

Phys469/669 Introduction to Observational Astronomy

2022 Fall Semester Syllabus

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Class website: www.physics.udel.edu/~jlp/astronomy.html

Course Book: None

AIP4WIN V2 Program (v2.4.10.NonReg):

<http://www.physics.udel.edu/~jlp/astronomy.html>

The program is required. Instructions on downloading and installing the program are given on the class website. There is no version for Mac. If you own a Mac, possible options are running the program under Wine 6.0.1 (Wine is a 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/>

CLEA Virtual Observatory:

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

Download the VIREO software and student manuals for exercises listed below. The CLEA Virtual Observatory runs under Windows. There is no version for mac. If you own a mac, the options are similar to those for the AIP4WIN program.

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.

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. Mt. Cuba Observatory is currently closed to the public, but we have permission to meet there, especially on clear nights. The COVID situation remains fluid, and the class remains dependent on the COVID procedures followed at Mt. Cuba. In most cases, the class will meet from 7-10 pm at Mt. Cuba Observatory. On clear nights, we will be working outside. On stormy/cloudy nights, we may meet via Zoom. In the beginning of the semester, it can be very warm and there can be mosquitoes, so be aware. By the end of the semester, it will be cold, so dress appropriately.

Work: This class is mainly a hands-on class. We will be conducting astronomical observations using telescopes at MCAO (depending on the weather), conducting virtual

observations via CLEA VIREO software, and calibrating and analyzing astronomical images.

Required work will consist of

1. **Observational journal**
 1. Your journal will serve as a record of all your observations and computer assignments (see Journal Handout). The journal is due one week after the final exam is handed out.
 2. Computer Assignments:
 1. 669: Basic Use of AIP, Image Analysis, Enhancement Pt. 1, Enhancement Pt. 2, Enhancement Pt. 3, Color Images
 2. 469: Basic Use of AIP, Image Analysis, Enhancement Pt. 1, Enhancement Pt. 2, Color Images
 3. Virtual Observatory
 1. HR Diagrams of Star Clusters
 2. Classification of Stellar Spectra
 4. Please note: the computer assignments and the Virtual Observatory assignments may be done at your own pace. **However, do not leave everything until the last week of the semester.**
 5. **take-home exam**
 1. The take home exam will be handed out on the last class. It will be due one week later.
 6. **final project**
 1. Your final project will consist of either a 25 page paper or a 25 minute presentation on an astronomical object/topic. You may choose any object/topic that interests you. The project is due the last day of class.

Grade:

1. 5% homework and attendance
2. 35% journal
 1. 15% AIP4WIN assignments
 2. 15% CLEA assignments
 3. 30% astrolabe observations
 4. 40% telescope observations
3. 30% exam
4. 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. You may choose between a 25 page report, or a 25 minute class presentation. If you choose the paper option, your report should be 25 pages long, double spaced, with reasonable margins, and a **maximum of 4 pages of figures and graphs**.

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 refereed 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. Choose one article for your starting point. It is okay if you don't understand everything in the papers you will find there. Your final project will include additional history and research on your chosen topic. You may use any additional sources, 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 hard copy 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.