I. GENERAL COURSE INFORMATION

Subject and Number: Physics 2B
Descriptive Title: General Physics
Course Disciplines: Physics/Astronomy
Division: Natural Sciences

Catalog Description:
This course is part of a one-year algebra- and trigonometry-based survey of physics. Topics covered include electric forces and fields, electric energy, electric circuits, magnetism, electromagnetic waves, geometric optics, wave optics, applied optics, relativity, electrons and photons, atomic structure, the nucleus, applied nuclear physics, and particle physics.

Conditions of Enrollment:
Prerequisite: Physics 2A with a minimum grade of C

Course Length:	**X Full Term**	**Other (Specify number of weeks):**
Hours Lecture:	**3.00 hours per week**	**TBA**
Hours Laboratory:	**3.00 hours per week**	**TBA**
Course Units:	**4.00**	

Grading Method: **Letter**
Credit Status: **Associate Degree Credit**

Transfer CSU: **X Effective Date: Prior to July 1992**
Transfer UC: **X Effective Date: Prior to July 1992**

General Education:
El Camino College:
1 – Natural Sciences
Term: Other: Approved

CSU GE:
B1 - Physical Science
Term: Fall 1991 Other:
B3 - Laboratory Sciences
Term: Fall 1991 Other:

IGETC:
5A - Physical Science with Lab
Term: Fall 1991 Other:

II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

1. **Applying Relevant Principles**: Students can identify the physical principles which are relevant in a given physical situation involving electricity, magnetism, electromagnetism, optics or modern physics in order to correctly answer conceptual questions.

Other exams

2. **Solving Physics Problems**: Students can identify and apply the relevant laws of physics along with the necessary mathematics to successfully solve a problem dealing with electricity, magnetism, electromagnetism, optics or modern physics.

Other exams

3. **Data Collection and Analysis**: Students can read and record, with appropriate units and uncertainties, measurements taken multimeter. Students can interpret and analyze that data, including error analysis.

Laboratory reports

B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Analyze physical problems involving electricity, electromagnetism optics and modern physics in order to:
   a. recognize all the physical principles required to solve the problem,
   b. isolate and model the physical principle(s) underlying each part of the problem,
   c. formulate the equation(s) for each part,
   d. combine and solve the system of equations for the problem, and
   e. assess the physical reality of the result in terms of the data given, for a variety of physical situations involving the topics covered in the course.

   Other exams

2. Explain physical phenomena using realistic mathematical modeling at the level of general physics.

   Homework Problems

3. Evaluate laboratory situations to construct simple electrical systems, construct simple optical systems, make measurements using basic measuring devices, manipulate the collected data using basic error theories, report the outcome of the experiment, and explain the results physically.

   Laboratory reports

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	14	I	ELECTRICITY A. Electrification of Bodies B. Conductors and Insulators C. Conservation of Charge D. Coulomb's Law E. Electric Field F. Lines of Force G. Potential Difference H. Capacitance I. Dielectrics J. Electrical Energy K. Electromotive Force L. Resistance M. Ohm's Law N. Current O. Electric Power P. Kirchoff's Laws Q. Series and Parallel Circuits R. Analysis of an Electric Circuit S. Ammeters and Voltmeters T. Wheatstone Bridge U. Potentiometer
Lecture	14	II	ELECTROMAGNETISM A. Magnetic Fields B. Magnetic Force on a Moving Charge C. Magnetic Force on a Current Segment D. Measurement of the Strength of a Magnetic Field E. Sources of Magnetic Field F. Magnets and Poles G. Earth's Magnetism H. Induced EMF and Magnetic Flux I. Meters J. Motors K. Generators L. Back EMF and Torque M. Transformers N. Impedance of a Coil O. Series Resonance P. Cathode Ray Tube Q. Power in an AC Circuit R. RMS Values
Lecture	13	III	ELECTROMAGNETIC WAVES AND OPTICS A. Models of Radiation B. Electric Oscillations

