



School District of Marshfield Course Syllabus

Course Name: AP Physics C Electricity & Magnetism

Length of Course: Year

Credit: 1 Credit

Program Goal:

The School District of Marshfield K-12 Science Program will prepare and motivate learners to explore, problem solve and collaborate with their classmates to interpret science and explain the world around them. Learners will acquire knowledge and evidence that promotes creative solutions through the evaluation and understanding of scientific theories and evidence. Learners will collect, analyze and reason with scientific data through investigations that ultimately allow for the generation of scientific explanations. Critical thinking skills will elevate natural curiosity, make sense of scientific data and promote scientific literate citizens.

Course Description:

This course is recommended for students intending to pursue degrees in the physical sciences or engineering. Explore concepts such as electrostatics, electric circuits, conductors, capacitors, dielectrics, magnetic fields and electromagnetism. Learn to apply differential and integral calculus in order to solve problems associated with these concepts. Build your understanding and critical thinking skills through inquiry-based, laboratory investigations that explore these

physics concepts. This course ordinarily forms the second part of the college sequence that serves as the foundation in physics for students majoring in the physical sciences or engineering. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. Strong emphasis is placed on solving a variety of challenging problems, some requiring calculus. Also study interactions among science, technology and society.

AP Physics C Electricity and Magnetism	
Text	
During the 18 week semester, we will explore concepts from electrostatics, DC circuits, magnetism, and electromagnetism. [[Young, Hugh D., Roger A. Freeman, and A Lewis Ford. <i>Sears and Zemansky's University Physics 11th Edition</i> , 2004, Reading, MA: Addison-Wesley, chapters 21-30.]. The course will meet 5 days per week, 43 minutes per day.	
Materials	
You need to have one three ring binder and one notebook, exclusively for Honors Physics. All class notes, homework, and reading notes go in your NOTEBOOK. All handouts and labs go in your THREE RING BINDER. This is a convenient way to organize material as it is presented to you. Being organized will certainly improve your chances of success! You will be expected to have method/place to store your lab work. Most labs will be turned in on loose-leaf paper. Labs need to be stored together after they are turned in and graded. A three ring binder is one great way to store these. Colleges may use your lab records to make a final decision to award or not award you college credit for those you who will continue into AP Physics next year. Please keep lab reports neat and well organized.	
Grades	
You will be graded on the following categories: 30% HOMEWORK QUIZZES and HOMEWORK 30% LAB ACTIVITIES - written by you as we work 40% EXAMS - at the end of each major unit combining multiple choice and free-response style questions You will be graded on the following categories:	

Homework:

Problems will be assigned an average of 3 nights a week. Please label each assignment and use plenty of space for each one.

Questions will be taken on homework problems the day before they are due. On the day they are due, a homework quiz may be given. Problems should be written completely and neatly. Show each step clearly, and be sure to consistently use units with numerical values.

Homework quizzes:

These quizzes will be 1 or 2 problems taken directly from the textbook. The quizzes are usually OPEN TEXTBOOK, meaning a calculator and textbook can be used, but your problem notebook may not be used. A limited amount of time will be allowed on each quiz. Keeping up to date on problem sets will make the quizzes very reasonable to complete. Problems will be graded on four areas: setup and equations, numerical values put into equations, numerical solution, and use of units throughout the problem. Missed homework quizzes will not be made up. Rather, a set number of quiz scores will be dropped at the end of each grading period.

Lab Activities are at the core of understanding physics! They will be usually completed in groups of 2 to 3 people. Working cooperatively together is critical to the success of everyone in the class. *Each student must hand in their own lab report.*

Labs reports are to be concise, organized accounts of the work which you have done. Most lab reports will be written in a formal style, according to guidelines we will work through together. Lab reports may be typed but do not need to be typed. Often we will use the computers to collect data and build graphs.

Exams will cover each major unit...often over two or more chapters. They will be a combination of multiple choice questions and free response problems. Exams may also contain review material from previous units.

