

DCHEP Physics Independent Study Class - 2005/6

Instructor: Jim Marshall, 723-9672 (H), marshiiearthlink.net

Pre-requisite: Physics is mathematical. Completion of Algebra II is recommended. Good math students who have completed Algebra I and are currently taking Algebra II may take this course with prior coordination with the instructor.

Schedule: First class - 29 August; Final exams complete - 25 May (Assuming no time lost due to instructor availability)

Materials:

Texts (2): BJU Press; Physics, For Christian Schools, Second Edition, Student Text and Lab Manual.

Other: Quad paper is required for homework & tests. A scientific calculator is required. The calculator does not require graphing capability, though it would be more helpful.

Course Location: DCHEP Classroom (B-21) on DCS 15th St. W. Campus

Instructor's Philosophy: Physics is only learned by doing. Students can expect to be challenged with homework. Few do well on tests without doing homework. Though homework may not be a significant part of the grade, the instructor will take note of those students who are and are not faithfully doing the assignments and take that into consideration during discussion with parents concerning course progress and other course issues.

Grading:

The instructor will determine the final grade. Tests will be administered on a nearly bi-weekly basis. There will be one mid term and one final. Missed tests will count as zero unless prior coordination is made with the instructor. Lab work will be turned in and graded. Homework will be reviewed on a regular basis. Postcards will be mailed to parents periodically to keep parents aware of the progress of their students. Any significant concerns will be communicated to the parents via a phone call from the instructor.

Grading weights:

Tests: 50%

Labs: 25%

Homework: 5%

Mid Term: 10%

Final: 10%

Grading scale:

90-100% A

80-89% B

70 - 79% C

60-69% D

<60% F

The course will end by 25 May. Late work will be expected to be caught up and completed by this date.

Course Description: Parents may obtain the course description from the DCHEP office.

Discipline: Uncooperative students will be provided verbal warning in class and parents notified by phone. Parents are expected to support the instructor in all class matters. Students who persist in disturbing the class will be directed to leave and not return.

Absences: Excessive absences that effect the students ability to keep up with the course will be discussed with the parents. The instructor reserves the right to drop students who are frequently absent for no apparent reason following discussion with the parents.

Class Schedule:

Mondays, 6:30-9 PM

Thursdays, 6:30-9 PM

Students should attempt to do all the homework assignments before each class. In the event difficulties are encountered with particular problems, students should move onto the next problem and bring questions to the upcoming class.

In the event the instructor is prevented from supporting a class for illness or work related reasons, parents will be notified by phone as soon as possible. As a general rule, the course assignments are known and students will be expected to work ahead and keep up with assignments.

Schedule:	Monday (M)	Thursday (T)	Lessons/Labs
August	29		(M) Ch 1, Sec 1,2
September		1	(T) Ch 1, Sec 3; Lab1-1
	5		(M) Labor Day-No Class
		8	(T) Ch 1 Rev; Ch 2, Sec 1
	12		(M) Ch 2, Sec 2
		15	(I") Lab 2-2
	19		(M) Ch 2, Sec 3
		22	(T) Lab 2-4
	26		(M) Ch 2 Rev; Ch 3, Sec 1
		29	(T) Ch 3, Sec 2; Oh 1&2 Ex
October	3		(M) Ch 3, Sec 3
		6	(T) Lab 1-2
	10		(M) Ch 3, Sec 4
		13	(T) Lab 2-5
	17		(M) Ch 3 Rev; Ch 4 Sec 1
		20	(T) Ch 4, Sec 2&3
	24		(M) Ch 4, Sec 4
		27	(T) Lab 2-3
	31		(M) Ch 4 Rev; Ch 3&4 Ex; Ch 5, Sec 1
November		3	(T) Ch 5, Sec 2&3
	7		(M) Ch 5, Sec 4
		10	(T) Lab 2-8
	14		(M) Ch 5 Rev; Ch 6, Sec 1
		17	(T) Ch 6, Sec 2

