Learning outcomes
This is the second semester of a two-semester calculus based course in AP Physics C. The goal of the course is to understand the core-principles of electromagnetism that dominate our everyday experiences. These include the basic rules of optics underlying the physics of light, which is a type of electromagnetic wave. Electrical energy and its usage form the very foundation of our modern society; it’s presence is pervasive ranging from household appliances to the lighting of our homes. The electromagnetic force, one of the four fundamental forces of nature, plays a central role in holding the stellar masses together, by providing a stabilizing force that offsets the crushing attractive force due to gravity. Such seemingly disparate topics can in fact be understood by developing a unifying framework for studying classical electromagnetism.

Our aim in this course is to cover the basics of electromagnetism: concepts of electricity, electrical charges, forces, fields, energy and electronic circuits. In addition, elements of atomic/nuclear structure will also be covered. This will give us an appreciation about the structure and colorful properties of matter and also about the various forces that hold atoms together. Finally, we will explore the laws of thermodynamics with everyday applications.

At the conclusion of the course, students will be able to:
1. Use electrical and magnetic field lines and their energy in understanding electromagnetic phenomena
2. Understand the basics of electrical circuits
3. Examine the wave motion as a mode of energy transfer
4. Appreciate the richness of the atomic world
5. Apply the laws of thermodynamics to real life problems

Texts & materials
Fundamentala of Physics by Resnick & Halliday (RH)
Scientific calculator; Laptop (optional); Lab notebook

Internet resources
Class attendance, preparation and expectations
Successful learning of physics entails becoming familiar to definitions and core concepts and their applications. It is very important to study and learn the material as covered in class as successive classes will build on concepts covered previously.

Evaluation
**Homework:** Homework assignments based on class presentations will be provided periodically. **They are due within a week after their receipt.**

**Labs:** The various concepts learnt during instructions will be illustrated in the lab periods. **Lab activities will be performed in groups of 3-4 students.** Successful completion of each week’s lab will entail performing the experiment carefully, recording pertinent data and observations completely, and turning in a complete and correct write-up of data analysis and results. Some lab days are reserved for instructions (please see below).

**Lab reports from each group (data, analysis, and results) are due at the beginning of the next lab.**

**Tests:** Three in-class tests and a comprehensive final exam (please see below). Tests may be comprised of a variety of question types, including fill-in, multiple choice, short answer, and problem solving. The tests are not cumulative (but note that each topic builds on previous topics). Test topics would be announced at least a week prior to the test date.

**Weighting:** Lab 25%; Homework 20%; Final exam 25%; In-class tests carries 30% of the total weight.

**Grading:** Grades will be rounded to the nearest integer. Specific letter grade will be assigned according to the following scheme:

- 90% or higher = A; 86% - 89% = A-
- 85% - 88% = B+; 81% - 84% = B; 77% - 80% = B-
- 73% - 76% = C+; 70% - 75% = C; 64% - 69% = C-
- 63% or below = D*

You have **1 business day** from when the graded test is returned to you to dispute your grade. To do so, you will need to make an appointment with the instructor.

**Extra credit**
You can earn up to 2% of your total course grade. Write a well thought-out 2-3-page commentary on a topic of your choice in modern physics. [**Must be emailed before the final week**]

**Make-up work**
Make-up work will be allowed only for the excused absences. Arrangements must be made for the make-up work before or immediately after the excused absence.

**Late-work**
Late homework assignments may be accepted up to one week after the due date with a penalty of 20% of the maximum points on that assignment. However, if the delay is due to an excused absence or with valid reasons, the instructor may reduce or forego the penalty.

**Tardiness and unexcused absences**
A student late to class/lab up between 5-7 minutes will be marked ‘tardy’. A student late to class/lab for more than 7 minutes will be marked ‘absent’. Students who sleep, read or work on materials not related to the class activities will be counted absent. Please refer to the student handbook for polices related to attendance, tardiness, excused and unexcused absences.

The content of this syllabus is subject to change. Changes will be announced in class or electronically.
Use of computers in classroom
Laptop can be used in the class only for class works such as taking notes and reading class notes. Laptop may not be used for e-mail, playing music or games, messaging, web browsing or downloading any files during the class period. If this becomes a chronic problem, an unexcused absence for that day would be assigned. A student should be prepared to use pen and paper when asked. All items being worked on should remain visible on the screen and be available for inspection. A laptop can’t be used during an exam.

Academic progress report
An academic progress report will be sent out as per the Academy policy for unsatisfactory performance in the course.

Changes to the syllabus
The content of this syllabus is subject to change. Changes will be announced in class or via online communications.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Texts (RH)</th>
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<tbody>
<tr>
<td>01/06</td>
<td>Electrostatics: Theory and observations Coulomb’s law</td>
<td>Ch. 21</td>
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<tr>
<td>01/13</td>
<td>Electric fields and electric potentials (and voltage); Gauss’s law Lab: Electrostatics using electroscope</td>
<td>Ch. 22 &amp; 23</td>
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<tr>
<td>01/20</td>
<td>Electrical currents; Ohm’s law &amp; Kirchoff’s rules Lab: Electric field mapping</td>
<td>Ch. 25 &amp; 26</td>
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<tr>
<td>01/27</td>
<td>Electrical circuits: Applications Lab: Ohm’s law</td>
<td>Ch. 27</td>
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<tr>
<td>02/03</td>
<td>Magnetism &amp; magnetic forces TEST 1</td>
<td>Ch. 28 &amp; 29</td>
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<tr>
<td>02/10</td>
<td>Biot-Savart’s law; Ampere’s law Lab: Series &amp; parallel resistive circuits</td>
<td>Ch. 29</td>
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<tr>
<td>02/17</td>
<td>Electromagnetism: Concepts; Electromagnetic radiation Lab: RC circuits</td>
<td>Ch. 31</td>
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<tr>
<td>02/24</td>
<td>Electromagnetic (EM) radiation; EM wave definition and spectrum; Maxwell’s equations Lab: Series and parallel circuits</td>
<td>Ch. 32</td>
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<td>03/09</td>
<td>Light: Refraction and reflection; ray optics Lab: Reflection and refraction</td>
<td>Ch. 34</td>
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<tr>
<td>03/16</td>
<td>Light: Interference and diffraction TEST 2</td>
<td>Ch. 35 &amp; 36</td>
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