

Syllabus

ASTRON 101 - The Solar System (4 Credits) - Gen.Ed.(PS)

This is a 4 credit course for nonscience majors. Topics covered include: Introductory survey of astronomy. How we learn about the Universe and what we already know of it, how it originated, evolves, and its ultimate fate. Emphasis on modern research in solar phenomena, stellar evolution (including white dwarfs, neutron stars, pulsars, and black holes) and galaxy studies (including quasars). Introduction to the night sky, telescopes, astronomical events, and celestial maps. Visual and telescopic observations of the constellations, moon, planets, stars, and other interesting astronomical objects.

The lab component is making visual observations of the stars, planets, and the Moon with your eyes.

Instructor: <PROF_FULL_NAME>

I have a PhD in Planetary Sciences from Massachusetts Institute of Technology, a Masters in Geology and Planetary Science from the University of Pittsburgh, and a BS in Physics and a Minor in Astrophysics from Rensselaer Polytechnic Institute. I study the mineralogies of asteroids. I have been teaching since the Spring of 2005 at a number of schools (UMASS-Amherst, Mount Holyoke College, Bates College, Framingham State University, Amherst College) where I have taught a variety of classes in Astronomy, Planetary Science, Geology, and Physics.

Calculator

Everybody will need a scientific calculator for the class.

Format

There will be a taped lecture for each unit with a corresponding Powerpoint presentation.

Academic Honesty

All work must be done by the individual. Cheating will be considered to be direct copying from another individual or from a website or book. Any assignment where cheating occurs will be given a grade of 0. Students can work together on observations.

Goals of Class

The goals of the class are to learn about the Solar System and understand the phenomena that we see in the sky. You will be able to identify some stars, planets, and constellations in the sky; you will understand how our ideas about the Solar System have changed over time; you will learn how the Sun works; you will learn characteristics and properties of the planets; and you will learn about the possibility of life throughout the Solar System and our galaxy.

Contact Information

Send me emails through Messages. I will respond as soon as I read the message (usually within a few hours).

Attendance Policy

There is no required attendance except between July 24th and August 4th when the students will need to do their daily observations. Since this is an online class, students should try to log in every day to do the work and check for any important messages.

Weekly Office Hours

I will have weekly office hours from 4-5 pm (EST) every Monday.

The zoom link is <LINK_ZOOM>

Lectures

Video lectures and powerpoints are under Weekly/Unit Content.

Book

Pathways to Astronomy (Authors: Stephen Schneider and Thomas Arny) (6th Edition) (ISBN 9781260258066) is the latest edition. 5th, 4th, 3rd or 2nd edition are perfectly fine to use. The book is also available as a low-priced ebook that you can read on your phones (ISBN [9781264150243](#)). The textbook is also on reserve at the library.

https://www.amazon.com/s?k=pathways+to+astronomy&ref=nb_sb_noss_1

<https://www.mheducation.com/highered/product/pathways-astronomy-schneider/M9781260258066.html>

All units (chapters) should be read before listening to the lecture. Reading the units will help you understand better the concepts in the lecture that I am emphasizing.

Online Tutoring

There is free online tutoring. See link on left side of Blackboard.

Accommodations

Any accessibility or accommodation issues should be brought up with the instructor at the beginning of the course. Information about accessibility services at UMASS can be found at <http://www.umass.edu/disability/students>.

Discussion postings

There will be a discussion section where you can discuss topics related to the course. These topics can be related to the course or astronomy in general. These posts will not be graded. Observations will also be posted in the discussion forum, which are graded.

Midterm and Final

The Midterm and Final will be open book and open notes. The exams can be found under Assignments. Comments will be given when any points are taken off on any question.

Grades

- A (92.50 – 100)
- A- (89.50 – 92.49)
- B+ (87.50 – 89.49)
- B (82.50 – 87.49)
- B- (79.50 – 82.49)
- C+ (77.50 – 79.49)
- C (72.50 – 77.49)
- C- (69.50 – 72.49)
- D+ (67.50 – 69.49)
- D (59.50 – 67.49)

•F (below 59.49)

Daily Observations of Sky

Starting July 24th , students must make daily observations of the sky for about two weeks. Using a sky chart (<http://www.stellarium.org/>) ; you may have to change the position and time to match your location), the student must observe the night sky once a day and log what they see (stars, planets, Moon) and the positions of these objects in the sky. A Discussion posting on what the student saw must be submitted by the next day. Many of the nights will be too cloudy for observations but a report will still need to be submitted. I will drop the 2 lowest Observation scores. You are graded for the planning of your observations and not what you actually see. When points are taken off, comments will be given to explain the reason so any errors can be fixed for the next post. Comments will also be given for making the observations more productive. There will also be a few discussion posts on making the observations and on what you learned.

