SYLLABUS
PHYS 1401
General College Physics

Western Texas College

I. Basic Course Information:
   A. Course Description: Fundamental principles of physics, using algebra and trigonometry; the principles and applications of classical mechanics and thermodynamics, including harmonic motion, mechanical waves and sound, physical systems, Newton's Laws of Motion, and gravitation and other fundamental forces; with emphasis on problem solving. Laboratory activities will reinforce fundamental principles of physics, using algebra and trigonometry; the principles and applications of classical mechanics and thermodynamics, including harmonic motion, mechanical waves and sound, physical systems, Newton's Laws of Motion, and gravitation and other fundamental forces; emphasis will be on problem solving.
   B. Prerequisites: Math 1314 College Algebra and Math 1316 Plane Trigonometry or Math 2312/2412 Pre-Calculus.
   C. Online course content is administered through the college's learning management system (LMS), Moodle, also called eCampus. A link to eCampus can be found on my.wtc.edu and to Moodle (the big M with a graduation cap) on the college's home page, www.wtc.edu.

II. Student Learning Outcomes (SLO)
   A. Determine the components of linear motion (displacement, velocity, and acceleration), and especially motion under conditions of constant acceleration.
   B. Apply Newton's laws to physical problems including gravity.
   C. Solve problems using principles of energy.
   D. Use principles of impulse and linear momentum to solve problems.
   E. Solve problems in rotational kinematics and dynamics, including the determination of the location of the center of mass and center of rotation for rigid bodies in motion.
   F. Solve problems involving rotational and linear motion.
   G. Describe the components of a wave and relate those components to mechanical vibrations, sound, and decibel level.
   H. Demonstrate an understanding of equilibrium, including the different types of equilibrium.
   I. Discuss simple harmonic motion and its application to quantitative problems or qualitative questions.
   J. Solve problems using the principles of heat and thermodynamics.
   K. Solve basic fluid mechanics problems.
   L. Demonstrate techniques to set up and perform experiments, collect data from those experiments, and formulate conclusions from an experiment.
   M. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.

III. Testing Requirements
   A. The midterm and the final exam must be proctored by an approved testing organization. (Ask your instructor for more details).
   B. Students are NOT allowed to use their book or notes of any kind while taking their midterm and final exam.
   C. **Students are allowed to use the formula sheet provided for the midterm and final exam.**

IV. Major Course Requirements
   A. Major Requirements 1 – There will be 6 unit tests

B. Major Requirements 2 – There will be 6 unit lab write-ups. Students are not allowed to take the final exam until at least 4 unit lab write-ups are completed.
C. Major Requirements 3 – There will be a midterm and final exam.
D. Unit tests, midterm, and final are all timed.

V. Grading System
A. See the First Day Handout for the percentages of the average in this course and the letter grade breakdown for the final grade.

VI. Information on Books and Other Course Materials
A. **Online access required:** MasteringPhysics contains *College Physics* (e-book) *with Master Access*, 10th edition, Young, Adams, and Chastain ISBN 9780133858006. Additional textbook is optional. ISBN 9780321902566.
B. **Lab kits required**: Contact the WTC Bookstore for PHYS 1401 (only): eScience Lab Kit #2539 Or for PHYS 1401 and 1402 combined: eScience Lab Kit #2541

VII. Other Policies: Please refer to the WTC Course Catalog for the following:
A. Campus Calendar
B. Final Exam schedule
C. How to drop a class
D. Withdrawal information
E. Student Conduct/Academic Integrity
F. Class Attendance
G. Students with Disabilities

VIII. Course Organization and Schedule

Topics	Chapters	Sections
Mechanics	1. Models, Measurements, and Vectors	1.1 Introduction 1.2 Idealized Models 1.3 Standards and Units 1.4 Dimensional Consistency and Unit Conversions 1.5 Precision and Significant Figures 1.6 Estimates and Orders of Magnitude 1.7 Vectors and Vector Addition 1.8 Components of Vectors
	2. Motion Along a Straight Line	2.1 Displacement and Average Velocity 2.2 Instantaneous Velocity 2.3 Average and Instantaneous 2.4 Motion with Constant Acceleration 2.5 Proportional Reasoning 2.6 Freely Falling Objectives 2.7 Relative Velocity Along a Straight Line
	3. Motion in a Plane	3.1 Velocity in a Plane 3.2 Acceleration in a Plane 3.3 Projectile Motion 3.4 Uniform Circular Motion 3.5 Relative Velocity in a Plane
	4. Newton's Laws of Motion	4.1 Force 4.2 Newton's First Law 4.3 Mass and Newton's Second Law 4.4 Mass and Weight

