

Wallenpaupack Area School District

COURSE: Physics II

GRADE LEVEL: 11-12

LENGTH OF COURSE: 120 hours

TEXT: Modern Physics, third edition

PUBLISHER: Holt

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COURSE DESCRIPTION:

This course is designed to be a college preparatory introductory course. It covers the areas of thermodynamics, wave motion, sound, light, electromagnetic radiation, optics, electrostatics, DC electricity, AC electricity, atomic and nuclear physics using algebra and geometry as its mathematical base. Effective presentation of this physics material is based on a rigorous treatment of mechanics. Measurement and problem solving techniques are also presented. Because mathematics is the language of physics, an adequate preparation in algebra is an essential prerequisite. Geometry and trigonometry necessary for some problem solving are presented by the instructor as part of the physics curricula.

CURRICULUM WRITING TEAM:

T. Kietrys

DATE OF REVISION:

2005

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11 - 12

Unit: Laboratory skills

PA Standards: 3.2.10.B
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics:	Skills:
1. Review of physics I laboratory skills and techniques including traditional and computers data collection skills	1. Know correct use of measurement equipment 2. Data collection and analysis review
Activities:	Performance Assessments:
1. Review using various measurement devices: triple beam balance, spring scales, thermometers, graduated cylinders, pressure gauges and force scales and computer data collection sensors 2. Cooperative learning groups 3. Board demonstrations 4. Guided practice 5. Homework	1. Teacher-made chapter tests and quizzes 2. Student notebook 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Heat Engines

PA Standards: 3.1.10.A
3.1.10.C
3.1.12.C

Topics:	Skills:
<ol style="list-style-type: none">1. Mechanical Equivalent of heat2. 1st, 2nd and 3rd laws of thermodynamics3. Heat transfer systems4. Heat engines, steam, gas, jet and turbine	<ol style="list-style-type: none">1. Applying the three laws of thermodynamics2. Work done by a gas3. Adiabatic and isothermal system analysis4. Entropy theory5. Engine theory for gas, steam, diesel, gas turbines, jet engines and rockets
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Groups projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Waves

PA Standards: 3.1.10.D
 3.1.10.E
 3.1.12.D
 3.1.12.E
 3.2.10.C
 3.4.10.B
 3.4.12.B
 3.7.10.A
 3.7.10.B
 3.7.12.A

<p>Topics:</p> <ol style="list-style-type: none"> 1. Nature of waves 2. Mechanical and electromagnetic wave theory 3. Characteristics of waves 4. Wave interactions: 5 properties of waves 5. Superposition principle 	<p>Skills:</p> <ol style="list-style-type: none"> 1. Measuring wavelength, velocity, amplitude, frequency and energy of waves 2. Waves along an elastic mediums 3. Electromagnetic wave theory 4. Produce standing waves in the lab
<p>Activities:</p> <ol style="list-style-type: none"> 1. Laboratory work in laboratory groups 2. Group projects and individual projects 3. Cooperative learning groups 4. Board demonstrations 5. Guided practice 6. Homework 	<p>Performance Assessments:</p> <ol style="list-style-type: none"> 1. Teacher-made chapter tests and quizzes 2. Student notebook 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Sound Waves

PA Standards: 3.1.10.B
3.1.10.C
3.1.10.D
3.1.12.C
3.1.12.D
3.4.10.A
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
<ol style="list-style-type: none">1. Nature of sound2. Doppler effect3. Harmonics and resonance4. Beats and beat frequency5. Decibels levels and loudness	<ol style="list-style-type: none">1. Measuring sound decibels and frequency2. Investigating the Doppler effect on sound waves3. Music harmonics, notes and frequencies4. Measure beat frequency using a sound sensor
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work an reports5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: The nature of light

PA Standards: 3.1.10.B
 3.1.10.C
 3.1.10.D
 3.1.12.C
 3.1.12.D
 3.1.12.E
 3.2.12.A
 3.7.10.A
 3.7.10.B
 3.7.12.A

