

Introduction to Astronomy

ESCI - 2510
Fall Semester, 2019

Dr. Steven Gollmer

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Office Hours: M, W: 1:00 –1:50

T,Th, F: 11:00 – 11:50

Open Door Policy(See below)

Text: *Astronomy*, 1st Ed., by Andrew Fraknoi, David Morrison and Sidney Wolf. This text is freely available as an electronic download from <https://openstax.org>. We will systematically work through the first seven chapters and then highlight topics from the remaining chapters. Supplemental material will also be used to enhance some topics and to broaden the discussion on cosmological issues. The laboratory portion of the lab has no textbook. Any material you need for the lab will be provided for you.

Prerequisite: High school physics and precalculus.

Class Room: ENS 240
Class Time: 2:00 - 2:50 M, W, F

Lab Room: ENS 227
Lab Time: Section 1 3:30 - 5:20 Th
Evenings/Mornings as announced

Class Web Page: <http://people.cedarville.edu/Employee/gollmers/esci2510/esci2510.htm>

Canvas Site: <https://www.cedarville.edu/canvas>

Course Description:

ESCI 2510 – Introduction to Astronomy - Fall

4 hours

An introduction to the structure and composition of the universe. Topics covered will include measurement of celestial objects, structure of the solar system and galaxy, composition and history of the universe. Time will be spent in the discussion of various cosmological models and their implications. The course and lab will be taught at a level which requires the use of algebra and trigonometry. Three weekly lectures and one twohour laboratory per week. Variations in the laboratory schedule will be made to accommodate field observations. This course satisfies the physical science requirement of the general education requirements. (Odd) (Fee. \$100)

Objectives:

Theory/Concepts: The student will be able to recall terminology related to astronomy, the basic kinds of astronomical data gathered, and the physical principles that affect astronomical phenomena. In addition they will apply these principles by explaining the physical basis for observed astronomical phenomena.

Analysis: The student will be able to analyze astronomical data using plots and appropriate mathematical techniques and evaluate the accuracy of physical models of the solar system and universe.

Communication: The student will express the physical basis of astronomical theories and models with clarity and relate the significance of these theories to historical understanding of science and the validity of different origins scenarios.

Community: The student will be able to express how astronomy impacts their daily life and affects decisions relevant to society.

Assessment Mapping	Theory / Concepts	Analysis	Communication	Community
Exams	X	X		
Final Exam	X	X		
Quizzes	X	X		
Poster Project	X		X	X
Laboratory	X	X	X	

Grading:

300	3 Unit Exams (100 pts each)
150	1 Final Exam (comprehensive)
70	Quizzes (10 pts each, best 7 out of 8)
36	Poster Project
108	Laboratory (12 pts each)
36	Observation Exercises (12 pts each)
700	Total

90% and up:	A
80% and up:	B
70% and up:	C
60% and up:	D
Below 60%:	F

Grading Scale:

The scale given above will be used to relate a percentage score to a letter grade. Generally the lowest three percentage points in the range will be minus and the highest three points will be plus.

The results for all exams, quizzes, homework, etc. will be given a point score. For example a 8 on a quiz means 8 out of 10 points were earned on the quiz. The calculation of the final grade will be the result of a straight percentage from the points accumulated during the course of the semester. Although no "curving" of the final grade will be done, I reserve the option of raising a students final grade due to their good attitude, class participation and marked improvement during the course of the semester.

Topics:

Histry of Astronomy	The Solar System	Stellar Distances
Celestial Sphere	Earth	Fate of Stars
Kepler's Laws	Terrestrial Planets	Galaxies
Orbits	Giant Planets	Cosmology
Satellites	Rings and Moons	Big Bang
Seasons	Our Sun	Life in the Universe
E&M Spectrum	Star Types	
Telescopes	HR Diagram	

Exams:

3 unit exams and one comprehensive exam will be given during the course of the semester. Though each unit exam only covers material from the previous unit exam, there is some building of concepts which will show up in later exams. Exams will be composed primarily of multiple choice, true/false, and matching questions. An understanding of terminology as well as the basic principles influencing astronomy will be tested. You will also be expected to draw conclusions based on presented data and an understanding of the course material. The final exam is comprehensive and will be similar to the unit exams except for length.

Quizzes:

8 quizzes are scheduled during the semester. These quizzes will give you a chance to see how I ask questions and will prepare you for the unit exams. The total of your best 7 quizzes will be used for your quiz grade. Each quiz is worth 10 points.

