Physical Science 111A

Course Syllabus

Winter Semester 2009

Professor Dorian M. Hatch

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Physical Science 111A  
Course Description  
Winter Semester 2009  

INSTRUCTORS  
Professor: Dorian Hatch in N350 ESC, 422-2427.  
Office hours: T, Th 10:15-11:00 am; others by appointment.  
Email: hatchd@byu.edu  
Teaching assistants: in laboratory room, C251 ESC, 422-9288  

TEXT  
The required SUPPLEMENT for this lab course is Ideas and Experiments in Physical Science, 2nd Edition, by B.K. Harrison. The laboratory experiments you will do for this course are contained in the SUPPLEMENT. The material should be valuable later in your own teaching.  

TEACHING ASSISTANCE  
The teaching assistants are former PS110A students. TAs will be available during most daytime hours M-F. Schedules will be posted early in the semester. Special times will be posted for Reading Days and Final Exam days. The lab phone number is 422-9288.  
The instructor will be available in his office during office hours or you can make appointments to meet with him at other times.  

COURSE WEB PAGE  
A direct link to the server carrying the course home page is http://gardner.byu.edu/110w. (You can also access the course homepage from the physics department homepage at http://www.physics.byu.edu, click on the link labeled “Courses”, then choose “Class Web Pages”, and select “Physical Science 111A”.) This is not a BYU Blackboard web page. Don’t go to Blackboard expecting to find the information there. There will be a single web page for both PS 111A and PS 110A. Many of the announcements refer to reading and tests and will not be relevant to 111A because you are doing only the lab portion of the material. However, your current lab scores will be available to you on the course homepage so that you can check them for accuracy. The scores entered in the computer will determine your grade. Go to the heading “Scores and Grades”. Use your Class Identification Number and your BYU ID to access these scores. Check these scores often to see that they are correctly entered. Be especially careful on these entries as we approach the end of the semester. If they are not accurately entered your final grade will be affected.  

CLASS IDENTIFICATION NUMBER  
Each of you will receive a personal class identification number (CID) for this course. The purpose of this number is to protect your privacy. You must enter this CID number on each of your laboratory reports in order to receive credit for your work. Your graded laboratory reports will be returned to you in the laboratory room, C251 ESC, sorted by your CID. If you were registered in the class before the first day of classes your CID number will
have been emailed to your Route-Y email address. If you do not regularly use your Route-Y address, please set it to forward your mail to the address that you regularly use. If you were not registered at the beginning of the semester or have not received your CID number by the first day of classes, you can obtain it over the Internet. Go to our course home page (see web site discussed above) and click on the link “Class Identification Numbers.” Put in your last name and then your first name. Use your BYU ID, etc., as you are asked to enter information. If you have difficulties with this process see the instructor.

**COURSE DESCRIPTION**

This course is meant to provide a physics, astronomy, and chemistry physical science laboratory for students who need that experience in addition to taking Physical Science 100 or its equivalent. It will also be taken concurrently as the lab part of Physical Science 110A. Instructions are provided below regarding lab exercises and reports.

Your particular lab session time is determined by the course section for which you are registered. The lab is in C251 ESC. It will be open most hours of the day. The schedule for doing the assigned labs during the semester is included in the course schedule at the end of this syllabus. PLEASE STICK TO YOUR SCHEDULED LAB TIME. DO NOT ATTEND OTHER LABS (except in cases of emergency, or during weeks when there is a university holiday.)

The experimental work to be done in the lab may occasionally appear elementary, but it is designed to illustrate physical science principles. It is important to have "hands-on" experience in understanding the way nature works -- and sometimes nature surprises us! It is expected that the reports you do will provide you with material for your science file EE 363 and ECE 363 and the reports will help you teach science later.

You must come to laboratory and do the experiments. Roll will be taken. Reporting any experimental work as if you had done it, when you have not done it, is a violation of the Honor Code.