21-25 Thanksgiving Week- No Class		
December	28	(M) Ch 6, Sec 3
	1	(T) Lab 2-9
	5	(M) Ch 6 Rev; Ch 6&7 Ex; Ch 7, Sec 1
	8	(T) Ch 7, Sec 2
	12	(M) Ch 7, Sec 3
	15	(T) Ch 7, Sec 4
	19	(M)Ch7Rev
12/20-1/4 Christmas & New Years - No Class		
January	5	(T) Ch 9, Sec 1
	9	(M) Mid Term Ex
	12	(T) Ch 9, Sec 2
	16	(M) Ch 9, Sec 3
	19	(T) Lab 3-2
	23	(M) Ch 9 Rev; Ch 10, Sec 1
	26	(T) Ch 10, Sec 2
	30	(M) Ch 10, Sec 3
February	2	(T) Ch 10 Rev
	6	(M) Ch 9&10 Ex; Ch 11, Sec 1
	9	(T) Ch 11, Sec 2
	13	(M) Ch 11, Sec 3
	16	(I') Lab 3-7
	20	(M) Ch 11, Sec 4
	23	(T) Ch 11 Rev; Ch 12, Sec 1
	27	(M) Ch 12, Sec 2&3
March	2	(T) Ch 12 Rev; Ch 13, Sec 1
	6	(M) Ch 118,12 Ex; Ch 13, Sec 2
	9	(T) Ch 13, Sec 2&3
	13	(M) Ch 13, Sec 4
	16	(T) Lab 4-10
	20	(M) Ch 13 Rev; Ch 14, Sec 1
	23	(T) Ch 14, Sec 2
	27	(M) Ch 14, Sec 3
	30	(T) Lab 4-12
April	3	(M) Ch 14 Rev; Ch 13&14 Ex; Ch 16, Sec 1
	6	(T) Ch 16, Sec 2
SAT Week (10-14) No Class		
	17	(M) Ch 16, Sec 3
	20	(T) Ch 16 Rev, Ch 17, Sec 1
	24	(M) Ch 17, Sec 2&3
	27	(T) Ch 17, Sec 4
May	1	(M) Ch 17 Rev; Ch 18, Sec 1
	4	(I'') Lab 4-2
	8	(M) Ch 18, Sec 2
	11	(T) Lab 4-3
	15	(M) Ch 18, Sec 3
	18	(T)Ch18Rev
	22	(M) Final Ex

Joshua Christian High School
Joshua Christian Independent Studies
Course Outline for Physics

I. Course Description

Physics is the study of the interactions of energy and matter. The topics discussed represent a survey of only the most essential material. Advanced theoretical physics involves the use of high-level mathematics, which will not be seen in this course. General topics to be covered are Classical Mechanics, Thermodynamics and Matter, Electromagnetics, and Geometric Optics and Light. (It is unlikely that time will permit Modern Physics to be addressed.) This course includes weekly laboratory experiments related to the subject material being studied. In this course, only algebraic skills will be required to understand the fundamental principles of physics. It is recommended that the student have completed Algebra II, or be an good math student who has completed Algebra I and is currently taking Algebra II. This is typically a junior or senior level high school course.

II. Course Objectives

1. The student will be exposed to the philosophical development of science through history.
2. The student will understand the general approach to scientific investigation and its limitations.
3. The student will learn about standardized measurement systems, be able to make physical measurements to a reasonable number of significant digits, and understand the difference between accuracy and precision.
4. The student will be able to discuss steps in a methodical approach to problem solving and be able to solve typical problems employing these steps.
5. The student will be able to describe one dimensional motion in graphical form, and to solve problems using equations of motion. Concepts included are speed, velocity, and acceleration.
6. The student will understand the difference between scalar and vector quantities. The student will be able to solve problems using vector addition and subtraction.
7. The student will be able to describe and solve problems involving kinematics in two dimensions. This includes problems involving projectile motion.
8. The student will be able to solve dynamic problems using Newton's first, second, and third laws of

