

Astronomy 102: Stars and Galaxies

<http://brahms.phy.vanderbilt.edu/a102>

Spring 2003

MWF, 10:00-11:00 AM, SC4327

Labs: M-Th 7:00-10:00 PM, 25th St. Garage Observing Facility

Textbook

21st Century Astronomy by Hester *et al.*, W.W. Norton & Company, 2002.

This course will focus on Parts I and III of the text. You may find some of the material in Part II helpful for the laboratory.

Course Staff

Instructor: Robert Knop

Stevenson Center 6912 (Physics 9th Floor)

Office Telephone 322-6165

E-mail: r.knop@vanderbilt.edu

Office Hours: M 1-2PM, W 2-3PM, Th 1-2PM

TAs:

Eric Smith (SC6907E, eric.a.smith@vanderbilt.edu; Office Hours MWF 11-12)

René Ortman (SC6612, rene.ortman@vanderbilt.edu; Office Hours TT 2:30-3:45)

Lyle Durham (SC6902, william.l.durham@vanderbilt.edu; Office Hours TT 11-12)

Prerequisites

Math 133 (Algebra & Trigonometry) or equivalent. You will do some mathematics on homework and exams, and in the laboratory. You should understand scientific notation (“powers of ten” notation) and be able to use a calculator to compute numerical values for problems which involve large numbers. You must be able to perform and understand simple algebraic equations and manipulations.

Course Description

The purpose of this course is to introduce you to Astronomy. The primary goals are twofold. First, to gain an understanding of the the nature of the Universe. Second, to understand something about the creative human endeavor we call “science”, and about the process of doing science. The material of the course will mainly focus on “stars and galaxies”, i.e. the universe outside our solar system. Although there is a lot out there, understanding of the ideas is more important than memorization of a million tiny facts.

Format

The course has two integral parts: a lecture and a laboratory. Note that **the lab is not a separate course, but is a part of the same course as the lecture**. You will receive only one grade for the course, and your lab work will contribute to this grade. You *cannot pass the course without adequately completing the labs*. As long as all labs are satisfactorily completed, your grade on your lab work will contribute 25% of your course grade (see “Grading” below).

The laboratories will be held in the observing facility on the top of the 25th St. Garage. Regular lab sessions are from Monday through Wednesday. In addition, there will be a make-up session held on Thursday.

You are required to attend your regular lab meeting. The make-up session is for those who want additional time with the telescopes. Some of the labs require work outside of the laboratory, including “naked-eye” (i.e. not requiring a telescope) observations. This is considered part of the homework for the course.

The labs are discussed in greater detail on the course web page. Note that you will *not* receive a printed “lab manual”; the descriptions of all the labs are *only* available on the web page. Be sure to read through the descriptions *before* you come to lab, and bring print-outs if necessary!

Homework & Exams

There are reading assignments listed in the schedule below. You are expected to complete the textbook reading assignment for a given day *before* coming to the lecture that day.

There will be five homework assignments due approximately every other week. Homework assignments will be handed out on Monday, and will be due **at the beginning of class on Friday**. Late homework will not be accepted. You are encouraged to discuss homework problems with other people in the class. However, the final solution you write up must be **your own work**. You are expected to use good judgment and abide by the Vanderbilt Honor Code in this matter.

There will be three in-class examinations, in addition to the final, given during the semester. You must complete each examination alone, without consulting others. **In-class examinations must be taken in class on the day they are administered.** The final examination will be offered during both the standard and alternate times given for this class.

Finally, you will be expected to complete some reading, observations, and analysis associated with the laboratory outside of class. This is part of the homework for the class, and has been taken into account in determining the length of the other homework assignments.

Grading

Your grade will be based on the following:

- 15% Homework assignments (6)
- 40% In-class examinations (3)
- 20% Final examination
- 25% Laboratory activities

Final Examinations will be three hours long and offered during the standard Vanderbilt final periods. For this class, the primary final examination time is **Wednesday, April 30, 3:00P.M.**. The alternate final examination time is **Friday, April 25, 12:00 Noon**.

The grading of the laboratory activities is described in greater detail in the “Labs” section of the course web page.

The course will be graded on a curve to obtain a final average between 2.8 and 3.0.

Distribution of Graded Material

Because this is a large class, it is not practical to return graded exams and homeworks during lecture. **Unless you specifically request otherwise**, all graded material will be returned to you, sorted alphabetically, in open-access “student mailboxes.” They are located on the 9th floor of the Physics Building, across from the service elevator next to room SC6902. If you prefer your work returned more privately, send an E-mail message to the instructor to make different arrangements.

Course Schedule

Assignments below are expected to be completed (for reading assignments) or turned in (for homework) at the start of lecture on the assigned day.

Week Of	Topic	Assignments, etc.
Jan 8-10	Introduction & Background	Fri Jan 10: Read Chapter 1 in text Read web page sections <i>Labs:How The Labs Work</i>
Jan 13-17	The Celestial Sphere; Celestial Coordinates; Seasons	Mon Jan 13: Read Chapter 2 in text Read web page sections <i>Labs:General Information</i>
Jan 20-24	Gravity; Orbits; Kepler's Laws	Mon Jan 20: Read Chapter 3 in text Fri Jan 24: Homework Assignment 1 Due
Jan 27-31	Light & Matter; Telescopes; The Electromagnetic Spectrum	Mon Jan 27: Read Chapter 4 in text Lab: Telescope practical exam (*)
Feb 3-7	Stars: Flux & Luminosity; Distance with Parallax; Stellar Spectra	Mon Feb 3: EXAMINATION 1 Wed Feb 5: Read Chapter 12.1-12.2 in text
Feb 10-14	Classification of Stars; The H-R Diagram; Clusters; Binaries & Variables	Mon Feb 10: Read Chapter 12.3 in text Fri Feb 14: Homework Assignment 2 Due Fri Feb 14: Turn in Lab Observing Log for grading
Feb 17-21	Stellar Structure; the Sun	Mon Feb 17: Read Chapter 13 in text
Feb 24-28	Star Formation; Interstellar Medium	Mon Feb 24: Read Chapter 14 in text Fri Feb 28: Homework Assignment 3 Due Lab: Constellation practical exam (*)
Mar 3-7	(Spring Break)	Look up!
Mar 10-14	Stellar Evolution; Planetary Nebulae; White Dwarf Stars	Mon Mar 10: Read Chapter 15 in text Fri Mar 14: EXAMINATION 2
Mar 17-21	Massive Stars; HII Regions; Supernovae; Neutron Stars & Black Holes	Mon Mar 17: Read Chapter 16 in text Fri Mar 21: Homework Assignment 4 Due Fri Mar 21: Turn in Lab Observing Log for grading
Mar 24-28	The Milky Way	Mon Mar 24: Read Chapter 18 in text
Mar 31- Apr 4	Galaxies; Spiral & Elliptical Structure; Mergers & Collisions	Mon Mar 31: Read Chapter 17 in text Fri Apr 4: Homework Assignment 5 Due
Apr 7-11	Seyfert Galaxies and Quasars;	Wed Apr 9: EXAMINATION 3
Apr 14-18	Cosmology; The Whole Universe	Mon Apr 14: Read Chapter 19 in text Fri Apr 18: Read Chapter 20 in text Fri Apr 18: Turn in Lab Observing Log for final grading
Apr 21	Wrap-up & review	

* **Note:** The laboratory examinations *may* be put off for lab sections which have bad weather during the scheduled exam date, or which have had bad weather in the previous weeks. Your TA will have more information as the date approaches.