A course calendar with links to all lessons and homework assignments is found on the

You must be taking PHYS 320 concurrently with PHYS 321 Lab. PHYS 321 Lab is a separate 1 unit
class from PHYS 320, and you will receive a separate grade. There is a lecture component of 321 where
you will have quizzes that count towards 20% of your PHYS 321 grade.

Due to limited space in TH 231, the lab component of this course will be taught by two instructors at
different times. Because of this, you cannot expect lab equipment to be left in the same state when you
return a week later; it will be used by other students.

You must bring your lab manual, and lab notebook to each lab class. Important details on how to prepare
and use your lab notebook can be found in the lab manual, and should be read carefully.

Course Description:

The experiments you will be performing in this class are not trivial. Indeed, several of them earned the
experimenters or theorists Nobel Prizes for the newly discovered principles. Unlike the original
experimenters, you will not be asked to build the apparatus from scratch...nor is it likely you will earn a
Noble Prize for discoveries made in lab! However, there are discoveries to be made: the apparatus may
operate in non-standard ways, the lab manual may contain errors, etc. Each week, in addition to the
specific topic/experiment under consideration, you should keep the following general ideas in mind. These ideas should be present in your formal lab reports.

1. When were these experiments originally performed, and by whom?
2. What theories of classical physics were challenged by this experiment?
3. What new concepts replaced them?
4. What principles of physics does the apparatus I am using rely on?
   (eg. diffraction, Ohm's Law, Lorentz Force Law, etc.)
   It will be assumed that you understand these principles as a matter of course.
5. What are the sources of error in my experiment, both random and systematic.
6. How can I estimate my error?
7. What methods can I devise to minimize these sources of error?
8. Are my results consistent with (one or more) theoretical expectations?
Grades will be calculated from the three categories below.

**Lab Notebooks** (40%): Students will work with one or more lab partner. Lab notebooks and lab reports must be composed individually, but should state the name of the partner(s). When working on a given instrument, make sure that each partner has the opportunity to use it. No make-up labs will be held.

**Written Lab Reports** (40% each): You will have two former lab reports to be types. One will be either Balmer Series or Photoelectric Effect, but I recommend all students attempt the formal for Balmer and redo it for Photoelectric if you get a bad grade. Everyone must to a former for Millikan oil drop.

**Quiz** (20%): From lecture component.

**Grades will be posted on the course website by the last four digits of your student ID.**

The grade scale used for this course is:

<table>
<thead>
<tr>
<th>letter</th>
<th>F</th>
<th>D</th>
<th>C−</th>
<th>C</th>
<th>C+</th>
<th>B−</th>
<th>B</th>
<th>B+</th>
<th>A−</th>
<th>A</th>
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</thead>
<tbody>
<tr>
<td>%</td>
<td>0-49</td>
<td>50-54</td>
<td>55-59</td>
<td>60-64</td>
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<td>75-79</td>
<td>80-84</td>
<td>85-89</td>
<td>90-100</td>
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</tbody>
</table>

**Dates & Policies**
For add and drop deadlines refer to the SFSU 2015 Calendar: [https://apps.sfsu.edu/cgi-bin/student/webcalendar.search?calid=2&previous=Y&keyword=Fall%20%2715](https://apps.sfsu.edu/cgi-bin/student/webcalendar.search?calid=2&previous=Y&keyword=Fall%20%2715)

**Spring 2015 Final's Schedule:** [http://www.sfsu.edu/~acadres/final_exams/finalf15.htm](http://www.sfsu.edu/~acadres/final_exams/finalf15.htm)


**Plagiarism:** [http://www.physics.sfsu.edu/policy/plagiarism.pdf](http://www.physics.sfsu.edu/policy/plagiarism.pdf) !!!!!Don’t do it!!!!!

**The Disability Programs and Resource Center (DPRC):** Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. DPRC is located in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472), by email [dprc@sfsu.edu](mailto:dprc@sfsu.edu), or visit their website at [http://www.sfsu.edu/~dprc](http://www.sfsu.edu/~dprc)

SF State fosters a campus free of sexual violence including sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. If you disclose a personal experience as an SF State student, the course instructor is required to notify the [Dean of Students]. To disclose any such violence confidentially, contact:

[The SAFE Place - (415) 338-2208; http://www.sfsu.edu/~safe_plc/](http://www.sfsu.edu/~safe_plc/)

[Counseling and Psychological Services Center - (415) 338-2208;http://psyservs.sfsu.edu/](http://psyservs.sfsu.edu/)

For more information on your rights and available resources: [http://titleix.sfsu.edu](http://titleix.sfsu.edu)
<table>
<thead>
<tr>
<th>Week</th>
<th>Lab#</th>
<th>Experiment</th>
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<tbody>
<tr>
<td>Aug 24</td>
<td>Lab 0</td>
<td>Registration</td>
</tr>
<tr>
<td>Aug 31</td>
<td>Lab 1</td>
<td>Data Analysis</td>
</tr>
<tr>
<td>Sep 7</td>
<td>Lab 2</td>
<td>Radioactive Decay, Counting Statistics</td>
</tr>
<tr>
<td>Sep 14 &amp; Sep 21</td>
<td>Lab 3</td>
<td>Spectral Lines, Balmer Series</td>
</tr>
<tr>
<td>Sep 28 &amp; Oct 5</td>
<td>Lab 4</td>
<td>Michelson-Morley</td>
</tr>
<tr>
<td>Oct 12 &amp; Oct 19</td>
<td>Lab 5</td>
<td>Photoelectric effect, Planck’s Constant</td>
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<tr>
<td>Oct 26 &amp; Nov 2</td>
<td>Lab 6</td>
<td>Frank-Hertz</td>
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<tr>
<td>Nov 9 &amp; Nov 16</td>
<td>Lab 7</td>
<td>Charge of electron (Millikan)</td>
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<tr>
<td>Nov 23</td>
<td>No Lab</td>
<td>Thanksgiving</td>
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<tr>
<td>Nov 30 &amp; Dec 7</td>
<td>Lab 7</td>
<td>Charge of electron (Millikan)</td>
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