

Astronomy: Observations and Theories



NAME OF COURSE: Introduction to Astronomy
COURSE #: AST100.910
INSTRUCTOR: Joe DalSanto
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TIMELINE: You must complete all coursework on or before **December 5, 2008.**

COURSE DESCRIPTION: The course is a descriptive, non-mathematical, non-laboratory survey course in astronomy. Topics include earth and sky, the structure and evolution of the solar system, stars, galaxies, and the universe. AST100 will not count towards a degree if student completes AST110 or AST105.

The course is designed for students with a general background so that non-technical, non-science, as well as those with little background in mathematics can succeed. If the text and study guide are used as directed, you can succeed. I hope that this will be a rewarding learning experience for you.

COURSE OBJECTIVES: Upon completion of this course, the student will be able to:

1. Define astronomy, describe the process of science, and offer examples of the dynamic and ever-changing nature of this discipline.
2. Describe the appearance and motions of the sun, moon, planets, and stars that can be observe with the naked eye, and explain related phenomena such as eclipses and seasons.
3. Identify the historical contributions of Ptolemy, Copernicus, Tycho, Kepler, Galileo, and Newton, and discuss how astronomy developed from the ancient

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conceptions of the Greeks to a modern understanding of gravity and orbital motion.

4. Explain the interaction of light and atoms, and discuss how telescopes and associated instruments are used to gather and analyze light at different wavelengths to measure the physical characteristics of stars and galaxies.
5. Describe the atmosphere of the sun, including the nuclear processes taking place in its core and surface phenomena.
6. Discuss how astronomers determine the basic properties of stars and explain how these properties change at different stages of a star's life.
7. Explain the physical processes taking place during the birth, life, and death of stars and binary star systems.
8. Describe the structure, behavior, origin, and evolution of galaxies.
9. Explain the fundamental principles of cosmology, including space-time, evidence for the big bang, and effects of inflation and acceleration of the universe.
10. Summarize the basic features of our solar system, the physical processes involved in its formation, and evidence for extrasolar planetary systems.
11. Compare and contrast the similarities and differences among the terrestrial planets, the Jovian planets, and smaller bodies of our solar system.
12. Summarize what is known about the origin and nature of life on Earth, and relate this to the search for possible life beyond our planet.

REQUIRED TEXTBOOKS:

Seeds, M.A., 2008, Horizons, Exploring the Universe, 10th edition, Thomson Brooks Cole, 516 p.

Cusano, D., Levine, J.M., and Sibbersen, K, 2008, Student Guide for Astronomy: Observations and Theories, 2nd edition for use with Horizons: Exploring the Universe, 10th edition, 430 p.

These texts may be purchased at the WCC bookstore at either Sugar Grove or Aurora Campus or through the WCC bookstore online site, <http://waubonsee.collegestoreonline.com/>. Books may be ordered individually if not in stock.

REQUIRED DVDs:

A complete set of DVD's is available to borrow through the Distance Learning Office, located on the Sugar Grove campus in Collins Hall room 145. There is no fee to borrow a complete set of the telecourse DVD's.

TIPS TO BEGIN:

Read and understand pages viii to xiii in the Student Guide. You would be strongly advised to devise a schedule (see the scheduling table in the sequence section) and keep to it. If you fall behind, it becomes very difficult to catch up and complete the course on time. **DON'T PROCRASTINATE!!** If you have any

questions about the material in this telecourse, don't hesitate to contact me by phone or email. I will get back to you as soon as possible.

SEQUENCE:

Read your telecourse study guide, starting on page *viii*, and then read Lesson 1. In particular, read the list of *Learning Objectives* and *Viewing Notes* for each lesson and read the appropriate pages in Seeds; these are the keys to the telecourse. It is also recommended that you learn the meanings of the terms in the *Key Terms and Concepts* before viewing. Review and study the *Summary*, and test yourself with the *Review Exercises*. Pay particular attention to the *Completion* and *Self-test* questions, you may see some of them again. After you have finished these, you are ready for lesson two. Follow the above procedures for each lesson for the best results.

LESSONS FOR EXAM 1

1. The Study of the Universe
2. Observing the Sky
3. Celestial cycles
4. The Birth of Astronomy
5. Astronomical Tools
6. The Science of Starlight
7. The Sun – Our Star

LESSONS FOR EXAM 2

8. The Family of Stars
9. Stellar Births
10. Stellar Deaths
11. Stellar Remnants
12. Our Galaxy: The Milky Way
13. Galaxies
14. Active Galaxies

LESSONS FOR EXAM 3

15. Cosmology
16. Solar Systems
17. The Terrestrial Planets
18. The Jovian Worlds
19. Solar System Debris
20. The Search for Life Beyond Earth

It is strongly recommended that you complete two lessons per week. You might benefit from developing your own timetable by completing the following table.