			C. Radiation D. Electromagnetic Waves E. Sources of Radiation F. Huygens' Principle G. Straight-Line Propagation of Light H. Refraction I. Thin Lenses J. Objects and Images (Ray Tracing, Lenses, Mirrors) K. Interference (Grating and Michelson Interferometer) L. Polarization of Light M. Camera N. Lens Aberration O. Human Eye P. Magnifier Q. Compound Microscope R. Telescope S. Spectroscope (Prism and Grating)
Lecture	13	IV	RELATIVITY, ATOMIC STRUCTURE, AND NUCLEAR PHYSICS A. Time Dilation B. Length Contraction C. Momentum and Energy D. Lorentz Transformation E. Relative Velocity F. Photoelectric Effect G. Electron Microscope H. Uncertainty Principle I. Wave Mechanics J. Atomic Structure K. Emission Spectra L. Bohr Theory for the Hydrogen Atom and its Limitations M. Quantum Mechanics N. Coherent Light O. Laser P. Quantum Numbers Q. Electron Spin R. Pauli Exclusion Principle S. Periodic Table of the Elements T. X-Rays U. Nuclear Structure V. Radioactive Decay W. Fission X. Fusion Y. Particle Accelerators Z. Colliding Beams AA. Cosmic Rays

Lab	54	V	LABORATORY WORK (Lab activities analyzed involve real-world data collection.) Choose from the following. Those marked with an asterisk (*) are mandatory. A. Reflection and Refraction of Light Rays (*) B. Curved Mirrors C. Thin Lenses (*) D. Young's Double Slit Experiment and Diffraction Grating (*) E. Polarization F. Electric Fields and Equipotentials (*) G. Capacitors (*) H. Batteries and Ohm's Law (*) I. Circuits in Series and Parallel (*) J. Magnetic Field K. Electric Motor and Faraday's Law (*) L. Oscilloscope
Total Lecture Hours		54	
Total Laboratory Hours		54	
Total Hours		108	

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. **PRIMARY METHOD OF EVALUATION:**

Problem solving demonstrations (computational or non-computational)

B. **TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:**

A bird stands on an electric transmission line carrying 2500 amperes. The line has 2.5 x 10^-5 ohm resistance per meter and the bird's feet are 4.0 cm apart. What voltage does the bird feel? Show all your work.

C. **COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:**

1. In a one-paragraph essay, describe how you can "see" a round drop of water on a table even though the water is transparent and colorless.

2. You need a 45-ohm resistor, but you only have 20-ohm and 50-ohm resistors. How can the desired resistance be achieved under these circumstances?

D. **OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**

Other exams
Quizzes
Reading reports
Laboratory reports
Homework Problems
Multiple Choice

V. INSTRUCTIONAL METHODS

Demonstration
Laboratory
Lecture

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS

Study
Answer questions
Required reading
Problem solving activities
Written work

Estimated Independent Study Hours per Week: 6

VII. TEXTS AND MATERIALS

A. **UP-TO-DATE REPRESENTATIVE TEXTBOOKS**

Serway and Vuille. College Physics. 11th ed. Cengage, 2018.
Leonardo/Prieto. Physics 2B/3B Lab Manual. El Camino College, 2009. Discipline Standard

B. **ALTERNATIVE TEXTBOOKS**

C. **REQUIRED SUPPLEMENTARY READINGS**

D. **OTHER REQUIRED MATERIALS**

Scientific Calculator

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification
Course Prerequisite Physics-2A	Sequential

B. Requisite Skills

Requisite Skills
PHYS2A-Analyze physical problems in order to recognize the physical principles required to solve the problem, isolate and model the physical principles underlying each part of the problem, formulate

the equations for each part, combine and solve the system of equations for the problem, and analyze and explain the results of the computations.
Demonstrate the ability to solve problems using Newton's Laws of Motion, momentum and impulse, work-energy theorem, conservation of energy, torque, the laws of thermodynamics, hydrostatics, hydrodynamics, Newton's Law of Universal Gravitation, and simple harmonic motion.
Conceptually explain physical phenomena perhaps too difficult for realistic mathematical modeling at the introductory physics level.

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification

D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact

Course created by Susan Prieto on 04/01/2009.

BOARD APPROVAL DATE:

LAST BOARD APPROVAL DATE: 01/22/2019

Last Reviewed and/or Revised by: Susan Stolovy **Date: Sept. 29, 2018**