SPARTANBURG COMMUNITY COLLEGE

Physical Science 101

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COURSE NUMBER: PHS 101

Prerequisite(s): MAT 102* with a minimum grade of "C."
Co-requisite(s): MAT 168

COURSE DESCRIPTION:

This is the first of a sequence of courses in physical science and includes an introduction to science with emphasis on science terminology and investigations of the physical world. Topics are selected from astronomy, chemistry, geology and physics. This course will focus on the following topics: matter, motion, energy, work, power and introduction to chemistry. The following topics will be covered to a lesser degree: machines, electricity, fluid mechanics, heat transfer, thermal expansion, heat and phase change, thermodynamics, and the generation and application of various energy sources.

General Course Outcomes

Students who complete the general education core curriculum should be able to demonstrate
1. Rationality, logic and coherence through critical thinking;
2. Their ability to express themselves effectively in quantitative and qualitative terms;
3. The scientific method of inquiry;
4. Their ability to access, retrieve, synthesize and evaluate information.

Textbook: Paul G. Hewitt, **John A. Suchocki**, **Leslie A Hewitt,** Conceptual Physical Science, 5th edition, Addison-Wesley.

Lab Manual: SCC Lab Manual for Physical Science 101

Recommended Materials: Scientific calculator (capable of basic arithmetic in scientific notation)

Method of Instruction: The class will be taught by lecture and class participation in laboratories. Materials and assignments may be require access to the school website.

Grading System:

90	-	100	=	A		60	-	69	=	D
80	-	89	=	B		Below	-	60	=	F
70	-	79	=	C						

Attendance Policy:
Students are responsible for punctual and regular attendance in all classes, laboratories, field trips, and other class activities. Full explanation of the school attendance policy is in the Student Handbook. Section-specific policies will be described in the instructor's syllabus addendum.

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Classroom Conduct:
Students are expected to uphold the integrity of the College's standard of conduct, specifically in regards to academic honesty. All forms of academic dishonesty including, but not limited to, cheating on assignments/tests, plagiarism, collusion, and falsification of information will call for disciplinary action. Disciplinary action imposed may include one or more of the following: written reprimand, loss of credit for assignment/test, termination from course, and probation, suspension, or expulsion from the College. For further explanation of this and other conduct codes, please refer to the Student Handbook.

Accommodations:
Students who need special accommodations in this class because of a documented disability should notify Student Disability Services by calling (864) 592-4818, toll-free 1-800-922-3679; via email through the SCC web site at www.sccsc.edu/resources/disabilities; or by visiting the office located in the East Building Room 30-B on the SCC Central campus. Contacting Student Disability Services early in the semester gives the College an opportunity to provide necessary support services and appropriate accommodations.

Additional Policies
Instructors may choose to supplement the information in this syllabus. Students are responsible for making sure they receive a copy of any syllabus addendum the instructor may provide.

Course Outcomes & Objectives:
Upon satisfactory completion of this course, the student will be able to:
Prologue: The Scientific Method
- Define the scientific method and describe why it is integral to the way science is done.
- Describe the relationship between theory and experiment and the role of each.
- Distinguish among facts, theories, and observations.
- Distinguish between science and nonscience.

Introduction: Unit of Measurement in Metric System
- Recognize and use the units of the metric system for length, mass, volume.
- Write numerical quantities with the correct number of significant figures and units.
- Manipulate units algebraically and make unit conversions using MKS system.
- Write numerical quantities in scientific notation.

Chapter 1: Patterns of Motion and equilibrium
- Define the kinematical variables used to describe the motion of a particle.
- Describe the motion of a body in free fall
- Distinguish between weight and mass and tell how these are related to each other near the surface of Earth.
- Describe how air resistance affects the motion of falling objects.

Chapter 2: Newton's Laws of Motion
- Understand how changes in the motion of objects correlate with the forces that cause these changes.
- Understand how Newton's three laws of motion describe the application of forces to objects.
- Find the net force on an object.
- State if an object is being accelerated in magnitude, direction, both or neither.
- Recognize a state of equilibrium.

