

**Linwood Holton Governor's School Syllabus
Principles of Physics I and II, PHY 121-122
Fall 2017-Spring 2018
8 hours college credit**



Welcome to Physics Class!

I am delighted that you have decided to take this course. Although Physics is relevant to everything that happens to us in our everyday lives, we oftentimes take these things for granted or don't even notice them at all. I hope that this course will help make you more aware of just how relevant Physics is to us. In fact the word "Physics" is derived from the Greek word for nature! Physics is fundamental in daily life examples such as electricity, the working of our vehicle, wristwatch, cell phone, CD player, radio, LCD TV set, computer, and - the list goes on. Physics is the science of matter and its motion, space-time and energy. Physics describes many forms of energy - such as kinetic energy, electrical energy, and electromagnetic energy; and the way energy can transform from one form to another. Everything surrounding us is made of matter and Physics explains matter as combinations of fundamental particles which are interacting through fundamental forces.

Dr. Rapp

Instructor: Dr. Steve Rapp
Office Hours: M-F 1:00 – 2:00 pm

Location: Linwood Holton Governor's School at the Southwest Virginia Higher Education Center, second floor, One Partnership Circle, P.O. Box 1987, Abingdon, VA 24210

Web Site: <http://www.hgs.k12.va.us> or <https://srapphgs.coursesites.com>

Phone: 276-619-4329 Email: srapp@hgs.k12.va.us Fax: 276-619-4309

Textbook: *College Physics, 8th Edition* by Raymond Serway, Chris Vuille, and Jerry Faughn, 2009, ISBN 13: 978-0-495-38693-3; ISBN 10: 0-495-38963-6. The following website may be a helpful study aid:

<http://www.glenbrook.k12.il.us/gbssci/Phys/Class/BBoard.html>.

Pre-requisites for the Course: Algebra I and II, Geometry

How to Succeed in This Course:

First, make sure you turn in all assignments on time. The due dates are found in the syllabus and in grade-book. Second, prepare for tests even though they are open book. Out-lining each chapter is an excellent study aid. Third, make sure lab reports are written in the proper lab report format. Fourth, consult the links below to help you develop study skills that you need to succeed.

[How to Read Your Textbook More Effectively](#)

[Time Management](#)

[Test Taking](#)

[How to Study](#)

Course Description:

PHY 121 covers fundamental principles of physics. It includes mechanics, gravitational and motion phenomena, work and energy, kinetic theory, elasticity of solids, gas laws and thermal physics. The student will receive 4 hours college credit for successful completion.

PHY 122 covers fundamental principles of physics. It includes electricity, magnetism, light, optics, vibrations, waves, atomic physics, nuclear physics, and relativity theory. The student will receive 4 college credits for successful completion.

Course Delivery:

This course will be taught via the Internet with daily on-line discussion sessions. Tests will be administered on-line and homework will be collected via email.

Materials:

Scientific Calculator, Windows XP or later, Microsoft Word 2003 or later, Microsoft Excel 2003 or later, Ilink, Physics Kit, and other materials to be announced at a later date

Grade Distribution:

Exams: 50%

Lab work: 50%

Event Schedule:

For detailed information on weekly schedule and assignments visit:

<https://srapphgs.coursesites.com>.

Policies:

Academic Dishonesty: Collaboration on examinations, in class assignments, and homework assignments is forbidden except where specifically specified as “Team” activities. In general, one team may not collaborate with another team on “Team” activities. Students violating this policy will be subject to disciplinary action and a failing grade in the class.

Class Attendance: *While ALHGS does provide flexibility of where the students take the class (exception for assessment days), we support the home school's policy for attendance.*

Assignments: ALL ASSIGNMENTS SHOULD BE COMPLETED ON TIME AND TURNED IN ON THE DUE DATE. ASSIGNMENTS WILL BE ACCEPTED UP TO 3 DAYS LATE, BUT THERE WILL BE A PENALTY OF 10 POINTS FOR EVERY DAY LATE. THIS MEANS THE MAXIMUM SCORE THAT CAN BE RECEIVED IS 70%. AFTER 3 DAYS A GRADE OF ZERO WILL BE RECORDED. MAKE SURE YOU EMAIL YOUR ASSIGNMENT FAR ENOUGH AHEAD SO THAT IT REACHES ME BY THE DEADLINE.

Grading System: The regular university grading scale will be used:
90-100 = A; 80-89 = B; 70-79 = C; 60-69 = D; 59 or below = F.

Course Objectives: PHY121

1. To increase student understanding of natural laws by emphasizing the basic principles of physics.
2. To develop the analytical skills critical for success in both educational undertakings and lifetime decision making through emphasizing the unity of physics.
3. To develop an understanding of the scientific process through the concept of a model and the steps of developing a theory, stating assumptions, recording observations, refining the model, and improving overall understanding.
4. To show students that physics is a dynamic, exciting field in order to prepare them for the 21st century when the need for scientific understanding will be greater than ever.
5. To present classical physics from a contemporary perspective.

Curriculum Framework: PHY 121

Part 1: MECHANICS.

1. Introduction.
2. Motion in One Dimension.
3. Vectors and Two-Dimensional Motion.
4. The Laws of Motion.
5. Energy.
6. Momentum and Collisions.
7. Rotational Motion and the Law of Gravity.
9. Solids and Fluids.