Poster Project:

Since it is not possible to cover everything in the textbook, I will pick and choose material so that you have a working knowledge of astronomy. Since knowledge of our solar system has increase significantly over the past decades, I will have students work in teams to design posters to highlight our understanding of the planets and objects of the solar system.

Laboratory:

The laboratory sessions are considered a vital part of this course. While the classwork will help you develop the general concepts and principles of astronomy, the labs will develop observation and interpretation skills. Each laboratory assignment is worth 12 pts and will consist of a variety of activities. Several of the lab exercises will be related to outdoor observations. Since we can not observe stars at 3:30 in the afternoon, we will need to schedule evening sessions. The grade for the evening labs is composed of an attendance grade and an activity grade. Some of the activities associated with the evening observations will run during the course of the semester and will be turned in at the end of the semester. The afternoon labs will consist of activities which can be completed that week.

Late Work:

Late work will be accepted with a penalty. Late homework and labs will be docked 10% if turned in within the first week and 20% thereafter. If late work is turned in during finals week, 50% of the value of the homework will be docked unless it falls under the category of being within the first week. Homework that is late due to an excused absence (prior arrangement with me or medical excuse) will not be docked if turned in the following class period.

Extra Credit:

No extra credit is available for this class. It is felt that spending time working on extra credit distracts from staying current on the material and preparing for the next graded activity.

Academic Integrity:

"The Academic Integrity Pledge is a commitment to live with integrity in all areas of life including the classroom. All forms of academic dishonesty violate this pledge and could result in dismissal from this community."

Although I encourage group efforts in studying and lab work, I still expect you to turn in your *own* work. If your work appears to be copied from another person's lab or homework, your assignment will be returned with either a zero or returned with the intent of a redo with a loss of credit. Which of these two options is chosen is at the discretion of the instructor.

During quizzes and exams you are required to do your own work. If during the quiz or examination time you receive help from an unauthorized source (ie. class mates, wireless access to the network, etc.), your quiz or exam will receive a zero and the Office of the Academic Vice-President will be notified.

Appeal Process:

Our commitment as faculty is to provide you with the best possible educational experience this semester. If a concern arises during the semester, I encourage you to discuss the issue with me or, if you wish to remain anonymous, you may share your concern Dr. Mark McClain, Chair of the Department of Science and Mathematics. He will work to resolve the issue. If the concern is about grading assignments or exams, your first responsibility is to speak with me. If you believe that the outcome of that meeting did not resolve the issue, you may appeal to Dr. McClain. The formal grade appeal process can be found at www.cedarville.edu/gradeappealprocess." Dr. McClain can be contacted by email (mcclain@cedarville.edu), by phone (extension 7940) or in his office (ENS 380A).

Academic Accommodations:

Disability Services coordinates reasonable accommodations for students with documented disabilities. Students in need of academic accommodations because of the impact of a disability are invited to e-mail the Disabilities Compliance Coordinator at disabilityservices@cedarville.edu or visit www.cedarville.edu/disabilities for information and an application. **Disability Services** is located in **The Cove (Academic Enrichment Center)** on the second floor of the BTS.

Attendance:

Attendance will be taken each day of class. Although it does not get recorded as a grade, it will be to your benefit to be present for class. One example is that a missed quiz will be recorded as a zero unless the absence is excused. Excused absences are allowed for sickness. If you need to miss class for a different reason, you must contact me beforehand and let me determine if this constitutes an excused absence. If a quiz or a lab is to be made up as a result of an excused absence, it must be completed within two days of your return. Another benefit for attending class is that material will be presented differently than in the book since I will endeavor to illustrate some of the physical principles, generate discussion about issues related to astronomy and include a Biblical perspective. Faithful attendance also demonstrates a good stewardship of the time and money with which God has entrusted you.

Open Door Policy:

I have one hour each day scheduled for office hours. You may also drop by my office at any other time whether it is class related or not. As long as I am present in my office and I do not have any pressing work that needs to be done, I will meet with you. I am privileged to have this ministry at Cedarville University. Whether you recognize it or not, God has put me in your life this semester to minister to you.