- motion. The student will understand the difference between mass and weight.
9. The student will be able to solve problems involving circular motion. This includes comparison of circular equations with linear equations of motion, the relationship between centripetal force and acceleration, torque, Kepler's laws of planetary motion, and using the law of universal gravitation to calculate the gravitational force between two objects.
 10. The student will be able to solve problems using free body diagrams involving tension, friction, gravity, and other forces using Newton's laws of motion.
 11. The student will be able to solve work and energy problems. Topics include work by constant and variable forces, calculation of mechanical power, the difference between kinetic and potential energy, and total mechanical energy.
 12. The student will understand and be able to solve problems involving conservation of energy. This will include theoretical versus actual mechanical advantage problems.
 13. The student will be able to define and calculate momentum. Topics include impulse, conservation of momentum, various modes of collisions in one and two dimensions, and the difference between linear and angular momentum.
 14. The student will be able to describe simple harmonic motion, to include frequency, wavelength, period, amplitude, and speed. The student will be able to describe and solve pendulum problems and describe the Doppler Effect.
 15. The student will be able to describe the four states of matter, the particles that make up matter, the forces that hold the particles of matter together, and physical properties of solids, liquids, & gases.
 16. The student will be able to describe the reaction of materials to heating, calculate thermal expansion, distinguish among temperature scales, describe various gas laws, and use gas laws to solve problems.
 17. The student will be able to describe kinetic and caloric theories of heat, define heat capacity & specific heat, predict heat transfer and temperature changes, define and use latent heats, and describe the different ways that thermal energy can be transferred.
 18. The student will be able to state the first, and second laws of thermodynamics, calculate work done by a heat engine, distinguish between open, closed, and isolated systems, and describe entropy.
 19. The student will be able to state the law of charges, describe the construction, function, and use of an electroscope, describe electrical induction, use Coulomb's law to determine electrostatic forces, and compare/contrast the electrostatic and gravitational force.
 20. The student will be able to describe electrical current, identify several sources of potential difference, distinguish between series and parallel circuits, identify factors in resistance, state & use Ohm's law in analyzing resistive circuits, apply Joule's law to determine power used in electrical components & circuits, and solve for various electrical parameters in simple circuits.
 21. The student will be able to describe magnetic fields, properties of magnets, differences between ferromagnetic, paramagnetic, and diamagnetic materials, describe the source & characteristics of geomagnetism & orientation of the earth's magnetic field, and describe the magnetosphere & how it causes the Van Allen belts & polar auroras. The student will be able to use the right hand rule to describe the direction of an electrically induced magnetic field, the magnitude and direction of magnetic forces on current carrying wires & coils, and describe the parts & function of a simple DC motor.
 22. The student will be able to describe the regions of the electromagnetic spectrum, the sources of visible light, compare and contrast the two method of analyzing light propagation, use Maxwell's equations to show how light is a periodic wave, use the law of reflection to predict a light ray's path, and predict the locations, size, and orientation of a reflected image from plane and curved mirrors.

III. Course Outline

A. First Semester

1. Measurement (Ch 1), motion in one dimension (Ch 2), two dimensional motion & vectors (Ch 3), forces & laws of motion (Ch 4), work & energy (Ch 5), momentum & collisions (Ch 6), and circular motion & gravitation (Ch 7).
2. Labs (typically one per chapter)
3. Chapter Tests
4. Mid-Term Exam

B. Second Semester

1. Heat (Ch 9), thermodynamics (Ch 10), vibrations & waves (Ch 11), sound (Ch 12), light & reflection (Ch 13), refraction (Ch 14), electric forces & fields (Ch 16), electrical energy & current (Ch 17), circuits & circuit elements (Ch 18), and magnetism (Ch 19).
2. Labs (typically one per chapter)
3. Chapter Tests
4. Final Exam

IV. Instructional Materials

- A. Text: Physics, 2006; Holt, Rinehart & Winston
- B. Lab Manual: Physics, For Christian Schools, Second Edition, BJU Press

V. Teaching Methods

- A. Teacher - Student discussion & interaction
- B. Daily lessons & lab work / homework

VI. Evaluation

A. Components

- 1. Chapter tests: 50%
- 2. Labs: 25%
- 3. Homework: 5%
- 4. Mid-term exam: 10%
- 5. Final exam: 10%

B. Scale

100-90	A
89-80	B
79-70	C
69-60	D
Lower	F