NOTE THAT YOU NEED TO REMEMBER THE TERM PAPER!

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Scheduling table

Event	Time allotted	Date
Start date		_____
Work through lesson 1 to 7	Add 4 weeks	_____
Take Exam 1	Add 1 week to study	_____
Work through lessons 8 to 14	Add 4 weeks	_____
Take Exam 2	Add 1 week to study	_____
Work through lessons 15 to 20	Add 4 weeks	_____
Take Exam 3	Add 1 week to study	_____

(no later than **Dec 5**)

GRADING POLICY:

Your grade will be based on the average of the three tests and your term paper (see Final Paper section of this syllabus for details), each worth 75 points. Your course grade will be determined as follows:

A	$\geq 90\%$	270 to 300 points
B	80 – 89%	240 to 269 points
C	70 – 79%	210 to 239 points
D	60 – 69%	180 to 209 points
F	$< 60\%$	< 180 points
I	See below	
W	As needed	

An incomplete will be granted entirely at the instructor's discretion.

You must complete this course on or before **December 5**. If you have not officially withdrawn from or completed the course by this date, you will receive an F for the course.

TESTS:

Each exam has 75 multiple choice questions, and you will have 90 minutes to complete them. You will take an exam after completing lessons 7, 14, and 20. Tests will be available to you on **August 25** at the Center for Learning Assessment. Go to the Center for Learning Assessment at either the Sugar Grove campus (Collins Hall, first floor-Room 137) or the Aurora campus (first floor-Room 110) and ask for the corresponding test. A photo ID is required to take a test. Tests will be taken on computer and you should receive your test score immediately upon finishing.

TERM PAPER:

You are to write a 5 page paper on one of the topics listed below. You may choose a topic of your own, but it will need to be approved by me.

Potential term paper topics (others need to be approved by me):

- What are extrasolar planets? How are they detected? How many are there currently? How big are they? What is known about their structure and composition? How many solar systems are known?

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- What are black holes? How do we know their structure if we can't 'see' them? What are their roles in the evolution of stars?
- Who was Edwin Hubble? What are his contributions to modern astronomy? Why are his contributions so important to modern astronomy?
- What are Messier Objects? Pick any Messier object that is a galaxy, and describe all that is known about it.
- Why is Mars so (scientifically) interesting to us Earth-dwellers? What missions are currently underway, and in the planning stages, that are going to answer some of these questions? What have the ongoing exploratory missions of Mars told us so far about the planet?

You must use the ideas and concepts you have obtained from this course, as well as several outside sources. You are expected to use at least 5 references, other than your textbook. Only 3 of those may be valid websites, more than 3 valid website references will be penalized, although this is variable depending upon the topic. Depending on your topic, you may have to use several valid websites as sources; **DO NOT COPY THAT WEBSITE**, please refer to the plagiarism statement in the student handbook. If I feel that your paper has been copied from websites, I will give you a 0 for this assignment, with possible referral to the Student Conduct Board for violation of plagiarism rules. I **DO NOT** consider Wikipedia as a valid reference for a term paper, and you will be penalized for listing it as one. If you are having difficulty finding appropriate references or determining whether a website is a valid reference, please contact me or a Reference Librarian in Todd Library.

I will expect you to completely discuss any astronomic terms and concepts that you include in your paper, understandable to a high school student. The format for this paper is discussed in the 'Instructions to authors' on the website of the Journal of Geoscience Education (<http://www.nagt.org/nagt/jge/instructions.html>, with pertinent sections excerpted below). Please refer to the grading criteria for the paper listed below. If you submit a draft of this paper prior to its due date (the Final exam), I will proof read it, assign a provisional grade, and return it to you to make corrections. **I STRONGLY RECOMMEND THAT YOU SUBMIT A DRAFT OF THIS PAPER TO ME.** This draft can be submitted via email **ONLY** if you use Microsoft Word (so that you can easily see my corrections). I will not accept a draft for review after August 1.

There are a total of 75 points for this assignment.

