Fall 2020

PHYS 202-001: Introductory Astronomy and Cosmology

Ian Gatley

New Jersey Institute of Technology
College of Science and Liberal Arts
Department of Physics
Introductory Astronomy and Cosmology, Section 001
Phys 202–001
Fall 2020

SYNCHRONOUS ONLINE COURSE using Webex:
Mondays 11:00 a.m. to 12:20 p.m. at: http://njit.webex.com/join/gatley
Wednesdays 11:00 a.m. to 12:20 p.m. at: http://njit.webex.com/join/gatley

Instructor

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Textbook: The electronic version of the textbook is available online at no cost

Astronomy (Yes, the name of the book is ***Astronomy***)
Senior Contributing Authors: Andrew Fraknoi, David Morrison & Sidney C. Wolff
https://openstax.org/details/books/astronomy

Grade

Your final grade will be based upon homework, two written reports, four in-class examinations, and one Final Examination. The in-class examinations will be held using Canvas on the following dates.

First Examination	Wednesday, September 23, 2020
Second Examination	Wednesday, October 14, 2020
Third Examination	Monday, November 9, 2020
Fourth Examination	Monday, December 7, 2020

Instructions for the two written reports will posted on Canvas.
The date and time of the Final Examination will be announced later.

There will be no "make-up" examinations. If you miss an examination, you will receive a grade of zero for that examination. The scores you earn will determine your final grade based on the following table.

85% to 100%	A
80% to 84%	B+
70% to 79%	B
65% to 69%	C+
50% to 64%	C
40% to 49%	D
0% to 39%	F

The homework grades will not be "curved," nor will the scores on the written reports be "curved." The examination grades will not be "curved," nor will the final grades be "curved." The homework and the examinations will cover topics discussed in class and/or topics discussed in the textbook. The Final Examination will cover the entire course's material.

Introductory Astronomy and Cosmology (Phys 202) and Introductory Astronomy and Cosmology Laboratory (Phys 202A) are two separate courses for which you will receive two separate and independently-determined grades. Moreover, you are free to be registered for either one of these courses without being registered for the other course. If you are registered for both courses, withdrawal from one course does not mean you must withdraw from the other course.

Academic Integrity

Any student who is disruptive in the online session will be in violation of the Academic Honor Code and will be reported to the Dean of Student Services.

Any student who cheats during an examination or in the writing of a report will be in violation of the Academic Honor Code. The student will automatically fail the course and will be reported to the Dean of Student Services so that further action may be taken. Examples of cheating during an examination include, but are not limited to, talking with another student, copying work from another student's work, or allowing another student to copy work from your own work.

Syllabus

Wed	2-Sep	Observing the Sky (Chapters 1 and 2)
Mon	7-Sep	No Class: Labor Day. Class meets tomorrow (Tuesday).
Tues	8-Sep	Orbits and Gravity (Chapter Three)
Wed	9-Sep	Earth, Moon, and Sky (Chapter Four)
Mon	14-Sep	Radiation and Spectra (Chapter Five)
Wed	16-Sep	Astronomical Instruments (Chapter Six)
Mon	21-Sep	Introduction to the Solar System (Chapter Seven)
Wed	23-Sep	Exam 1 (Chapters 1-7)
Mon	28-Sep	Earth and Other Cratered Worlds (Chapters 8 and 9)
Wed	30-Sep	Venus and Mars (Chapter Ten)
Mon	5-Oct	Giant Planets, Rings, Moons (Chapters 11 and 12)
Wed	7-Oct	Comets, Asteroids, Samples (Chapters 13 and 14)
Mon	12-Oct	The Sun (Chapters 15 and 16)
Wed	14-Oct	Exam 2 (Chapters 8-16)
Mon	19-Oct	Starlight and Stars (Chapters 17 and 18)
Wed	21-Oct	Distances. Gas & Dust in Space (Chapters 19 and 20)
Mon	26-Oct	Star & Planet Formation (Chapter Twenty-one)
Wed	28-Oct	Stars' Adolescence to Old Age (Chapter Twenty-two)
Mon	2-Nov	Death of Stars (Chapter Twenty-three)
Wed	4-Nov	Review of Chapters 17-23
Mon	9-Nov	Exam 3 (Chapters 17-23)
Wed	11-Nov	Black Holes, Curved Spacetime (Chapter Twenty-four)
Mon	16-Nov	The Milky Way Galaxy (Chapter Twenty-five)
Wed	18-Nov	Galaxies (Chapter Twenty-six)
Mon	23-Nov	QSOs, Black holes, Galaxy Evolution (Chapters 27 & 28)
Wed	25-Nov	No Class: Friday classes meet
Mon	30-Nov	The Big Bang (Chapter Twenty-nine)
Wed	2-Dec	Review of Chapters 24-29
Mon	7-Dec	Fourth Examination
Wed	9-Dec	Review of Chapters 1-29

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Learning Objectives and Outcomes

Comprehend our place in the universe.
Describe the size of the universe, and relate this size to everyday human experience.
Describe the age of the universe, and relate this age to every day human experience.
Understand various astronomical coordinate systems.
Analyze the changes in the sky from different locations on the Earth.
Recall the brightest stars in the sky and several constellations in the sky.
Comprehend the electromagnetic spectrum.
Use the Doppler effect to analyze redshifts and blueshifts.
Understand the laws of optics, and use them to construct telescopes.
Comprehend atomic theory, including subatomic particles.
Analyze different types of spectra.
Describe the changes in perspective that led to the Copernican revolution.
Apply Kepler's laws to explain observations of planetary motion.
Describe Newton's model of the universe, including Newton's laws and Newton's theory of gravitation.
Describe the origin of the solar system, and explain how this model explains the properties planets.
Comprehend the geology and the atmospheric processes of the terrestrial planets.
Analyze the Jovian planetary systems as microcosms of the entire solar system.
Discuss the minor objects of the solar system, including asteroids, meteoroids, comets, and dust.
Describe the properties of the Sun.
Analyze the interior of the Sun, including the nuclear reactions in its core.
Analyze other stars in the context of the Hertzsprung-Russell diagram.
Use the Hertzsprung-Russell diagram to discuss the birth, evolution, and death of stars.
Evaluate various Hertzsprung-Russell diagrams for different types of star clusters.
Analyze the evolution of binary star systems.
Describe Einstein's model of the universe (both the special relativity and the general relativity theories).
Describe the properties of the Milky Way galaxy.
Analyze other galaxies in the context of the Hubble sequence.
Discuss various theories of the birth, evolution, and death of galaxies.
Describe the large-scale structure of the universe.
Explain the evidence, both theoretical and observational, for the expansion of the universe.
Calculate the age of the universe from the Hubble law.
Formulate the Big Bang model of cosmology.
Comprehend theories on the frontiers of theoretical physics.
Explain the history of the universe.