



Course Number and Title: PHY 111 Conceptual Physics

Campus Location:

Georgetown, Dover, Stanton, Wilmington

Effective Date:

2020-51

Prerequisite:

MAT 020, SSC 100

Co-Requisites:

None

Course Credits and Hours:

4.00 credits

3.00 lecture hours/week

3.00 lab hours/week

Course Description:

In this course, students explore the physical world and develop concepts to explain natural phenomena. Laws and theories of the physical world are presented and applied to applications, including motion, gravity, energy, waves, sound, and electricity.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

None

Schedule Type:

Classroom Course

Hybrid Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Identify the defining characteristics and organization of science. (CCC 2, 6)
2. Integrate and differentiate the basic processes of classical kinematics, with emphasis on linear motion. (CCC 2, 6)
3. Integrate and differentiate the basic processes of classical dynamics, with emphasis on Newton's laws and energy. (CCC 2, 6)
4. Integrate and differentiate the basic principles of waves and sound. (CCC 2, 6)
5. Analyze the basic principles of static electricity. (CCC 2, 6)
6. Analyze the basic principles of current electricity. (CCC 2, 6)
7. Integrate laboratory and didactic principles and experiences with emphasis on speed, forces, periodic motion, work and power, and sound and circuits. (CCC 1, 2, 3, 5, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Identify the defining characteristics and organization of science.
 1. Define *fact, hypothesis, law, and scientific method*.
 2. Discuss science and engineering practices.
2. Integrate and differentiate the basic processes of classical kinematics, with emphasis on linear motion.
 1. Define and identify the units of speed, velocity, and acceleration, and explain their interrelationship.
 2. Determine unknown variables from the equations for velocity and acceleration.
 3. Distinguish uniform acceleration from other types of motion.
 4. State the uniform acceleration formulas, and apply them when initial velocity equals zero.
 5. Interpret and create motion graphs from the information provided.
 6. Define *vector quantity, scalar quantity, and resultant vectors*.
3. Integrate and differentiate the basic processes of classical dynamics, with emphasis on Newton's Laws and energy.
 1. Define and calculate mass, weight, volume, force, and terminal speed.
 2. List and identify units of measure for mass, weight, volume, and force.
 3. State and apply Newton's Laws.
 4. Apply the condition of mechanical equilibrium to determine unknown forces.
 5. Define, identify, and calculate units of work, energy, power, potential energy, kinetic energy, and efficiency.
 6. State and apply the principle of conservation of energy.
4. Integrate and differentiate the basic principles of waves and sound.
 1. Describe waves in terms of amplitude, frequency, period, wavelength, and wave speed.
 2. Explain how frequency, period, wavelength, and wave speed are interrelated.
 3. List and identify units of measure for frequency, period, wavelength, and wave speed.
 4. Explain the difference between longitudinal and transverse waves.
 5. Define *infrasonic, ultrasonic, compression, rarefaction, natural frequency, forced vibration, and resonance*.
 6. Explain how the above terms relate to sound waves and their production.
 7. Explain interference patterns, Doppler effect, bow wave, shockwave, sonic boom, standing wave, nodes, and antinodes.
 8. Identify the typical frequency range of human hearing.
5. Analyze the basic principles of static electricity.
 1. Describe the basic structure of an atom.
 2. Define and identify common examples of atoms and molecules.
 3. Define *charge, conductor, semiconductor, insulator, superconductor, electric field, electric potential energy, and voltage*.
 4. List and identify the units of measure for charge, electric field, electric potential energy, and voltage.
 5. State and apply Coulomb's Law.
 6. State and apply the principle of charge conservation.
 7. List and describe three methods for charging objects.
 8. List and identify common conductors and insulators.
 9. Explain the relationship among electric potential energy, charge, and voltage.
 10. Apply the conservation of energy for a charge placed in an electric field.
6. Analyze the basic principles of current electricity.
 1. Define *current, alternating current (AC), direct current (DC), and resistance*.
 2. List and identify the units of measure for current and resistance.
 3. State and apply Ohm's Law.
 4. Explain the dangers of current electricity.
 5. Distinguish between parallel and series circuits, and calculate the equivalent resistance and values of current in the circuit.
 6. Calculate the power consumed by an electrical circuit.
7. Integrate laboratory and didactic principles and experiences with an emphasis on speed, forces, periodic motion, work and power, and sound and circuits.
 1. Perform scientific measurements and calculations using significant digits.
 2. Compare and contrast constant velocity and constant acceleration motion by constructing and analyzing motion graphs of moving objects.
 3. Verify Galileo's experiment of freely falling objects.
 4. Measure mass and weight, and determine acceleration due to gravity.
 5. Verify Newton's second law of motion in at least two experimental situations, one for equilibrium and the other for accelerated motion.
 6. Determine the actual mechanical advantage (AMA), ideal mechanical advantage (IMA), and efficiency of simple machines.
 7. Determine the period of a simple pendulum.
 8. Determine the frequency of a wave generator using standing waves.
 9. Determine the velocity of sound using a resonance tube.
 10. Investigate types of charges developed by the three methods of charging.
 11. Measure the resistance of a series/parallel combination of resistors.
 12. Verify Ohm's Law and determine resistance from the I-V plot.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
4 - 5 Unit Tests* (summative) (equally weighted)	50%
Final Exam** (summative)	15%
Labs (summative) (equally weighted)	20%
Other - Homework, Quiz, Projects (formative)	15%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

None

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.