Fall 2020

PHYS 202-101: Introductory Astronomy and Cosmology

Robert Duffin

New Jersey Institute of Technology
College of Science and Liberal Arts
Department of Physics
Introductory Astronomy and Cosmology, PHYS 202 Section 101
Fall 2020

CONVERGED LEARNING COURSE using Webex:
Thursdays 6 pm - 8:50 pm at: https://njit.webex.com/join/rduffin **or in KUPF theatre.**
You must be logged onto your NJIT account and have a working microphone and speaker

Instructor
Robert Duffin, Ph.D.
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Office Hours: Email me a question or email me for an online appointment.

Course Description: A non-mathematical presentation of contemporary views of the origin, evolution, and structure of the solar system, stars, galaxies, and the universe. Special topics include neutron stars, black holes, gravitationally strange objects, and the big bang.

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

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 three in-class examinations, and one Final Examination. The in-class examinations will be held using Canvas on the following dates.

First Examination	Thursday, September 24, 2020
Second Examination	Thursday, October 22, 2020
Third Examination	Thursday, November 19, 2020
Final	TBD online

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 examination grades will not be "curved," nor will the final grades be "curved." 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. The three semester exams (each two hours long) will take place online during class-time.

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.

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"*

Syllabus

Sep 3	Observing the Sky (Chapter 1 and 2) Orbits and gravity (Chapter 3)
Sep 10	Earth Moon and the Sky (Chapter 4) Radiation and Spectra (Chapter 5)
Sep 17	Astronomical Instruments (Chapter 6) Introduction to the Solar System (Chapter 7)
Sep 24	Exam 1 (Chapter 1-7)
Oct 1	Earth and the other cratered worlds (Chapter 8 and 9) Venus and Mars (Chapter 10)
Oct 8	Giant Planets, Rings and Moons (Chapter 11 and 12) Comets, Asterioids, Samples (Chapter 13 and 14)
Oct 15	The Sun (Chapter 15 and 16) Starlight and Stars (Chapter 17and 18)
Oct 22	Exam 2 (Chapter 8-18)
Oct 29	Distances, gas and Dust in Space (Chapter 19 and 20) Star and Planet Formation (Chapter 21)
Nov 5	Stars Adolescence to old age (Chapter 22) Death of Stars (Chapter 23)
Nov 12	Black Holes and Curved Space Time (Chapter 24) The Milky Way Galaxy (Chapter 25) Galaxies (Chapter 26)
Nov 19	Exam 3 (Chapter 19-26)
Nov 26	Thanksgiving
Dec 3	QSO's, Black Holes, Galaxy Evolution (Chapter 27 and 28) The Big Bang (Chapter 29)
Dec 10	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 universe, including Newton's laws and 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 Universes' expansion.
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.