Topics:	Skills:
<ol style="list-style-type: none"> 1. Properties of light 2. Dual nature of light 3. Photoelectric effect 4. Quantum theory 5. X-rays 6. Illumination and light measurement 	<ol style="list-style-type: none"> 1. Understanding the electromagnetic spectrum 2. Calculating wavelength, frequency, velocity and energy of an em wave 3. Einstein's photoelectric effect experiment and the development of quantum mechanics 4. Photon emission and x-ray production 5. Photometry labs and demonstrations
Activities:	Performance Assessments:
<ol style="list-style-type: none"> 1. Laboratory work in laboratory groups 2. Group projects and individual projects 3. Cooperative learning groups 4. Board demonstrations 5. Guided practice 6. Homework 	<ol style="list-style-type: none"> 1. Teacher-made chapter tests and quizzes 2. Student notebook 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Reflection

PA Standards: 3.1.10.B

3.1.10.C

3.1.12.C

3.4.10.C

3.4.12.C

Topics:	Skills:
<ol style="list-style-type: none">1. Reflection and reflectance2. Mirrors and mirror technology3. Images formed by reflection4. Ray diagrams5. Applications of reflection	<ol style="list-style-type: none">1. Measuring angles of incidence, reflection, refraction, and total internal reflection2. Finding the focal length of a mirror and a lens3. Drawing ray diagrams4. Practical applications of reflections and refractions
Activities:	Performance Assessments:
<ol style="list-style-type: none">A. Laboratory work in laboratory groupsB. Group projects and individual projectsC. Cooperative learning groupsD. Board demonstrationsE. Guided practiceF. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Refraction

PA Standards: 3.1.10.C
3.1.12.C
3.4.10.C
3.7.10.A
3.7.10.B
3.7.12.A

Topics: <ol style="list-style-type: none">1. Optical refraction2. Lens optics3. Lens equations4. Uses of refraction5. Dispersion and color	Skills: <ol style="list-style-type: none">1. Measuring angles of incidence, reflection, refraction, and total internal reflection2. Finding the focal length of a mirror and a lens3. Drawing ray diagrams4. Practical applications of reflections and refractions
Activities: <ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	Performance Assessments: <ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Course: Physics II

Grade Level: 11-12

Unit: Diffraction and Interference

PA Standards: 3.1.10.B
3.1.10.C
3.4.10.C
3.4.12.C

Topics: <ol style="list-style-type: none">1. Interference2. Diffraction3. Polarization4. Wavelength by diffraction	Skills: <ol style="list-style-type: none">1. Producing interference patterns in the lab2. Measuring wavelength by diffraction3. Investigating interference patterns and bi-refringence using polarizing filters
Activities: <ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	Performance Assessments: <ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Electrostatics

PA Standards: 3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics: <ol style="list-style-type: none">1. Electric charge2. Electroscopes3. Induction and conduction methods of transferring charges4. Potential difference5. Capacitors	Skills: <ol style="list-style-type: none">1. Using electroscopes2. Producing charges by induction and conduction in the lab3. Capacitor labs
Activities: <ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	Performance Assessments: <ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Direct Current Circuits

PA Standards: 3.4.10.A
3.4.12.A
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics:	Skills:
<ol style="list-style-type: none">1. Sources of DC current2. Series and parallel circuits3. Ohms law4. DC networks	<ol style="list-style-type: none">1. Measuring voltage, current and resistance in the DC lab2. Calculating Ohm's law in the DC lab3. Wiring and trouble shooting circuits in series and parallel arrangement
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Course: Physics II