You will be expected to do approximately six experiments in each lab, in small groups of students, under the direction of a Teaching Assistant. The experiments use simple materials that are commonly available, so that you can do them later for your own teaching. The requirements and format for each weekly laboratory write-up will be given to you by your TA. Even though you will work with others, the written reports must be done individually.

The laboratory reports are due at the beginning of your next scheduled lab period. Staple the reports to a yellow cover sheet (six are included in this syllabus) and hand them to the TAs at the beginning of the lab. No lab will be accepted late. Occasionally however, because of unusual circumstances (sickness etc.) a late lab assignment may receive credit, but you must obtain the approval from the course professor prior to submitting the late report to be considered for credit.

Laboratory 0 is an introduction to the laboratory work. At the end of the semester you will be asked to turn in all your completed laboratory work collected together, as a portfolio. This will count as Lab 12.

Laboratory 11 involves one home experiment and four astronomical observing projects. These may be done at any time; the report is due near the end of the semester. The assigned work is described in the lab supplement by Harrison. WARNING! We often have cloudy weather in Provo; that makes viewing impossible. Do not
leave this lab to the end of the semester, or you may be unable to complete it. Notice that one project takes TWO WEEKS; you may wish to begin shortly after the new moon around the third week of February.

Laboratory 12 At the end of the semester you will be asked to resubmit all your completed laboratory work collected together, as a portfolio. This will count as Laboratory 12.

LABORATORY EXTRA CREDIT

You may earn up to nine points extra lab credit, equivalent to one lab assignment, by doing one of the following extra labs: (1) collect information on several experiments, which you could use in the classroom, and turn in a report with that information, (2) do experiment 11-6 as described in the supplement by Harrison. Clarification on these labs will be provided for you by your teaching assistant. Normally, no other extra credit projects are allowed.

BASIC ASTRONOMY

The following material is basic astronomical material, not covered in Physical Science 100, that may be useful to you as you do Lab 11 and later in your own teaching.

1. The end star in the handle of the Little Dipper is Polaris, the "Pole Star" or the "North Star". It is almost directly above the Earth's north pole at the present time. The point in the sky exactly above the Earth's north pole is called the North Celestial Pole, or NCP here, for short. The altitude of the NCP above the northern point of the horizon is always equal to one's latitude.

2. Over a period of several thousand years, the Earth's north pole points toward a changing location along a circle in the north part of the sky. (The Earth acts like a spinning top; the direction of the axis "precesses".) In about 12,000 years, the star Vega will be the "north star"; the NCP will be closest to it.

3. The Big Dipper rotates once every 24 hours, in a counterclockwise direction, around the NCP.

4. The Earth rotates under the stars, so from our point of view they move across the sky from east to west just as the Sun does, and rise and set as it does. However, near the NCP, we can see their full circle of rotation, a counterclockwise rotation as noted in #3.

5. Because the Earth also revolves around the Sun yearly, those stars which are visible each night gradually change. In the summer, we can see the constellations of Lyra, Scorpius, and Cygnus, for example; in the winter, we can see Orion, Gemini, and Taurus. Because of the Earth's revolution, any given star rises four minutes earlier than it did the previous night. Thus, in a month's time it rises two hours earlier; and 12 months--a year--later, its rising time is back where it started. This is easily observable.

6. The Earth's motions cause the positions of the stars to vary over time, from our point of view. However, the stars do not move relative to each other. (Actually, they do, but so slowly that we will not notice it in our lifetimes.) Thus, the stars as we see them in the sky do not move relative to each other. This helps us locate stars. For example, the two outer stars of the bowl of the Big Dipper (the "pointers") always point to Polaris. The bowls of the Dippers face each other. The constellation Draco threads between the Dippers, and the constellation Cassiopeia (the "Big W") is roughly on the side of Polaris opposite the Big Dipper. Orion always has his arm raised to club the onrushing Taurus, while his dogs Canis Major and Minor are always behind him.
(to the east as we see them). The swan Cygnus always flies along the Milky Way, as does the eagle Aquila (this direction is south when these constellations are in the eastern part of the sky.) The stars in the handle of the Big Dipper, followed around, lead to the star Arcturus in the constellation Bootes.