- (50 points) for the clarity of thought and completeness of your arguments presented. This component will evaluate the science and content of the answer, the detail that is presented (or not presented as interpreted by you as not necessary for the reader to know), and the clarity and completeness of the discussion, given that the reader will not have participated in the class and is unfamiliar with what you have done.
- (15 points) for grammar, spelling, punctuation, and ability to effectively communicate your thoughts/ideas. I will take off 1 point for each word that is not spelled correctly, (or a correctly spelled word that is used incorrectly). In other words, use the spell check **AND** grammar check!
- (10 points) presentation style and professionalism of your assignment, and conforming to instructions: typed pages on 8 ½ x 11 paper with the 4

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margins no greater than 0.75 inch, font size no larger than 12 point and double-spaced. If you include pictures or illustrations (you are encouraged to do so), they DO NOT count towards the required length of text.

Pertinent excerpts from Journal of Geoscience Education webpage:

- Papers should be written in the first person and in active rather than passive voice. Text should not be block or right justified, and words should not be broken between lines. The first page of a manuscript should have the title and authors' names.
- All papers must be accompanied by informative abstracts of 200 words or less, the shorter the paper, the shorter the abstract. The use of phrases such as *is discussed, is described, or are presented* must be avoided. Instead, authors should remember that the abstract is not a description of the paper, but should be a short version of the essential parts of the paper. It is NOT an introduction to the paper.
- The use of illustrations that contribute to the message an author is trying to communicate is strongly encouraged. Illustrations include cross sections, diagrams, drawings, graphs, maps, and photographs. Tabular items such as columnar lists of words and numbers are considered tables, not figures. Illustrations in the Journal are called figures and are given sequential Arabic numbers. If authors wish to have multi-part figures (4A, 4B, and so forth), they must put the A, B, C on the figures.
- Footnotes, as such, are not used in the Journal, but are incorporated into the text in the style followed by most geological journals. A list of References Cited should appear at the end of each paper. Serial and book titles and the names of publishers in the list should not be abbreviated but should be spelled out. The format for citations and references should be that used in recent issues of the Journal. See, for example, the list at the end of these Instructions. Failure to include such a list when appropriate may suggest that an author is not familiar with the literature of a field, has not given proper credit to prior work, and has not taken such research into account in his/her own work.
- Lists of words or numbers are called tables and are given sequential Arabic numbers, like figures. Each table should have its own caption and, unlike figure captions, each table caption should be typed below its table.
- Titles should be short and informative, rather than catchy or cute. As a general rule, titles should not contain punctuation, particularly colons.
- Units of Measurement: International Metric System (SI) units of measurement should be used, with English equivalents following (in parentheses), if necessary.

▪ Citation Style

Embedded Citations within text:

Single Author: (Smith, 2002)

Two Authors: (Smith and Jones, 2002)

More than Two Authors: (Smith et al., 2002)

End-of-paper reference section entries

Journal article:

Devlin, J. F., 2003, Rationalizing geomorphology with an energy balance, Journal of Geoscience Education, v. 51, p. 398-409.

Book:

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Gilman, A.G., Rall, T.W., Nies, A.S., and Taylor, P., editors, The Pharmacological Basis of Therapeutics (8th edition), New York, Pergamon, 650 p.

Book Chapter:

Kuret, J.A., and Murad, F., 1990, Adenohypophyseal hormones and related substances, In: Gilman, A.G., Rall, T.W., Nies, A.S., and Taylor, P., editors, The Pharmacological Basis of Therapeutics (8th edition), New York, Pergamon, p. 1334-1360.

Abstract:

Mendez, M.F., Manon-Epaillat, R., Lanska, D.J., and Burstine, T.H., 1977, Rapikivi granites [abstract], Geological Society of America Abstracts w/ Programs, v. 34, p. 295.

Dissertation:

Dettmers, J.M., 1995, Assessing the tropic cascade in reservoirs: the role of an introduced predator [dissertation], Columbus (Ohio), Ohio State University, 188 p.

Conference Paper:

Meyeres, B., and Hermanns, K., 1985, Formaldehyde release from pressed wood products, In: Turoski, V., editor, Formaldehyde: analytical chemistry and toxicology, Proceedings of the symposium at the 187th meeting of the American Chemical Society, Washington, D.C., American Chemical Society, p. 101-106.

Web page:

Burka, L.P., 1993, A hypertext history of multi-user dimensions: MUD history, <http://www.utopia.com/talent/lpd/muddex/essay> (accessed 2 August, 1996).

Software:

ID Software, 1993, The ultimate doom, New York, GT Interactive Software.