Assessment Criteria:

Teacher Education Program Unit and Program Assessments Assigned to Course

Unit Outcome	Program Outcome	Decision Points	Assessment
Competence	NSTA Std 1a.	4	#1 Content Knowledge
Competence	NSTA Std 1a.	1, 2, 3, 4	#2 Content Knowledge

Conclusion:

Use this semester in astronomy well. Astronomy does contain a lot of facts and information; however, by understanding the underlying principles these facts begin to fall into perspective. The textbook contains key terms, review questions, questions for thought, and exercises. Use these portions of the chapter to make sure you really understand the material covered. Just reading through the text will not adequately prepare you for quizzes and exams. I suggest you find a study partner or group that will help you assimilate the material from the class. I want you to develop a working knowledge of astronomy and that will take time. This course assumes that you have an adequate preparation in mathematics and an understanding of basic physics principles. If you find that these areas are wanting during the semester, you will need to put in extra study time to be successful in this class.

I hope your appreciation for astronomy will grow during this semester although it will require a sustained amount of effort. I continue to be amazed that we are able to understand as much as we do about the universe in spite of its complexity. It demonstrates to me that we have an infinite God, who reveals himself in ways we can understand (Ro. 1:20).

Addendum to the Syllabus:

Due to dynamics present during the course of the semester, the instructor may make adjustments to the printed schedule. However, if any changes are made to content coverage or dates of exams, students will be notified either in class or by email.

	Date	Ch.	Topic	Activities		Date	Ch.	Topic	Activities
			ESCI 2510 - Intro. To Astronomy						
					M	10/14	7	Poster Planning Day	
					W	10/16	7	Exploration of the Solar System	
W	8/21		Introduction		F	10/18		<i>Fall Break - No Class</i>	
F	8/23	1	Science and the Universe		Lab				
M	8/26	2	Celestial Sphere		M	10/21	7	Trans-Nepunian Objects (TNO's)	
W	8/28	2	History of Astronomy		W	10/23	7	Asteroids and Comets	
F	8/30	3	Kepler's Laws	Q1	F	10/25	7	Extrasolar Planets	Q5
Lab		1	<i>Stellarium (Lab)</i>		Lab		6	<i>Rotation of the Sun (CLEA)</i>	
M	9/2		<i>Labor Day - No Class</i>		M	10/28		Poster Presentation	
W	9/4	3	Orbits and Satellites		W	10/30	15	The Sun	
F	9/6	4	The moon		F	11/1	15	The Sun	
Lab		2	<i>Kepler's Law (Lab)</i>		Lab			<i>Observation of Night Sky (TBA)</i>	
M	9/9	4	The Seasons	Q2	M	11/4	15	The Sun	
W	9/11	4	The Calendar		W	11/6	17	Stars	
F	9/13		Exam #1 Ch. 1 - 4		F	11/8	17	Stars	Q6
Lab			<i>Size of the Solar System (Outside)</i>		Lab		7	<i>Spectral Classification of Stars (CLEA)</i>	
M	9/16	5	E&M Spectrum		M	11/11	17	Stars	
W	9/18	5	Hydrogen atom and spectroscopy		W	11/13	19	Distances in Space	
F	9/20	6	Telescopes		F	11/15		Exam #3 Ch. 7, 15, 17, 19	
Lab		3	<i>Spectra of Elements (Lab)</i>		Lab			<i>Solar viewing (Observation)</i>	
M	9/23	6	Telescopes	Q3	M	11/18	23	Death of Stars	
W	9/25	7	The Solar System		W	11/20	23	Death of Stars	
F	9/27	7	The Earth		F	11/22	25	Galaxies	
Lab		4	<i>Size of the Moon (Lab)</i>		Lab		8	<i>Radioastronomy and Pulsars (CLEA)</i>	
M	9/30	7	Terrestrial Planets		M	11/25	29	Origin of the Universe	Q7
W	10/2	7	Terrestrial Planets		W	11/27		<i>Thanksgiving Break - No Class</i>	
F	10/4	7	Giant Planets	Q4	F	11/29		<i>Thanksgiving Break - No Class</i>	
Lab			<i>Observation of Night Sky (TBA)</i>		Lab				
M	10/7	7	Giant Planets		M	12/2		<i>Thanksgiving Break - No Class</i>	
W	10/9	7	Moons and Rings		W	12/4	29	Origin of the Universe	
F	10/11		Exam #2 Ch. 5-7		F	12/6	30	Anthropic Principle	Q8
Lab		5	<i>Moons of Jupiter (CLEA)</i>		Lab		9	<i>Hubble's Law (CLEA)</i>	
					M	12/9	30	Life in the Universe	
					W	12/11		Final Exam (1:00 - 3:0)	