Grading Rubric for Observations: 100 points if the student made significant preparations for observations. Listed all needed quantities;

75 points if the student made some preparations for observations. Listed most needed quantities;

50 points if the student did not make very good preparations for observations. Did not list most needed quantities.;

0 points if the student did not make any preparations. Observations were inaccurate.

Grading for Astronomy 101 (4 credits)

Assessments - 25%

Daily observations of the sky - 25%

Midterm - 25%

Final - 25%

Assessments

There will be assessments assigned for every unit that is covered in the class. The assessments should be done as quickly as possible but have to be completed by the last day of class (August 19th). I will drop the grades of the 2 assessments with the lowest scores. The assessment questions will be relatively straightforward questions or calculations. The assessments are found under Assessments.

Late Assignments

I will not accept late assignments unless there is a valid excuse with an official note.

Schedule

Introduction

Unit 1 Our Planetary Neighborhood

Unit 2 Beyond the Solar System

Unit 3 Astronomical Numbers

Unit 4 Foundations of Astronomy

Unit 5 The Night Sky

Unit 6 The Year

Unit 8 Lunar Cycles

Unit 11 Planets: The Wandering Stars

Unit 12 The Beginnings of Modern Astronomy

Unit 13 Observing the Sky

Unit 14 Astronomical Motion: Inertia, Mass, and Force

Unit 15 Force, Acceleration, and Interaction

Unit 16 The Universal Law of Gravity

Unit 21 Light, Matter, and Energy

Unit 22 The Electromagnetic Spectrum

Unit 23 Thermal Radiation

Unit 24 Atomic Spectra: Identifying Atoms by Their Light

Unit 25 The Doppler Shift

Unit 28 Detecting Light

Unit 29 Collecting Light

Unit 30 Focusing Light

Unit 32 The Earth's Atmosphere and Space Observatories

Unit 51 The Sun, Our Star

Unit 52 The Sun's Source of Power

Unit 34 The Structure of the Solar System

Unit 35 The Origin of the Solar System

Unit 36 Other Planetary Systems

Unit 37 The Earth as a Terrestrial Planet

Unit 38 Earth's Atmosphere and Hydrosphere

Unit 39 Our Moon

Unit 40 Mercury

Unit 41 Venus

Unit 42 Mars

Unit 43 Asteroids

Unit 44 Comparative Planetology

Unit 45 Jupiter and Saturn

Unit 46 Uranus and Neptune

Unit 47 Satellite Systems and Rings

Unit 48 Ice Worlds, Pluto, and Beyond

Unit 49 Comets

Unit 50 Impacts on Earth

Unit 86 The Search for Life Elsewhere

Assessments, Midterm, and Final are due by August 25th.

Recommended Schedule

The class is very self-paced. But a recommended schedule would be:

Week 1:

Units 1, 2, 3, 4, 5, 6, 8, 11

Week 2:

Units 12, 13, 14, 15, 16, 21, 22, 23

Week 3:

Units 24, 25, 28, 29, 30, 32, Midterm

Week 4:

Units 51, 52, 34, 35, 36, 37, 38, 39

Week 5:

Units 40, 41, 42, 43, 44, 45, 46, 47

Week 6:

Units 48, 49, 50, 86, Final

General Education Learning Objectives

According to the UMass General Education Council, "the purpose of the General Education requirement is to stretch students' minds, broaden their experiences, sharpen their critical thinking and evaluation skills, and make connections through shared experiences." In this course, we will examine the power and limitations of scientific investigation. We will consider some of the fundamental questions addressed by astronomy and learn how the physical sciences can address these questions. While most of the objects astronomers study are remote, many provide new perspectives on the Earth, and the methods we use can be applied to many "real world" problems. Finally, we will explore what we know and don't know about the Universe and its constituent parts, and how we have reached those conclusions. In this context, students will be required to think about and solve conceptual and quantitative problems of astronomy and physics, including some moderately challenging topics. This will involve some use of algebra and geometry.