7. The phases of the Moon are caused by its different positions relative to the Earth and the Sun. Remember that its light is reflected light from the Sun.

8. The seasons are caused by the fact that the Earth's axis is tilted so that it is not perpendicular to the Earth's orbit. (NOTE: This is elementary, but people still misunderstand it. Be sure you get it right!) The Sun's rays strike more nearly vertically in the summer than in the winter. The Earth is slightly closer to the Sun in January than in July, but not enough to moderate our winter much. One's latitude on the Earth affects the length of daylight from season to season because of the differing positions of the Sun relative to the Earth. The (apparent) daily N-S motion of the setting or rising Sun along the horizon can be observed by plotting it.

9. Because of the establishment of time zones, the Sun rises and sets later--by the clock--in the western part of a time zone than in the eastern part.

10. Planets move among the stars, as can easily be seen by plotting their position relative to the stars over a period of time. Generally they move west to east, but sometimes they seem to move east to west, an effect of the Earth's motion and our changing point of view. The planets are located near the Sun's "ecliptic" (path in the sky), so are never found in the north (in our hemisphere.) Venus and Mercury, planets whose orbits are closer to the Sun than the Earth's, are never found very far away from the Sun in the sky.

**GRADES**

Grades will be determined entirely from the lab report scores, approximately on the following scale:

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<thead>
<tr>
<th>Letter</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93</td>
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<tr>
<td>A-</td>
<td>88</td>
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<tr>
<td>B+</td>
<td>85</td>
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<td>B</td>
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<td>B-</td>
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</tr>
<tr>
<td>D</td>
<td>58</td>
</tr>
<tr>
<td>D-</td>
<td>55</td>
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The letter grade "I" (Incomplete) is given on a contractual basis with the instructor. An incomplete is only given when extenuating and unavoidable circumstances (serious illness, death in the immediate family, etc.) occur AFTER the twelfth week of a semester.

**STUDENTS WITH DISABILITIES AND PREVENTING SEXUAL HARASSMENT**

BYU is committed to providing reasonable accommodation to qualified persons with disabilities. If you have a disability that may adversely affect your success in this course, please contact the University Accessibility Center at 422-2767. Services deemed appropriate will be coordinated with the student, instructor and Center.

BYU’s policy against sexual harassment extends not only to employees of the university, but to students as well. If you encounter sexual harassment, gender-based discrimination, or other inappropriate behavior, please talk to your professor or department chair, or contact the BYU Equal Employment Opportunity Office at 422-5895, or the Honor Code Office at 422-2847.
### PHYSICAL SCIENCE 111A SCHEDULE: WINTER 2009

<table>
<thead>
<tr>
<th>Week of</th>
<th>Lab</th>
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<tbody>
<tr>
<td>Jan 12-16</td>
<td>Lab 0 (intro)</td>
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<tr>
<td>Jan 19-23</td>
<td>Lab 1</td>
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<tr>
<td>Jan 26-30</td>
<td>Lab 2</td>
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<tr>
<td>Feb 2-6</td>
<td>Lab 3</td>
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<td>Feb 9-13</td>
<td>Lab 4</td>
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<td>Lab 5</td>
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<td>Feb 23-27</td>
<td>Lab 6</td>
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<td>Mar 2-6</td>
<td>Lab 7</td>
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<td>Mar 9-13</td>
<td>Lab 8</td>
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<tr>
<td>Mar 16-20</td>
<td>Lab 9</td>
</tr>
<tr>
<td>Mar 23-27</td>
<td>Lab 10</td>
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</tbody>
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Lab 10 is due by April 1 at 2:00 p.m.

Lab 11 is due by April 8 at 2:00 p.m.

Lab 12 (portfolio) and extra credit labs are due by April 13 at 2:00 p.m.

January 19, February 16, and February 17 are days on which regular lab scheduling must be rearranged. Go to another lab section during these weeks if you would normally have lab on these days. Make sure the lab instructor for that alternate lab section gives you credit for attendance.