



# PH262U & SCI316U: General Astronomy II

## Stellar, Galactic, and Extra-galactic Astronomy

**Instructor:** Chris Butenhoff

**Office:** SB2 436

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**Office hours:** W, 9:30-11:30h, or by appointment.  
If this time does not work for you, please contact me to arrange a meeting.

**TAs** Doaa Teama, dteama@pdx.edu

**Text:** 21<sup>st</sup> Century Astronomy, 2<sup>nd</sup> edition.  
Hester et al., W.W. Norton & Company

**Term:** Spring 2009

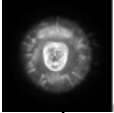
**Room:** NH 350

**Class Meeting:** TR, 10:00-11:50h

**Class website (Blackboard):**

<http://bb.pdx.edu>. If you are registered for the class, you should automatically have access to the site.

WELCOME!



Astronomy is among the oldest of sciences but also perhaps the most modern, as rapid advancements in telescopes and instruments take us deeper and farther into the Universe with eyes that can probe all wavelengths and with more clarity than ever before. From both new and ancient light we are learning more everyday about how stars live, galaxies evolve, and what the ultimate fate of the universe may be. It's a good time to take an interest in astronomy!

Though this is General Astronomy II, General Astronomy I is not a prerequisite, but this does present some challenges. For those of you who have taken the first course, there will be some overlap in material in this course, mainly the motion of the sky and the physics of light. For those of you who haven't taken the first course, some of the terminology may be unfamiliar and may require a look back in the book. We will skip over some of the opening chapters that were covered in the first term, most importantly those chapters covering the Solar System and planets. Instead our emphasis will be primarily on stars, galaxies, and the universe at large --- cosmology. As I believe all students of astronomy should understand the motions of the sky, we will spend the beginning of the term understanding these motions.

Math requirements: Keep in mind that astronomy is really a branch of physics. As such we will work with physics equations and mathematics at the algebra level. Though no previous knowledge of physics is assumed, you should have comfort with unit conversions, scientific notation, algebraic equations, and basic trigonometry.

**Some goals of this course include:**

- To understand the patterns and motions of the sky.
- To familiarize yourself with the night sky.
- To understand how we use light to learn about stars and galaxies.
- To better appreciate the richness and beauty of the Universe.
- To gain experience using real astronomical data.
- To understand how we know what we think we know.
- To understand how stars evolve from birth to death.
- To have a basic understanding of the evolution of the Universe.
- To learn and to use physical laws to solve mathematical problems.
- To incorporate what we know about the Universe into your own worldview.



**Homework sets** - Homework is varied in content, being a mixture of textbook problems and projects based on the Sloan Digital Sky Survey data. Homework sets are collected every other week and late homework *is not accepted*. I will drop your lowest homework score. Feel free to use the *Discussion* page on Blackboard for hints and tips from fellow classmates, but please do not post solutions.

**Quizzes** - There will be short (ten multiple-choice questions) quizzes every Tuesday. These will keep you up-to-date with the material and will help me assess how well the class is comprehending the material. The quizzes also alleviate some of the weight and the accompanying stress of the midterm and final. The quizzes test on material presented in the lectures and textbook since the previous quiz. Please use Scantrons (available at the bookstore) to help ease the grading burden. The quizzes are given promptly at the beginning of class and no allowance will be made for late arrivals. I will drop your two lowest quiz scores.

**Exams** – There will be one midterm and the final. Exams will contain both multiple-choice and short answer questions. The final will be comprehensive with an emphasis on the material covered after the midterm. You are allowed to use one sheet of notes --- front and back --- for the exams and a calculator.

**Observations** - Weather permitting, you'll have the chance to look at stars, planets, nebulae, clusters, and perhaps galaxies with the department's computer-assisted 8-inch reflecting telescope. Most observing will take place at 9 pm on the top floor of Parking Structure #3 on campus. On one occasion we may go to an area park for better observing conditions. You are required to attend at least one observing session and write a brief summary of ten objects that you observed either with your naked eye or through the telescope. Guidelines for this report can be found on Blackboard. I'll announce observing nights in class and on Blackboard.

**Lecture notes:** Should be available soon after each lecture on Blackboard.

#### **Extra Credit –**

*Presentation (3pts)* – About a 10-minute presentation on a topic of your choice at the beginning of the class. We can only schedule one or two of these per lecture, so sign-up early if you're interested. Inform me of your presentation at least one lecture period in advance. Follow the guidelines for presentations that are found on Blackboard.

*Online discussion (2 pts)* – Throughout the term I'll post a number of questions on the Blackboard discussion boards. To get full extra credit marks, post at least fifteen responses to the questions. Responses must add information to the discussion and not be simple rhetorical statements.

*Observation project (3 pts)* – There are three possible observing projects you can do for extra credit, the analemma, phases of the moon, and progression of the constellations. Details can be found on Blackboard. The purpose of the exercise is to gain experience looking at the motion of the sky, a hobby that will hopefully stay with you after the course is finished. Note that two of the projects require observations spread out throughout the term, so the sooner you get started the better.

**Absences** - To establish a fair make-up policy, only officially excused absences will be allowed the opportunity to do missed work. These include doctor-excused illnesses, family emergencies, and university-sanctioned events. Missing an assignment due to work or other conflicting appointments are not valid absences. If you think you will be missing significant amount of class due to work, please be aware of this policy.

**Contact:** Though you are welcome to contact me through my normal email, please utilize the Blackboard mail system when possible. .

**TENTATIVE SCHEDULE** - Warning, we will likely get off track from this schedule. See Blackboard for up-to-date schedule

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<b>Week of</b>	<b>Quiz/Exam</b>	<b>Readings</b>	<b>Due</b>
31-Mar		Intro (Ch 1). Motions and patterns in the sky (Ch 2)	
7-Apr	Quiz 1 (T)	Motions and patterns (Ch 2)	
		Star Properties and Light (Ch 13,4)	
14-Apr	Quiz 2 (T)	Star Properties and Light (Ch 13, 4)	HW1 (T)
21-Apr	Quiz 3 (T)	Brief overview of the Sun (Ch 14)	
		Star Formation (Ch 15)	
28-Apr	Quiz 4(T)	Star Formation (Ch 15)	HW2 (T)
		Low mass stars (Ch 16)	
5-May	<b>Midterm</b> (T)	Low mass stars (Ch 16)	
12-May	No quiz	High mass stars (Ch 17)	HW3 (T)
19-May	Quiz 5 (T)	Galaxies ( Ch 18)	
26-May	Quiz 6 (T)	Milky Way (Ch 19)	HW4 (T)
2-Jun	Quiz 7 (T)	Cosmology (Ch 20)	
			HW5 (R)
			Observations(R)
9-Jun	<b>Final Exam</b> , 1015-1205 (T)		

T = Tuesday  
R= Thursday

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**Point Distribution**

Midterm	20	
Final Exam	25	
Homework (drop one)	20	
Quizzes (drop two)	25	
Telescope observing	10	(5 for attendance, 5 for paper)
<i>Extra Credit</i>		
Presentation	3	
Observation project	3	
Online Discussion	2	

**Grading:**

100-90	A
80-89	B
70-79	C
60-69	D

“+” for top three percentages in each range

“-” for bottom three percentages in each range

NOTE: If the class average is less than 75 (before extra credit is considered), all scores will be adjusted upwards to meet this criterion.

SCI316 students will be graded slightly more difficult than PH262 students.

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**Important dates:**

Apr 5:	Last day to drop class for 100% refund.
May 5:	Midterm
May 17:	Last day to change grading option.
Jun 9 :	Final Exam, 1015-1205, Same room