Grade Level: 11-12

Unit: Heating and Chemical Effects

PA Standards: 3.2.10.B
3.2.12.B
3.4.10.A
3.4.12.A

Topics:	Skills:
<ol style="list-style-type: none">1. Heating effects2. Energy and electric current3. Joules law4. Power in electric circuits5. Purchasing electric energy6. Electrolysis and electroplating7. Faraday's law	<ol style="list-style-type: none">1. Measuring Joules law in the lab2. Electroplating copper onto silver3. Calculating the cost of electric power4. Performing Faraday's lab
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Group projects and individual projects2. Laboratory work in laboratory groups3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Magnetic effects

PA Standards: 3.1.10.E
3.1.12.E
3.4.12.A
3.7.10.A
3.7.10.B
3.7.12.A
3.7.12.B

Topics: <ol style="list-style-type: none">1. Magnetism2. Domain theory3. Magnetic permeability4. Magnetic field and a charge in motion5. Magnetic field and current in a loop	Skills: <ol style="list-style-type: none">1. Measuring magnetic field strength2. Producing a magnetic field from an electric current
Activities: <ol style="list-style-type: none">1. Group projects and individual projects2. Laboratory work in laboratory groups3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	Performance Assessments: <ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Course: Physics II

Grade Level: 11-12

Unit: Electromagnetic induction

PA Standards: 3.1.10.E
 3.1.12.E
 3.4.10.B
 3.4.12.B
 3.7.10.A
 3.7.10.B
 3.7.12.A
 3.7.12.B

<p>Topics:</p> <ol style="list-style-type: none"> 1. Induced currents 2. Faraday's induction experiment 3. Cause of induced emf and current 4. Lenz's law 5. Generators 6. Motors 7. Inductance 	<p>Skills:</p> <ol style="list-style-type: none"> 1. Inducing a current in a DC lab 2. Applying the left hand generator rule 3. Applying the right hand motor rule 4. Understanding motor and generator theory and application
<p>Activities:</p> <ol style="list-style-type: none"> 1. Group projects and individual projects 2. Laboratory work in laboratory groups 3. Cooperative learning groups 4. Board demonstrations 5. Guided practice 6. Homework 	<p>Performance Assessments:</p> <ol style="list-style-type: none"> 1. Teacher-made chapter tests and quizzes 2. Student notebook 3. Projects (individual & group) 4. Laboratory work and reports 5. Final Exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Alternating current

PA Standards: 3.2.10.C
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
<ol style="list-style-type: none">1. AC measurements2. Power in AC circuits3. L, R and I in series4. Resonance	<ol style="list-style-type: none">1. Measuring AC current, voltage and power in and AC lab2. IRC circuits applications
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports6. Final exam

Wallenpaupack Area School District

Course: Physics II

Grade Level: 11-12

Unit: Atomic Structure

PA Standards: 3.1.10.E
3.1.12.E
3.2.10.C
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
<ol style="list-style-type: none">1. Subatomic particles2. The electron3. The proton4. The neutron5. Mass spectrograph6. Nuclear binding	<ol style="list-style-type: none">1. Understanding the atomic theory of matter2. Naming and describing the sub atomic particles3. Calculating binding energy
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam

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Course: Physics II

Grade Level: 11-12

Unit: Nuclear Reactions

PA Standards: 3.1.10.D
3.2.10.C
3.4.10.B
3.4.12.B
3.7.10.A
3.7.10.B
3.7.12.A

Topics:	Skills:
<ol style="list-style-type: none">1. Fission2. Fusion3. Cosmic rays4. Radioactivity5. Nuclear reactors and reactions6. Radioisotopes	<ol style="list-style-type: none">1. Researching current fission reactions and uses2. Researching current fusion reactions and uses3. Researching radioisotopes and their uses
Activities:	Performance Assessments:
<ol style="list-style-type: none">1. Laboratory work in laboratory groups2. Group projects and individual projects3. Cooperative learning groups4. Board demonstrations5. Guided practice6. Homework	<ol style="list-style-type: none">1. Teacher-made chapter tests and quizzes2. Student notebook3. Projects (individual & group)4. Laboratory work and reports5. Final Exam