Chapter 3: Momentum and Energy
- Define momentum.
- Define impulse and describe how it affects changes in momentum.
- Understand the relationship between impulse, force, and the time it takes an object to stop.
- State the conservation laws that apply to linear momentum and give examples of each.
- Deal with the conservation of energy law and understand its importance in the overall scheme of physical science.
- Perform calculations using the concepts of work, energy, and power.
- Calculate the potential and kinetic energies of a body in a conservative system.

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- Determine mechanical advantage and find the relationships between input and output force and distance in a simple machine.
- Find the efficiency of a simple machine.

Chapter 8: Static and Current Electricity
- Define electric charge, current, and voltage.
- Use Coulomb's law to determine the force on a charge due to another charge.
- Define an electric field, know the direction in which it points and use it to determine the force on a charge.
- Define electric potential and electric potential energy and relate them to each other.
- Use Ohm's law to solve problems that involve the current in a circuit, the resistance of the circuit, and the voltage across the circuit.
- Describe the factors that affect the resistance of a wire.
- Distinguish between DC and AC.
- Demonstrate an understanding of the difference between parallel and series circuits.
- Determine power and energy consumption of a component in an electric circuit.

Chapter 9: Magnetism and Electromagnetic Induction
- Explain the relationship between magnetic poles and a magnetic field.
- Understand the origin of a magnetic field in moving charges and magnetic domains.
- Determine the force on a moving charge or current-carrying wire due to a magnetic field.
- Know what magnetic induction is and how it used to create generators and motors.

Chapter 10: Waves and Sound
- Understand the origin of a wave in a vibrating object.
- Define the different terms that are used to describe a wave.
- Understand interference and how it creates beats and standing waves.
- Describe the Doppler Effect and use it to predict how and when the frequency of a wave will change.

Chapter 11: Light
- Know the parts of the electromagnetic spectrum, including differences and similarities.
- Explain why reflection is specular or diffuse and the Law of Reflection.
- Describe refraction; know when and why it occurs.
- State what changes with the color of light; what dispersion is, and how it separates light into its' colors.
- Define polarization and explain how it can be used to reduce the intensity of light.

Chapter 12: Atoms and the Periodic Table
- Give the basic ideas of the Bohr model of the atom.
- Distinguish between the groups and periods of the periodic table.
- Define atomic number, mass number, atomic mass.
- Define an atomic spectrum is, and describe how it is produced and how it is related to the electron orbits of an atom.
- Describe the shell model of the atom and how it accounts for the chemical properties of atoms.

Chapter 13: The Atomic Nucleus and Radioactivity
- Demonstrate an understanding of the strong nuclear force and how it determines the stability of a nucleus.
- Describe the three most common modes of radioactive decay.
- Understand fission and fusion and the difference between them..
- Define and understand a nuclear chain reaction.
- Determine radioactive half-life; use half-life to determine the age of a sample.
- Understand mass-energy equivalence and use it to determine whether a nucleus will undergo fission or fusion.

Chapter 14: Elements of Chemistry
- Name some of the basic inorganic compounds, and write their chemical formulas.
- Describe the difference between physical and chemical changes and be able to identify changes as either physical or chemical.

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- Learn the basic rules for naming simple compounds.

Chapter 15: How Atoms Bond and Molecules Attract

- Understand the law of conservation of mass as it applies to chemical reactions.
- Use the law of definite proportions and see how this law leads to the assignment of unique formula masses to compounds.
- Describe the processes of ionic, covalent, and hydrogen bonding and be able to write the formulas for compounds formed by the first two processes.
- Read electron dot structures and chemical equations.
- Define electronegativity, dipole, and polar bond and be able to determine which molecules will be polar.
- Know the types of molecular attractions and the physical origin of each.

Chapter 17: How Chemicals React

- Distinguish between the physical and the chemical properties of substances, and tell how chemical reactions can change these properties.
- Determine if a chemical equation is balanced.
- Use a chemical equation to determine the mass ratios of reactants and products.
- Define the types of components that can be present in a chemical reaction.
- Understand the role of energy in chemical reactions and explain how various factors can affect reaction rate.
- Distinguish between exothermic and endothermic reactions.
- Explain what is meant by activation energy.