Determine the Q value for energies in specific nuclear reactions.

Projects Required:
None

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 time 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.