Computers will be used often in this course. Plan to store all of your computer work on the hard drive using a folder with your name. Each lab group should use the same computer for each lab.

The text for the course is University Physics, eleventh edition, by Young and Freedman, written for a first year college physics course. Some of the assigned problems (those marked web) will have a solution completely worked out online. Solutions will be given to you after the assignment due date. Those that you still have difficulty with will be presented by a student for solutions by the class as a whole.

We need to approach this course as a team. Our goal is to help each person to become a confident physics problem solver and thinker. Working as a team, we can achieve great success.

Text Assignments:

Chapter	Discussion Questions	Exercises
21	2,5,6,7,17,24	2,4,8,17,18,23,25,28,30,31,39,46,48,54,56,58,62,65,67,71,75,80,82,83,92,101,104,105
22	1,3,4,9,15,17	1,3,7,12,15,20,23,28,31,35,39,45,50,52,56,59,60,65
23	1,3,5,8,9,18,19	1,3,7,12,13,17,26,31,32,35,40,41,44,49,54,55,58,59,65,72,80,85,89
24	1,2,3,4,7,11,15	2,6,7,10,14,15,23,30,32,39,41,48,58,59,61,67,71,73,75,77,80
25	1,3,6,10,13,19	1,5,8,10,11,20,30,32,35,39,43,48,50,53,57,60,64,68,73,74,78,81
26	1,2,3,5,6,11	1,5,6,7,14,15,19,20,25,28,32,36,39,43,44,45,47,49,55,58,62,68,73,77,78,82,88,90,91
27	1,5,8,14,16	1,3,7,11,13,15,17,20,23,25,28,30,32,33,40,44,46,48,51,53,56,57,61,63,66,70,74,79,82,86,91
28	1,2,3,4,11,16	2,3,6,8,11,15,18,23,25,29,30,32,35,40,43,45,46,49,51,54,55,60,65,74,75,77,82,83
29	1,4,6,7,9,11,12,16,17	2,3,4,8,12,16,17,20,22,25,30,34,36,38,42,43,45,50,52,54,56,57,58,64,69,73,77
30	2,3,5,7,9	1,4,7,9,12,14,18,20,24,29,32,36,38,42,43,45,47,49,50,59,61,63,65,67,69,74,76,77,79

Topics/Content Outline- Units and Themes:

• Week 1

- o M: Chapter 21: Electric Charge and Electric Field Coulombs Law
- o T: Assign Chapter 21 HW
Whiteboard Ch 21 problems
- o W: Whiteboard Ch 21 problems
- o R: Lab: Determine Coulomb Constant from Charged Balloons
- o F: Finish Lab

- **Week 2**

- o M: Correct Ch 21 HW
Quiz Chapter 21
- o T: Chapter 22: Gauss's Law
Assign Chapter 22 HW
- o W: Lab: Mapping Electric Fields
- o R: Finish Labs
- o F: Finish Chapter 22 Examples
Whiteboard Ch 22 problems

- **Week 3**

- o M: Correct Ch 22 HW
Quiz Chapter 22
- o T: Test Chapters 21-22
- o W: Chapter 23: Electric Potential
Assign Chapter 23 HW
- o R: Lab: Measuring Charges
- o F: Lab: Measuring Charges

- **Week 4**

- o M: Finish Lab: Measuring Charges
- o T: Finish Chapter 23 Examples
Whiteboard Ch 23 problems
- o W: Correct Chapter 23
Quiz Chapter 23
- o R: Chapter 24: Capacitance and Dielectrics
Assign Chapter 24 HW
Whiteboard Ch 24 problems
- o F: Lab: Charging/Discharging a Capacitor

- **Week 5**

- o M: Finish Lab
- o T: Correct Ch 24 HW
Chapter 24 Quiz
- o W: Lab: Series and Parallel Capacitor Arrangements
- o R: Finish Labs
- o F: Test Chapter 23-24

