

PHY102: Astronomy, Cosmology and Astrophysics
Gustavus Adolphus College Spring Semester 2017

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Textbooks (Required):

- *The Cosmic Perspective, Eighth Edition* by Bennett, Donahue, Schneider and Voit, ©2017, Pearson
- *PHY102 Lab Manual Spring 2017*, by Steve Mellema and Chuck Niederriter
- *Star and Planet Locator*, from Edmund Scientific

Course Objectives:

1. Achieve an understanding of “how we know what we know” in science and in astronomy.
2. Come to an understanding of your own, personal position in the universe.
3. Examine the relationship between scientific knowledge and other types of knowledge.
4. Understand the social context of science, and astronomy in particular, both historically and contemporarily.
5. Learn critical thinking, quantitative reasoning and problem-solving skills and be able to apply them successfully to the solution of scientific problems.

Achievement of these objectives will be demonstrated through writings (answers to group problems, papers, exams, and lab reports) as well as participation in class discussions.

Course Policy and Evaluation:

1. **Lecture Schedule:** The regular class meeting time is Monday, Wednesday and Friday during the 2nd period time slot (9:00-9:50 AM). Class periods will be used for discussion, lecture, problem solving, etc. Attached is a daily calendar of activities for the course. When a reading assignment is listed for a class discussion, the **reading is expected to be completed before coming to the class.**
2. **Group Problems:** Frequently, students will work together, in assigned groups of 2-3 members, to cooperatively solve problems. Only one group solution will be submitted, with all group members receiving the same grade. There will be no make-up for group problems missed due to absence.
3. **Homework:** Homework assignments will be administered using the [Mastering Astronomy](#) website associated with our textbook. These will be assigned periodically and will have fixed due dates/times. You should register at the www.masteringastronomy.com website as soon as

possible using the Student Access kit that came with your textbook. Our Class ID is **PHY102S2017**.

4. **Labs:** Each student must register for and attend a laboratory class weekly on **either** Tuesday **or** Thursday during the same class period, 9:00-9:50 AM.
 - a. **Pre-Lab Quizzes:** I have not decided if I'm going to do pre-lab quizzes BUT if so, on days when a lab experiment is scheduled, there will be a pre-lab quiz based upon the lab handout for that experiment. This quiz will be administered via Moodle on the Gustavus website. The quiz must be completed by each student before coming to lab, and the Moodle assignment for that day will expire 15 minutes before lab begins, i.e. at 8:45 AM.
 - b. **Lab Experiments:** Attendance at lab experiments is required. Lab reports will only be accepted from those who signed the lab attendance sheet. Generally, the 50-minute lab period will be long enough for students to take the necessary data, but additional work time will be needed outside of class to finish the analysis and write the lab report.
 - c. **Evening Observing Labs:** Each student will also be required to complete four evening observing laboratory exercises, one during each month of the semester.
 - d. **Lab Reports:** Although lab work will be carried out in groups, each student must submit an individual lab report. While data will undoubtedly be shared among lab-group members, all calculations, conclusions and answers to questions are expected to be done by the individual submitting the report. Lab reports will be worth 10 points each for in-class labs and 20 points each for evening observing labs.
5. **Extra-Credit Video Reports:** Throughout the semester, a series of videos will be reserved and available to watch in the library. These videos are optional, but any student who watches a video and submits a 1-2 page summary paper (**summarizing** the video and **relating** it to the course discussions) will receive extra credit of up to 5 points toward the next exam score. Video extra credit points may not carry over past the next hour exam, and no exam score can ever exceed 100%.
6. **Exams:** There will be four one-hour exams during the course of the semester (see schedule below) and a two-hour, comprehensive final exam. Students must arrange **in advance** to take an exam at other than the scheduled time, and may do so **only** for a valid health or school-related reason. It is the responsibility of the student to inform the instructor during the first week of the semester regarding any anticipated absences due to required field trips, athletic events, musical performances, or other extra-curricular activities. Exams missed without pre-arrangement are entered as zero credit and cannot be made up.
7. **Attendance:** Students are expected to attend all class periods, and are responsible for all announcements and assignments made during class.
8. **Evaluation:** Grades will be assigned using the following as a guide:

40% Hour Exams (10% each)	15% Homework	5% Pre-Lab Quizzes
15% Final Exam	10% Group Problems	15% Lab Reports

Final course grades will use the following scale as a guide:

94-100 A	90-94 A-	86-90 B+	82-86 B	78-82 B-
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74-78 C+	70-74 C	66-70 C-	62-66 D+	58-62 D
				0-58 F

9. **Academic Honesty:** Having signed and agreed to abide by the College's Honor Code, students thereby pledge that, in all academic exercises, examinations, papers, and reports, they shall submit their own work. Footnotes, or some other acceptable form of citation must accompany any use of another's words or ideas. In the context of this course, students are expected to collaborate and to discuss their out-of-class assignments. However, submitting under one's own name work that is merely copied from another is a violation of the Honor Code. (The full text of the Gustavus Academic Honor Code Policy may be found at: https://gustavus.edu/general_catalog/current/acainfo).
10. **Disability Services:** Gustavus Adolphus College is committed to ensuring the full participation of all students in its programs. If you have a documented disability (or you think you may have a disability of any nature) and, as a result, need reasonable academic accommodation to participate in class, take tests or benefit from the College's services, then you should speak with the Disability Services Coordinator, for a confidential discussion of your needs and appropriate plans. Course requirements cannot be waived, but reasonable accommodations may be provided based on disability documentation and course outcomes. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact Disability Services as early as possible. Disability Services (<https://gustavus.edu/advising/disability/>) is located in the Advising and Counseling Center. Disability Services Coordinator Laurie Bickett (lbickett@gustavus.edu or x6286) can provide further information.
11. **Help for Students Whose First Language is not English:** Support for English Language Learners (ELL) and Multilingual students is available via the College's ELL Support staff person, Andrew Grace (agrace@gustavus.edu or x7395). He can meet individually with students to consult about academic tasks and to help students seek other means of support. The ELL Support person can also consult with faculty members who have ELL and multilingual students enrolled in their classes. The College's ELL staff person can provide students with a letter to a professor that explains and supports academic accommodations (i.e. additional time on tests, additional revisions for papers). Professors make decisions based on those recommendations at their own discretion. In addition, ELL and multilingual students can seek help from peer tutors in the Writing Center.
12. **Incompletes:** A grade of incomplete will **only** be given for work not completed due to circumstances beyond the control of the student (*this is the College policy*).

