

Syllabus

Introduction to Astronomy Lab

Physics 091, Spring 2018

The laboratory associated with [Introduction to Astronomy](#).

Last revised February 16th, 2018:

The most current version of the syllabus is at:

<http://physics.stmarys-ca.edu/courses/Phys091/18S>

INSTRUCTIONAL TEAM

- Prof. Brandon Eberly (Sections 2 & 3) and Prof. Brian Hill (Section 1)
- Office: Galileo 103B
- Office hours:
 - Prof. Eberly: Mondays 6:30-7:30pm (on afternoon lab days) or 3:00-4:00pm (outdoor observational lab days), and by appointment. Appointments may be in-person or by Skype.
 - Prof. Hill: same office hours as in Physics 90 syllabus (see [Prof. Hill's home page](#)).
- Teaching Assistants: Josh Mills (Section 1), Ashley Phelps (Section 2) and Ariana Hofelmann (Section 3)

OVERVIEW

This lab is the required companion to [Physics 90](#). Each week will feature a laboratory exercise related to concepts and topics taught in lecture. Some algebra and geometry will be used.

OUTCOMES

Together, the lecture and laboratory of the Introduction to Astronomy course are designed to achieve the outcomes enumerated in the

[Mathematical and Scientific](#) pathway to knowledge. The laboratory portion of the course has three main outcomes:

- Collect, analyze, and interpret empirical data gathered in a laboratory or field setting.
- Support the outcomes of the lecture portion of the course.
- Acquire the tools to become a skilled, life-long observer of the skies.

MATERIALS

You will need:

- The workbook that is also being used in lecture for some labs. When needed, it will be announced by email a few days before the lab. You will not need the textbook during lab.
- A mechanical pencil (or an ordinary pencil and a way to keep it sharp), an eraser, and clean notebook paper during lab.
- For the evening observing labs, especially in the beginning of the semester you will need to dress warmly. Temperatures during early spring evenings sometimes drop into the 30s.

SCHEDULE

All labs are conducted on Mondays.

Afternoon labs for Section 1 are conducted between 11:45am and 1:45pm; for Section 2 between 2:00 and 4:00pm; for Section 3 between 4:15 and 6:15pm.

Evening observational labs are conducted beginning at dusk. The decision as to whether to have an evening observing lab on a given Monday will be announced by email on Friday (three days before). Dusk is about 5:30pm early in the semester. Due to the lengthening of the days and the change to daylight savings time, dusk occurs about 7:30pm late in the semester.

For the [Spring Semester](#) there are 12 Mondays on which we can conduct labs. We are prepared to have five indoor labs and five outdoor observational labs. In addition, we will conduct one make-up lab on one of the last Mondays of the semester. We don't have perfect forecasting, and

therefore one of the Mondays is budgeted for one outdoor lab cancellation.

- Indoor Labs

At present, the following indoor labs are planned:

- Creation of Star Charts: supports the understanding of the celestial coordinate system (declination and right ascension), builds scientific graphing ability (including interpolation skills), and is essential preparation for the outdoor observing labs.
 - Circular and Parabolic Motion Lab: supports the understanding of Newton's Universal Law of Gravitation, and develops data-taking and hypothesis-checking concepts
 - Reflection lab: supports the understanding of ray tracing and other techniques of geometrical optics, supports the ideas of light gathering and reflector telescope principles
 - Refraction and Lenses Lab: supports the understanding of Snell's law, focal lengths, real and virtual images, and refractor telescope principles
 - Spectroscopy and Doppler Shift Lab: supports the understanding of light as a spectrum and the fundamental reasoning that led Hubble to believe in the Big Bang
- Outdoor Observational Labs

The observational labs are held at the SMC Campus Observatory Pad. Most of you have passed this while walking to the Cross. If you aren't familiar with the location, these fairly complete directions are still applicable: [last fall's public observing night directions](#).

At present the following outdoor observational labs are planned:

- Naked Eye Observing Lab: understand the celestial coordinate system, the ecliptic, the elementary use of star charts, and get oriented to the outdoor observing environment
- Binocular Observing Lab: continue developing the use of star charts, understand field of view, become more accurate in locating celestial objects
- Three Telescope Observing Labs: developing the use of star charts, understand field of view, become more accurate in locating celestial

objects. The telescope observing labs will start with easy (large, bright) targets selected from those that are available in the early evening, and proceed toward observation, including note-taking and drawing of more difficult targets. Targets will range over all of those discussed in the course: moon, planets, clusters, novae and galaxies.

GRADING

The lab grade is separate from the lecture grade. You are required to attend all labs. Recognizing that there are sometimes unavoidable reasons for missing a lab, an opportunity to make up one missed lab on a Monday near the end of the semester will be provided.

Both participation and evaluation are required for full credit on each lab. Active participation will be demonstrated by each lab group member showing that they are individually conversant with the laboratory procedure and equipment operation. Evaluation may consist of worksheets, questions, reports of observations, drawings and analyses as appropriate for each lab.

Since you will not receive any credit for an absence, and since there are 10 labs required, each absence will in effect subtract 10% from your final grade. Final letter grades will be assigned as follows: 90-100% are A's, 80-89% are B's, 70-79% are C's, 60-69% are D, 0-59% F.

OTHER

The [Stem Center Tutoring](#), [Academic Honor Code](#), [Student Disability Services](#) and [Mission](#) statements from the Physics 90 syllabus are applicable to Physics 91.

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