- **Week 6**

- o M: Chapter 25: Current, Resistance, and Electromotive Force
- o T: Assign Chapter 25 HW
Whiteboard Ch 25 problems
- o W: Lab: Ohm's Law
- o R: Finish Lab

- **Week 7**

- o M: Correct Ch 25 HW
- o T: Quiz Chapter 25
Chapter 26: Direct Current Circuits
- o W: Finish Chapter 26 Examples
Assign Chapter 26 HW
Whiteboard Ch 26 problems
- o R: Lab: Resistors in Series and Parallel
- o F: Finish Labs

- **Week 8**

- o M: Correct Ch 26 HW
- o T: Chapter 26 Quiz
- o W: Test: Chapters 25-26
- o R: Chapter 27: Magnetic Field and Forces
- o F: Finish Chapter 27 Examples
Assign Chapter 27 HW
Whiteboard Ch 27 problems

- **Week 9**

- o M: Lab: Magnetic Field in a Coil
- o T: Finish Lab
- o W: Correct Ch 27 HW
- o R: Chapter 28: Sources of Magnetic Fields
- o F: Finish Chapter 28 Examples
Assign Chapter 28 HW
Whiteboard Ch 28 problems

- **Week 10**

- o M: Quiz Chapter 27
- o T: Lab: Magnetic Field in a Permanent Magnet

- o W: Finish Lab
- o R: Correct Ch 28 HW Chapter 28 Quiz
- o F: Test: Chapters 27-28

- **Week 11**

- o M: Chapter 29: Electromagnetic Induction
Assign Chapter 29 HW
- o T: Lab: Induction in a Coil
- o W: Finish Lab
- o R: Whiteboard Ch 29 problems
- o F: Correct Ch 29 HW
Quiz Ch 29

- **Week 12**

- o M: Chapter 30: Inductance
- o T: Ch 30 Examples
Assign Chapter 30 HW
Whiteboard Ch 30 problems
- o W: Quiz Chapter 29
- o R: Lab: Inductors in Circuits
- o F: Lab: Continued

- **Week 15**

- o M: Finish Labs
- o T: Correct Ch 30 HW
- o W: Chapter 30 Quiz
- o R: Test: Chapters 29-30

- **Weeks 16&17**

- o Students construct electric motors from nails and wire and use them to complete mechanical work.

AP Physics Lab Report Format

NAME: _____

Date of lab: _____

Title: _____

PURPOSE: (1 or 2 sentences)

What is the point of this lab? What are we trying to accomplish?

MATERIALS:

What equipment does this lab require? Sketch the setup if appropriate.

PROCEDURE: (3-7 sentences)

What steps need to be followed to conduct the lab (summarize in your own words what you did in the lab)? Are your directions clear and precise? Is the lab easily repeatable with only your directions? Include sketches or diagrams if helpful.

DATA:

What raw data is collected throughout the lab? All numeric values must have their units stated, though in a table it is acceptable to indicate the units in the table headings. Data should be recorded here as it is first collected.

Organize a data table before collecting data. Some labs will include a separate data sheet. In those cases, just put “see data sheet” under this heading.

CALCULATIONS:

What calculations are necessary to arrive at the quantities desired? Show these calculations in step-by-step form. *If there are no calculations, do not include this heading.*

GRAPH:

If appropriate, develop a graph to illustrate relationships between variables. What type of relationship (direct, inverse square...) exists between the variables? There should be a statement following each graph summarizing what it indicates about the information it shows. **Be sure to label all graphs with appropriate units.** *If there are no graphs, do not include this heading.*

QUESTIONS: Answer any applicable or assigned questions. If questions are on a separate sheet included in the handout just staple those to your writeup and put “see question sheet” under this heading.

CONCLUSIONS: (3-5 sentences) What are the major findings of the lab? What happened as you ran the lab? Did everything go as expected? What particular things are important to watch for?

- Respond to the purpose. What concepts does the lab illustrate?
- How do your results compare to what theory predicts should happen?
- What are possible sources of error in the data? Comment on how one might minimize or eliminate this error.