Physical Science 111A

Course Packet

Fall Semester 2008

Professor: Robert Beck Clark

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Physical Science 111A  
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Fall Semester 2008

INSTRUCTORS
Professor: Robert Beck Clark, Office: N345 ESC, Office Phone: 422-2805. Email rbc@aip.org
Office hours: TTh 2:30-2:50 p.m. and W 11:00-11:45 a.m.- Other times by appointment.
Teaching Assistants: in Laboratory Room, C251 ESC, 422-9288

TEXT
*Ideas and Experiments in Physical Science 2nd Edition*, by B.K. Harrison. The laboratory experiments that you will conduct for this course are contained in this required text. This material should also be valuable later in your teaching.

CLASS IDENTIFICATION NUMBER(CID)
Each of you will require 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 the last two digits of your CID number. If you were registered for Physical Science 111A before the first day of classes this semester, your CID should have been emailed to you at your Route-Y email address. If you have not received your CID by email or have lost or deleted it, you may obtain your CID from the BYU Department of Physics and Astronomy website course page at [http://physics.byu.edu/Courses](http://physics.byu.edu/Courses). Select “Get a CID Number” and then the class “Physical Science 111A”. Then follow the instructions.

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

Your particular laboratory session is determined by the course section for which you are registered. The laboratory room is 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 outline. 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 for Elementary Education 352 and that they should help you teach science to your own students later.
You must come to the lab and do the experiments. Roll will be taken. You are encouraged to discuss the
laboratory assignments with other students, but the laboratory reports submitted must be in your own words. Reports copied from other students’ work are considered to be plagiarism and a violation of the Honor Code by all involved. Reporting any experimental work as if you had done it, when you have not done it, is also 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 lab write-up will be given to you by your teaching assistant. Even though you will work with others, the written reports must be done individually and in your own words.

The laboratory reports are due at the beginning of your next scheduled lab period. Staple your report to a completed yellow “Lab Report” cover sheet and hand it to your TA at that time, in the laboratory room. Occasionally, laboratory reports may be submitted late due to unusual circumstances such as illness and may receive credit, but you must obtain the approval of the course professor prior to submitting the late report to be considered for credit.

Laboratory 0 is an introduction to the laboratory work.

Laboratory 11 involves one home experiment and four astronomical observing projects. These may be done at any time; this report is due near the end of the semester. The assigned work is described in the lab manual. 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. Note in particular that one project takes TWO WEEKS; you may wish to begin shortly after the new moon on August 30.

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

EXTRA CREDIT

You may earn up to nine points extra lab credit, equivalent to one lab assignment, by collecting information on several experiments, which you could use in the classroom, and turning it in. Details will be provided to you from your teaching assistant. 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.

**PERSONAL ASSISTANCE**

The teaching assistants are former PS110A students. Teaching Assistants will be available according to their posted schedules. 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 and appointments may be made for other times.

**GRADES**

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

- **A** 90% or above
- **A-** 86-89%
- **B+** 83-85%
- **B** 80-82%
- **B-** 76-79%
- **C+** 73-75%
- **C** 69-72%
- **C-** 65-68%
- **D+** 62-64%
- **D** 58-61%
- **D-** 50-57%
- **E** below 50%

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.

You may calculate your current percentage at any time by simply by dividing your total current number of lab points by the maximum number of points you could have (9 times the number of labs which should have been submitted). Finally, multiply this fraction by 100 and you will have your current percentage.

**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 and instructor by that office.

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 contact the Honor Code Office at 422-2847.

**PHYSICAL SCIENCE 111A SCHEDULE: FALL 2008**

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<th>Week of:</th>
<th>Laboratory:</th>
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<tbody>
<tr>
<td>Sept 8-12</td>
<td>Lab 0 (Introduction)</td>
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<td>Sept 15-19</td>
<td>Lab 1</td>
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<td>Sept 22-26</td>
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<td>Sept 29- Oct 3</td>
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<td>Nov 24-28</td>
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Lab 11 is due on or before Dec 2 at 2 p.m.

Lab 12 (portfolio) and extra credit labs are due on or before Dec 9 at 2:00 p.m.