

Cayuga Community College- Cayuga Advantage
General Physics I & II - PHY 103 & 104
4 credit hours each

Catalog Descriptions

PHY 103: Includes kinematics in one and two dimensions, Newton's Laws of motion, free body diagrams, work-energy theorem, conservation of energy and linear momentum, center of mass, centripetal acceleration, translations and rotations of rigid bodies, torque and equilibrium.

PHY 104: Continuation of PHY 103. Course content includes Kirchoff's voltage and current rules; reactance and resonance; electromagnetism, Faraday's Law, standing waves, the Doppler effect, reflection and refraction, mirror and lens ray diagrams, interference, diffraction and polarization.

Student Learning Outcomes PHY103:

Upon completion of this course, the student should be able to:

- 1. Analyze the relationship between displacement, velocity, and acceleration.*
- 2. Analyze free-body diagrams and apply Newtons 2nd Law*
- 3. Apply energy and linear momentum conservation principles.*
- 4. Analyze angular displacement, angular velocity, and angular acceleration within circular motion environments.*
- 5. Analyze centripetal and tangential accelerations.*
- 6. Analyze rotational and translational equilibrium.*

Student Learning Outcomes PHY104:

Upon completion of this course, the student should be able to:

- 1. Analyze electrostatics and magnetostatics problems.*
- 2. Analyze the relationship between voltage, current, and resistance associated with both DC and AC electrical circuits.*
- 3. Analyze reflection, refraction, interference, diffraction, and polarization principles of light.*
- 4. Analyze characteristics of mirrors and lenses.*
- 5. Apply superposition principle to electricity, magnetism, light, and sound.*

Course Requirements:

To accomplish course objectives, students must:

- 1. Abide by college attendance policies for class and lab- minimum 80% attendance rate.*
- 2. Complete assignments, labs, and projects in a timely manner.*
- 3. Take all exams and quizzes.*
- 4. Successfully complete all required laboratory assignments.*

Evaluation of Student Performance and Grading:

Evaluation of student work will be based upon performance on: quizzes, exams, homework, laboratory reports, projects, and final exams.

Textbook: College Physics 8th edition, Serwey & Vuille

Marking Period Dates PHY103

*Mid MP 1 Oct. 7th
MP 1 Nov. 10th*

*Mid MP 2 Dec. 16th
MP 2 Jan. 27th*

Marking Period Dates PHY104

*Mid MP 3 March 8th
MP 3 April 7th*

*Mid MP 4 May 17th
MP 4 June 16th*

LABS will be due EACH mid-marking period and end of marking period

Course Outline- Physics 103

1. Units, Dimensions, and other Preliminaries
 - a. *Fundamental Units*
 - b. *Metric System*
 - c. *Unit Analysis*
 - d. *Unit Conversions*
2. Kinematics
 - a. *Vector Addition and Subtraction*
 - b. *Displacement, Velocity, and Acceleration*
 - c. *Free Fall (1D motion)*
 - d. *Projectile Motion (2D motion)*
3. Newton's Laws of Motion
 - a. *Inertia*
 - b. *Free Body Diagrams*
 - c. *Friction*
4. Work and Energy
 - a. *Potential and Kinetic Energies*
 - b. *Conservation of Energy*
 - c. *Power*
5. Momentum and Collisions
 - a. *Momentum and Impulse*
 - b. *Conservation of Momentum*
 - c. *Elastic and Inelastic Collisions*
6. Circular Motion
 - a. *Angular Measure*
 - b. *Angular Velocity and Acceleration*
 - c. *Centripetal Acceleration*
7. Rotational Motion
 - a. *Translation and Rotation*
 - b. *Torque and Equilibrium*
 - c. *Rotational Dynamics*
 - d. *Rotational Work and Energy*
 - e. *Angular Momentum*