		4.5 Newton’s Third Law 4.6 Free-Body Diagrams
	5. Applications of Newton’s Laws	5.1 Equilibrium of a Particle 5.2 Applications of Newton’s Second Law 5.3 Contact Forces and Friction 5.4 Elastic Forces 5.5 Forces in Nature
	6. Circular Motion and Gravitation	6.1 Force in Circular Motion 6.2 Motion in a Vertical Circle 6.3 Newton’s Law of Gravitation 6.4 Weight 6.5 Satellite Motion
	7. Work and Energy	7.1 An Overview of Energy 7.2 Work 7.3 Work and Kinetic Energy 7.4 Work Done by a Varying Force 7.5 Potential Energy 7.6 Conservation of Energy 7.7 Conservative and Non-Conserved Forces 7.8 Power
	8. Momentum	8.1 Momentum 8.2 Conservation of Momentum 8.3 Inelastic Collisions 8.4 Elastic Collisions 8.5 Impulse 8.6 Center of Mass 8.7 Motion of the Center of Mass 8.8 Rocket Propulsion
	9. Rotational Motion	9.1 Angular Velocity and Angular Acceleration 9.2 Rotation with Constant Angular Acceleration 9.3 Relationship Between Linear and Angular Quantities 9.4 Kinetic Energy of Rotation and Moment of Inertia 9.5 Rotation About a Moving Axis
	10. Dynamics of Rotational Motion	10.1 Torque 10.2 Torque and Angular Acceleration 10.3 Work and Power in Rotational Motion 10.4 Angular Momentum 10.5 Conservation of Angular Momentum 10.6 Equilibrium of a Rigid Body 10.7 Vector Nature of Angular Quantities
Periodic Motion, Waves, and Fluids	11. Elasticity and Periodic Motion	11.1 Stress, Strain, and Elastic Deformations 11.2 Periodic Motion

		11.3 Energy in Simple Harmonic Motion 11.4 Equations of Simple Harmonic Motion 11.5 The Simple Pendulum 11.6 Damped and Forced Oscillations
	12. Mechanical Waves and Sound	12.1 Mechanical Waves 12.2 Periodic Mechanical Waves 12.3 Wave Speeds 12.4 Mathematical Description of a Wave 12.5 Reflections and Superposition 12.6 Standing Waves and Normal Modes 12.7 Longitudinal Standing Waves 12.8 Interference 12.9 Sound and Hearing 12.10 Sound Intensity 12.11 Beats 12.12 The Doppler Effect 12.13 Applications of Acoustics 12.14 Musical Tones
	13. Fluid Mechanics	13.1 Density 13.2 Pressure in a Fluid 13.3 Archimedes' Principle: Buoyancy 13.4 Surface Tension and Capillarity 13.5 Fluid Flow 13.6 Bernoulli's Equation 13.7 Applications of Bernoulli's Equation 13.8 Real Fluids: Viscosity and Turbulence
Thermodynamics	14. Temperature and Heat	14.1 Temperature and Thermal Equilibrium 14.2 Temperature Scales 14.3 Thermal Expansion 14.4 Heat Energy 14.5 Phase Changes 14.6 Calorimetry 14.7 Heat Transfer 14.8 Solar Energy and Resource Conservation
	15. Thermal Properties of Matter	15.1 The Mole and Avogadro's Number 15.2 Equations of State 15.3 Kinetic Theory of an Ideal Gas 15.4 Heat Capacities 15.5 The First Law of Thermodynamics 15.6 Thermodynamics Processes 15.7 Properties of an Ideal Gas
	16. The Second Law of Thermodynamics	16.1 Directions of Thermodynamics Processes 16.2 Heat Engines 16.3 Internal Combustion Engines 16.4 Refrigerators

		16.5 The Second Law of Thermodynamics 16.6 The Carnot Engine: The Most Efficient Heat Engine 16.7 Entropy 16.8 The Kelvin Temperature Scale 16.9 Energy Resources: A Case Study in Thermodynamics

Disclaimer: Schedule and content is subject to change at the instructor's discretion.

Last Modified: May 29, 2018