February

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
			1	2	3	4
5	6 Classes begin: Syllabus/ Introduction	7 Experiment 1: <i>Observation and Star Chart</i>	8 Chapter 1: <i>A Modern View of the Universe</i>	9 Experiment 1: <i>Observation and Star Chart</i>	10 Chapter 2: <i>Discovering the Universe for Yourself</i>	11
12	13 Sections 3.1- 3.3: <i>The History of Astronomy</i>	14 Experiment 2: <i>Introduction to Voyager: Skygazer</i>	15 Sections 3.4- end: <i>The Science of Astronomy</i>	16 Experiment 2: <i>Introduction to Voyager: Skygazer</i>	17 Sections 4.1- 4.3: <i>Understanding Motion</i>	18
19	20 Sections 4.4- end: <i>Gravitation and Tides</i>	21 Experiment 3: <i>Introduction to Spectroscopy</i>	22 Sections 5.1- 5.3: <i>Properties of Light and Matter</i>	23 Experiment 3: <i>Introduction to Spectroscopy</i>	24 Sections 5.4- end: <i>Learning from Light</i>	25

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March

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
26	27 Review: Chapters 1-5	28 Experiment 4: <i>Light, Brightness and Distance</i>	1 Hour Exam: Chapters 1-5	2 Experiment 4: <i>Light, Brightness and Distance</i>	3 Chapter 7: <i>Our Planetary System</i>	4
5	6 Chapter 8: <i>Formation of the Solar System</i>	7 Experiment 5: <i>The Moons of Jupiter</i>	8 Chapter 9: <i>Planetary Geology</i>	9 Experiment 5: <i>The Moons of Jupiter</i>	10 Sections 10.1- 10.5: <i>Planetary Atmospheres</i>	11
12	13 Chapter 11: <i>Jovian Planet Systems</i>	14 Experiment 6: <i>The Greenhouse Effect</i>	15 Chapter 12: <i>Asteroids, Comets and Dwarf Planets</i>	16 Experiment 6: <i>The Greenhouse Effect</i>	17 Chapter 13: <i>Other Planetary Systems</i>	18
19	20 Review: Chapters 7-13	21 Experiment 7: <i>Discovery of Extrasolar Planets</i>	22 Hour Exam: Chapters 7-13	23 Experiment 7: <i>Discovery of Extrasolar Planets</i>	24 No Class: Spring Break	25
26	27 No Class: Spring Break	28 No Class: Spring Break	29 No Class: Spring Break	30 No Class: Spring Break	31 No Class: Spring Break	

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April

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
						1
2	3 Chapter 14: <i>Our Star – the Sun</i>	4 Experiment 8: <i>Classification of Stellar Spectra</i>	5 Section 15.1: <i>Properties of the Stars</i>	6 Experiment 8: <i>Classification of Stellar Spectra</i>	7 Sections 15.2-15.3: <i>Patterns Among the Stars; Star Clusters</i>	8
9	10 Chapter 16: <i>Star Birth</i>	11 Experiment 9: <i>HR Diagrams of Star Clusters</i>	12 Chapter 17: <i>Star Stuff</i>	13 Experiment 9: <i>HR Diagrams of Star Clusters</i>	14 No Class: Easter Break	15
17	18 No Class: Easter Break	19 Experiment 10: <i>Dying Stars and the Birth of the Elements</i>	20 Chapter 18: <i>The Bizarre Stellar Graveyard</i>	21 Experiment 10: <i>Dying Stars and the Birth of the Elements</i>	22 Review: Chapters 14-18	23
24	25 Hour Exam: Chapters 14-18	26 Experiment 11: <i>Radio Astronomy of Pulsars</i>	27 Chapter 19: <i>Our Galaxy – the Milky Way</i>	28 Experiment 11: <i>Radio Astronomy of Pulsars</i>	29 Sections 20.1-20.2: <i>Galaxies and Distances</i>	30

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May

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
1	2 Sections 20.3- end: <i>Hubble's Law</i>	3 Experiment 12: <i>The Hubble Redshift- Distance Relation</i>	4 Sections 21.1- 21.2: <i>Lifetimes of Galaxies</i>	5 Experiment 12: <i>The Hubble Redshift- Distance Relation</i>	6 Sections 21.3- end: <i>Active Galactic Nuclei</i>	7
8	9 Sections 22.1- 22.2: <i>The Big Bang</i>	10 Experiment 13: <i>The Quest for Object X</i>	11 Sections 22.3- end: <i>Inflation and Evolution of the Universe</i>	12 Experiment 13: <i>The Quest for Object X</i>	13 Review: Chapters 19-22	14
14	15 Hour Exam: Chapters 19-22	16 No Lab	17 Final Exam Review/Final Class Day	18 No Lab: Reading Day	19 Final Exam 8:00-10:00 AM	20
21	22	23	24	25	26	27
28	29	30	31			

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