Part 2: THERMODYNAMICS.

11. Energy in Thermal Processes.

12. The Laws of Thermodynamics.

Lab Work – Not all labs will be completed; Only selected labs will be assigned.

Labs in capital letters are new on line HTML5 simulations

Lab 1.1: Dancing Raisins

Lab 1.2: Measuring Stuff

LAB 2.1: Equations of Motion

Lab 2.2: g!! How Fast Can You React?

Lab 3.1: Building a Trebuchet

Lab 3.2: Mousetrap Racer

LAB 3.3: Forces and Motion

LAB 3.4: Projectile Motion

Lab 4.1: Measuring Static and Kinetic Friction

Lab 4.3: Building a Primitive Hovercraft

Lab 4.4: The Balloon Helicopter

LAB 4.5: Newton's Laws

LAB 4.6: Universal Gravitation

LAB 4.7: Newton's Second Law

LAB 4.8: Friction Forces and Applied Forces

LAB 4.9: Speed and Stopping Distances

LAB 4.10: Determination of Force of Gravity

LAB 5.1: Kinetic and Potential Energy

Lab 5.2: Building a Salt-Water Fuel Cell Car

LAB 6.1: 1_D Collisions

LAB 7.1: Satellite Playground

Lab 7.2: What is a Steradian?

LAB 8.1: Circular Forces

Lab 9.1: Force Buoyancy

Lab 9.2: Floating Steel

LAB 9.3: Density Simulation

LAB 9.4: Under Pressure

LAB 9.5: Force Buoyancy

LAB 10.1: Maxwell-Boltzman Distribution

Lab 11.1: Heat of Fusion of Ice

Lab 12.1: Zippity Do-Dah Ice Cream

Course Objectives: PHY 122

- 1. To increase student understanding of natural laws by emphasizing the basic principles of physics.**
- 2. To develop the analytical skills critical for success in both educational undertakings and lifetime decision making through emphasizing the unity of physics.**

3. To develop an understanding of the scientific process through the concept of a model and the steps of developing a theory, stating assumptions, recording observations, refining the model, and improving overall understanding.
4. To provide students with a thorough coverage of modern physics so that they will better comprehend the important public policy issues facing them as citizens.
5. To show students that physics is a dynamic, exciting field in order to prepare them for the 21st century when the need for scientific understanding will be greater than ever.
6. To present classical physics from a contemporary perspective.
7. To treat modern physics thoroughly

Curriculum Framework: PHY 122

Part 3: VIBRATIONS AND WAVES.

13. Vibrations and Waves.

14. Sound.

Part 4: ELECTRICITY AND MAGNETISM.

15. Electric Forces and Electric Fields.

17. Current and Resistance.

19. Magnetism.

Part 5: LIGHT AND OPTICS

22. Reflection and Refraction of Light.

23. Mirrors and Lenses.

25. Optical Instruments.

Part 6: MODERN PHYSICS

26. Relativity.

28. Atomic Physics.

29. Nuclear Physics.

Lab Work – Not all labs will be completed; only selected labs will be assigned.

Labs in capital letters are new on line HTML5 simulations

LAB 13.1: Hooke's Law Simulation

Lab 13.2: Tick Tock, Tick Tock

LAB 13.3: Waves

Lab 14.1: Doppler Effect

LAB 14.2: Resonance

LAB 15.1: Electric Fields
Lab 15.2: Getting Charged Up
Lab 15.3: Building an Electroscope
LAB 17.1: Ohm's Law Simulation
Lab 19.1: Constructing an Electric Motor
LAB 19.2: Magnetic and Electric Fields
LAB 22.1: Lenses
LAB 22.2 Bending Light
LAB 23.2: Virtual Lenses
LAB 25.1: Color Vision
LAB 27.1: Black Body Radiation
LAB 27.2: Interactions of Matter with Light
Lab 28.1: Too Hot To Handle
Lab 29.1: Operating a Virtual Tokamak Fusion Reactor
Lab 30.1: Building Your Own Airplane

Emergency Information:

A. Linwood Holton Governor's School

Information & Instructions for Individuals with Disabilities:

Students may request academic accommodations for identified disabilities through ALHGS's Main Office (276- 619-4326). We will evaluate the request, consult with appropriate officials from the student's home school, and develop a plan that outlines necessary and reasonable accommodations to be followed. All correspondence will be kept confidential.

Emergency Statement:

In the event of a major interruption of technological connectivity or actual emergency affecting the student's school, the offices of HGS, or the community college through which a student is receiving his/her credit - course requirements, class meeting times or schedules, assignment deadlines, and grading schemes are subject to changes that may include alternative delivery methods, alternative methods of interaction with the instructor, alternate class materials, changes to class membership, a revised attendance policy; a revised semester calendar and/or grading scheme, etc..

For more general information about plans for dealing with such catastrophic events or emergencies, please consult the following resources:

- The College Website
- Your School's Emergency notification and response plan
- The Holton Governor's School Web-Page (<http://www.hgs.k12.va.us/>)

Should such a situation arise, HGS's Administrator will work closely with the appropriate school division and college personnel to resolve it as soon as possible. Students will be contacted through available forms of communication and given specific directions as to how they will proceed to complete their course work, how timelines will be adjusted, etc.