Physics (2007-2008 School Year)
Mr. Morse

Course Description

This two semester course provides students with a fundamental understanding of mechanics, heat, sound, light and electricity and magnetism. The course will prepare students for additional study of physics at the college level. Specific topics will include motion and force, work and energy, momentum, rotational kinematics, fluid mechanics, heat, wave theory, sound, light, electrostatics, electric current, magnetism, and a brief overview of atomic and nuclear physics. We will include a historical perspective via class discussions of the contributions of selected scientists to the major areas of physics. The laws of conservation of energy and conservation of mass will be used as unifying concepts throughout the course. Students will perform a number of laboratory experiments and investigations. The details of these labs will be recorded in the laboratory notebooks. A formal laboratory report will be required for many of the experiments.

Syllabus (subject to change)

First Semester

Week	Topics
	First Quarter
1	Course logistics, the science of physics, displacement and velocity
2	Acceleration, falling objects
3	Review and test on one dimensional motion *(chapters 1-2*), introduction to vectors
4	Vector operators, projectile motion
5	Review and test on 2 dimensional motion *(chapter 3)*
6	Changes in motion, Newton's first law, Newton's second law
7	Everyday forces, review and test on forces and laws of motion *(Chapter 4)*
	Second Quarter
8	Work, energy and conservation of energy
9	Power, review and test on work and energy *(chapter 5)*
10	Momentum and impulse, conservation of momentum, collisions
11	Review and test on momentum and collisions *(chapter 6)*
12	Rotational motion, tangential and centripetal acceleration
13	Gravitation, Kepler's laws, torque, rotation and inertia
14	Rotational dynamics, review and test on rotational motion, equilibrium and dynamics *(chapters 7-8)*
15	Introduction to heat, latent heat, phase changes
16	Review and test on heat *(chapter 10)*

Second Semester

Week	Topics
	Third Quarter
1	Introduction to thermodynamics – heat, work and internal energy, cyclical processes
2	Heat engines, review and test on thermodynamics *(chapter 11)*
3	Simple harmonic motion, properties of waves
4	Wave interactions, review and test on waves *(chapter 12)*, sound waves
5	Sound intensity, standing waves, harmonics
6	Characteristics of light, flat mirrors, curved mirrors
7	Polarization, review and test on sound, light and reflection *(chapters 13-14)*
8	Light refraction and Snell's law, thin lenses, combinations of lenses, optical phenomena
9	Interference and diffraction of light, review and test on light refraction and interference *(chapters 15 and 16)*
	Fourth Quarter
10	Electrostatics and electric force
11	Electric fields, electric potential energy, electric potential
12	Capacitance, stored electric energy
13	Review and test on electric forces, fields and energy *(chapters 17- 18)*
14	Resistance, Ohm's law, electric power, series and parallel circuits
15	Complex resistor combinations, review and test on circuits (*chapters 19-20*)
16	Magnets and magnetic fields, electromagnetism
17	Induced current, alternating current, generators and motors, inductance
18	Review and test on magnetism, induction and alternating current *(chapters 22-22)*, introduction to nuclear physics, nuclear decay
19	Nuclear energy, particle physics, review and test on nuclear physics *(chapter 23)*

Grading

70% Tests and quizzes
15% Lab notebooks and lab reports
15% Homework/class participation

Tests will be given at the end of each major course unit or about every 2-3 weeks. Each unit test will count as 100 points toward the test/quiz grade. In addition to unit tests, quizzes will be given in the middle of some of the longer units. Each quiz will count 20-40 points or 20-40% of the value of a unit test.

Lab notebooks will be collected and graded at least once per quarter, primarily for completeness and adherence to the Ridgeview Classical Schools Lab Notebook Guidelines. Lab reports will be required for many lab experiments performed in class. Lab reports should follow the structure outlined at the end of this syllabus.

Homework will be assigned almost every day. Regular completion of homework is essential to success in physics class. We will allocate time at the beginning of each class for detailed homework discussion. In addition to written homework assignments, students will be required to read material from the text and from selected other sources. Students are expected to complete the reading assignments and be ready to participate in class discussions based on these assignments. Class participation will be partly evaluated on the student's ability to discuss key points covered in the reading assignments.

Lab Reports

Some lab experiments will require submission of a formal lab report. Experiments requiring these reports will be specifically identified as the course proceeds. The formal lab reports should follow the following template. Include each section listed below in every report and label the sections. These lab reports are intended to be a brief (1-2 single space typed pages) summary of the experiment performed by the student. Strive for conciseness. Try to include a graph of your data in every report. If possible use a computer tool such as Excel or the Vernier Data Pro software to analyze and plot the data. Each student is expected to turn in a report (no "team" reports).

Title – the name of the experiment performed. Normally this will be the name assigned in class and written in your lab notebook.

Introduction – explains the hypothesis you set out to test and why you and your class were asked to perform the experiment. It could include a summary of information you already know from previous studies and how that knowledge would be expanded, challenged or verified by doing the experiment. If appropriate it could include references to specific scientific laws or theories.

Materials and methods – provides a brief description of what you did. It should include a list of the materials and equipment used and a description of the experimental procedure. Provide enough detail that another student would be able to perform a similar experiment by referring to this section. Include the names of your lab partner(s) in this section.

Results - presents the key data gathered in the experiment. You don't need to include detailed data tables of all your measurements – this should already be in your lab notebook. Just provide a summary of the data in the form of a simple table or graph to enable the reader to quickly understand your results. Explain how the results relate to the hypothesis you are testing.

Discussion – explains your interpretation of the results of the experiment. Did the experiment provide a valid test of your hypothesis? Did it support or refute your hypothesis? What were the likely sources of error? Include possible ways to minimize errors and improve the overall experimental process.

Text

Serway and Faughn – *Physics*
Holt, Rinehart and Winston, 2000 edition

Course materials and other requirements

1. A scientific calculator that provides trigonometric functions (sine, cosine, etc), logarithms and scientific notation. Graphing capability and an equation solver will prove useful. A calculator such as TI-83 or TI-84 is a good choice. A basic scientific calculator with a one line display is adequate to perform the calculations, but it will be easier to keep track of your calculations on a multi-line display. Much of the course work will consist of solving problems. Students must bring their calculator to class every day.
2. Bound lab notebook. (Most students will use notebooks started in previous science classes.)
3. A Student Safety Contract read, understood and signed by the student and his/her parent or guardian. For everyone's safety in the lab, terms of the safety contract will be strictly enforced. (please return this to Mr. Morse by September 8)
4. A copy of this course description sheet signed by the student and his/her parent or guardian, acknowledging having read it. (please return this to Mr. Morse by September 8)

Signatures

Each student and his/her parent or guardian is to sign this course description sheet, acknowledging having read it. Please return this page of the course description to Mr. Morse.

Additional copies of this course description are available on the Ridgeview Classical Schools website: www.ridgeviewclassical.com.

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Student signature Parent/guardian signature