South Central College

PHYS 101 Introductory Physics

Course Outcome Summary

Course Information

Description
A one semester course covering the basic principles of physics at a conceptual level and with a minimal amount of math. Topics generally included mechanics, simple machines, atomic structure, heat, light, and sound. Lecture and laboratory components (MNTC 3: Natural Sciences)

Total Credits 3
Total Hours 48

Types of Instruction

Instruction Type
Lecture

Pre/Corequisites
MATH 0075 with a C or higher, or a score of 56 or higher on the Arithmetic portion of the Accuplacer test.

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Explain the origin of physics and range of topics
   Learning Objectives
   - Describe the subjects and phenomenon studied in physics
   - Review how people studied physics in history
   - Tell the importance of observation and experiments in physics
   - Name the three main branches of modern physics research

2. Review kinematics
   Learning Objectives
   - Depict displacement and its difference from distance
   - Define velocity and speed
   - Define acceleration
Diagram basic vector operations

3. Define force and mass
   Learning Objectives
   Determine the acting forces in various cases
   Draw free-body diagram and decompose forces
   Explain the concept of inertia
   Define mass as the measure of inertia

4. Describe Newton's laws of motion
   Learning Objectives
   Compare Newton's first law and Aristotle's view
   Explain relations between force, mass and acceleration
   Demonstrate the co-existence of action and reaction forces

5. Describe universal gravity
   Learning Objectives
   Express the relation between gravitational force and masses of objects
   Describe the dependence of gravitational force on distance
   Define weight
   Explain the different weights of one object on different planets

6. Determine work and energy
   Learning Objectives
   Define work
   Define kinetic energy
   Explain work-energy theorem
   Define potential energy
   Describe the principle of conservation of energy
   Define power

7. Identify simple machines
   Learning Objectives
   Explore the advantages of simple machines
   Describe an inclined plane
   Describe pulley system
   Describe a lever

8. Review impulse and momentum
   Learning Objectives
   Define impulse and momentum
   Explain the principle of conservation of momentum
   Apply the conservation of momentum to rockets and airplanes

9. Discuss fluid dynamics
   Learning Objectives
   Define pressure
   Review Pascal's principle
   Define density
   Explain Archimedes' principle
   Explain Bernoulli's law and apply it to airplanes

10. Illustrate behaviors of waves
    Learning Objectives
    Describe transverse and longitudinal waves
    Define period, frequency and speed of periodic waves
    Illustrate the principle of linear superposition
    Depict the interference and diffraction of waves
11. **Describe sound phenomenon**
   Learning Objectives
   - Estimate distances by the use of the speed of sound
   - Describe Doppler's effect
   - Describe beats

12. **Investigate heat and temperature**
   Learning Objectives
   - Name three main temperature scales
   - Examine the thermal expansion or contraction of substances
   - Point out different specific heat capacity of substances
   - Classify major processes of heat transfer

13. **Study light and optics**
   Learning Objectives
   - Investigate properties of images formed by mirrors
   - Compare images formed by two types of thin lenses
   - Explain the principles of eye, camera and telescope
   - Illustrate the interference patterns in double-slit experiment
   - Describe diffraction patterns
   - Summarize the nature of light as wave

14. **Demonstrate electric charges and electric fields**
   Learning Objectives
   - Describe properties of electric charges
   - Diagram electric fields caused by different charges
   - Describe the motion of charges in a uniform electric field
   - Review electric potential and electric potential energy

15. **Discuss current and circuits**
   Learning Objectives
   - Describe electric current
   - Explain the dependence of resistance on conditions of conductors
   - Describe the relations of current, voltage and resistance
   - Name components of a simple DC circuit
   - Contrast DC to AC circuits

16. **Investigate magnet and magnetic fields**
   Learning Objectives
   - Describe the interaction between poles of magnets
   - Illustrate magnetic fields
   - Show the motions of electric charges in magnetic fields
   - Explain the forces of magnetic fields on a current-carrying wire
   - Illustrate magnetic fields formed by a current

17. **Interpret electromagnetic waves**
   Learning Objectives
   - Describe the results of changing electric fields and magnetic fields
   - Describe the propagation of electromagnetic waves
   - Classify electromagnetic waves of various wavelengths

18. **Describe atoms and molecules**
   Learning Objectives
   - Tell the size and components of a hydrogen atom
   - Describe more complicated atoms and ions
   - Explain how atoms and ions are bonded into molecules
   - Name the nucleons and explain the source of nuclear energy
Compare nuclear fission and nuclear fusion

19. Study Earth and space

Learning Objectives
Classify the surface circles and inner layers of the Earth
Describe the relative motions of the Sun, the Earth and the Moon
List the planets and their relative positions in the solar system
Explain the energy source of the Sun
Describe dwarf stars, neutron stars and black holes
Illustrate the Milky Way and other galaxies
Describe the expansion of the Universe

20. Brief basic concepts of theory of relativity

Learning Objectives
Express the basic assumptions of special relativity
Show the equivalence of mass and energy
Describe the effects of time dilution and length shrink

SCC Accessibility Statement

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Additional information and forms can be found at: www.southcentral.edu/disability

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