

Phys669 Introduction to Observational Astronomy

Spring 2024 Semester Syllabus

Instructor: Dr. Judi Provencal
Sharp Lab 268
jlp@udel.edu

Class website: <https://www.physics.udel.edu/~jlp/classweb2/>

Course Book: None

AIP4WIN Program: AIP4WIN V2 (v2.4.10.NonReg)

<https://www.physics.udel.edu/~jlp/classweb2/>

The program is required. Instructions on downloading and installing the program are given on the class website. It is not installed on any computers at UD. There is no version for Mac. If you own a Mac, possible options are running the program under WINE (windows emulator that runs on mac), installing Windows using Virtualbox, or borrowing a Windows computer.

For Windows 10: when you install the program, ***it is very important to follow instructions found on the class website.***

AIP Group: There is a users group with additional information:

<https://groups.io/g/AIP4Win/>

PROJECT CLEA Virtual Observatory Website:

<http://www3.gettysburg.edu/~marschal/clea/CLEAhome.html>

Download the VIREO software and student manuals for exercises listed below.

Other Material: One spiral bound notebook (or equivalent) and a flashlight (preferably with a red cover). Not something so bright that you blind everyone else trying to work. Tablets can also be used to record observations, astrolabe measurements, and other work.

Course Organization: The subjects and activities covered during this course will depend on the weather. Therefore, the format is a little freer than most classes. In most cases, the class will meet from 7-10 pm at Mt. Cuba Observatory. Later in the semester, after the switch to daylight savings time, we may switch to meeting from 8-11 pm. On clear nights, we will be working outside. Especially at the beginning of the semester, it can be very cold. The domes ARE NOT HEATED so dress appropriately. A hat, gloves, layers, and warm socks are a must.

Work: This class is mainly a hands-on class. We will be conducting telescope observations, working with remote observing software such as the CLEA software, working with remote observing via the SARA telescopes, and learning about image analysis with AIP4WIN.

Required Work:

1. Observational journal
 1. Your journal will serve as a record of all your observations (see journal handout), simulated observing sessions, and computer assignments.
 1. **Telescope Observations (based on weather)**
 2. **24 inch telescope**
 3. **4.5 inch refractor**
 4. **11 inch Celestron telescopes**
 2. **Computer Assignments (in the order they should be completed):**
 1. Basic Use of AIP,
 2. Image Analysis,
 3. Image Enhancement Pt.1
 4. Image Enhancement Part 2
 5. Image Enhancement Part 3
 6. Color Images
 3. **CLEA Assignments:**
 1. HR Diagrams of Star Clusters,
 2. Classification of Stellar Spectra,
 3. The Revolution of the Moons of Jupiter
 4. The Journal is due one week after the last day of class.
2. Take-home exam
 1. The take home exam will be distributed on the last class. It will be due in my office one week later.
3. Final project
 1. Your final project will consist of a 25 minute presentation on an astronomical object/topic. You may choose any object that interests you. The projects will be due the last two classes. We will draw numbers to see who goes on what night.
4. What and how to turn material in: You will turn in your final exam and your observational journal one week after the last class. You may turn in hard copies or electronic versions (preferred). For electronic versions, pdf files or shared drives are popular.
 - Notes: You are allowed to work together for this class. Everyone must, however, submit their own copies of their work for the final grade.

Grade:

- 5% homework and attendance
- 35% journal
 - 20% in class work (AIP4WIN image analysis)
 - 40% astrolabe observations
 - 40% telescope observations – including virtual work with CLEA software
- 30% exam
- 30% project

Topics:

- 1) The Sky**
 - a) Locating objects in the sky
 - b) The constellations
 - c) Messier Objects
- 2) Motions**
 - a) Solar System
 - b) The Moon
 - c) The stars
- 3) Light – how we use it to study the stars**
 - a) Photometry
 - b) Spectroscopy
 - c) Astrometry
- 4) Equipment and Techniques**
 - a) Telescopes
 - 1) Refractors
 - 2) Reflectors
 - b) Detectors
 - 1) Photographic plates
 - 2) CCD cameras
 - c) Calibrations and Analysis
 - 1) Dark Frames
 - 2) Flat Fields
 - 3) Bias Frames

Final Project

Pick an object we have observed in class for your topic or talk to me about a topic that interests you. Your project will consist of a 25 minute class presentation on your topic.

The world today is drowning in information. Unfortunately, the quality of this information varies widely. When researching your topic, you will be evaluating the available sources. You will need to be able to make decisions as to where to search for information about your topic, and how to evaluate whether the information you have found is valid. For astronomy, a good place to start is with the following journals: The Astrophysical Journal, the Astronomical Journal, Astronomy & Astrophysics, or Monthly Notices of the Royal Astronomical Society. The SAO/NASA Astrophysics Data System website includes articles from these sources, and so is a good place to start searching. Your final project will include additional history and research on your chosen topic. You may use any additional sources you like, including the internet. However, be aware that many internet sources do not undergo any type of review process. Make sure to evaluate your sources. Try to determine if the source's content is fact or fiction. Make sure you include at least four sources, two of which are NOT websites.

Sources that count as NON-INTERNET

- 1) Any article from the SAO/NASA Astrophysics Data System**

2) Hard cover book

Questions to consider for your report....

- 1) What type of object have you chosen?
- 2) Why is this type of object important to astronomy? In other words, what important questions do these objects help solve?
- 3) How do we study this object?
- 4) What is currently known about the object you've chosen?
- 5) What are some other examples of this type of object?

Academic honesty:

The submission of another person's recorded work (in whole or in part, with or without modification of detail) is plagiarism and will be handled in accordance with University procedures. Recorded work includes handwritten and other hardcopy forms as well as copy in electronic media. In accordance with copyright principles, it is acceptable to include work of another person in your own, if you explicitly identify the author and have permission.