Course Outline - Physics 104

8. Electrostatics

- a. *Electrostatic Charging*
- b. *Coulomb's Law*
- c. *Voltage (Electric Potential Difference)*
- d. *Series/Parallel Capacitance*

9. DC and AC Circuits

- a. *Ohm's Law*
- b. *Series/Parallel Resistance*
- c. *Kirchoff's Voltage and Current Laws*
- d. *Reactance and Impedance*
- e. *Circuit Resonance*

10. Magnetism

- a. *Magnetic Fields and Forces*
- b. *Electromagnetism*
- c. *Faraday's Law*
- d. *Lenz's Law*

11. Harmonic Motion and Mechanical Waves

- a. *Simple Harmonic Motion*
- b. *Transverse and Longitudinal Waves*
- c. *Interference and Superposition*
- d. *Reflection, Refraction, and Diffraction*
- e. *Standing Waves and Resonance*

12. Sound Waves

- a. *Speed of Sound*
- b. *Sound Intensity*
- c. *Reflection, Refraction, and Diffraction*
- d. *Doppler Effect*

13. Geometric Optics

- a. *Reflection and Refraction*
- b. *Total Internal Reflection*
- c. *Dispersion*
- d. *Plane and Spherical Mirrors*
- e. *Lenses*

14. Physical Optics

- a. *Thin Film Interference*
- b. *Diffraction*
- c. *Polarization*

Physics Lab Reports for PHY 103 and PHY 104

The laboratory experience is an important part of PHY 103 & 104 providing the opportunity to investigate concepts and relationships in a hands-on environment. The labs also serve as evidence of your understanding of the relationships that are at the heart of the courses. Formal lab write-ups are expected with each lab assignment. General guidelines are listed below assist the write-up process.

ALL lab reports must be word-processed and *MUST be your own work!*

*It is fine to discuss lab details with peers, collaborate on lab calculations in class, discuss questions and analysis, and other team-based work, BUT it is **not acceptable** to turn in a team/partner written lab write up.*

All labs must be completed in the two courses and must earn at least a 70%

Lab Format:

- Title of Lab– (*also please include your name and the names of your lab partners*)
- **Abstract** -
 - What the purpose or objective of the lab was
 - How you completed the experiment (brief and generalized)
 - What you found out that is directly related to the purpose
 - How accurate your results were (% error if applicable)
- Materials & Procedure (often okay to include the lab handout for this part)
- Data collected (sometimes okay to just include data table in handout)
- Graphs (Excel or Logger Pro preferred)
- **Analysis** – calculations neatly shown – include formulas, units, substitution
- Question answers (pre lab Q's as well as final Q's)
- **Conclusion** –
 - *Restate* the purpose of doing the lab
 - What you did in the lab- general overview – more details than in abstract, but NOT the step by step procedure
 - What you found RELATED to the purpose and its significance.
 - DATA that is related to what you found- give an example of your results
 - Error analysis- accuracy of the result – % error calculation if applicable– State where errors might come from, BUT NOT HUMAN ERRORS like “calculated wrong, measured wrong”, etc.!The errors should reflect on the poor quality tool used, friction, limitations of the setup, inconsistent trials, assumptions made that are not exactly true in the real world, etc.

If your printer is not working, out of ink, or you don't have one- save the document on a flash drive to print at school, share via Google Docs, and/or EMAIL me the file! NO EXCUSES...

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There will be several labs where electronic alternatives to the formal lab reports can be substituted. These alternatives include: a poster presentation via Powerpoint (using a formal college scientific poster template- see your teacher for this template), a video with narration, a wiki or web page, or some other option that can be mutually agreed upon PRIOR.

Labs are due at the middle and end of each marking period. Do not procrastinate!

Labs turned in after the mid or end of marking period due dates are for course completion only and will be calculated in as a ZERO for the marking period average for when they were due.

****Labs count toward approximately 30% - 35% of any marking period grade****

Warning- Lunch detention may be assigned for students who owe back labs.