New Jersey Institute of Technology
College of Science and Liberal Arts, Department of Physics
Introductory Astronomy and Cosmology,
PHYS 202 Section 104 (PHYS 202104), Spring 2023

Lecture Location: TIER LH-1.
Lecture Time: Wednesday 6 pm - 8:50 pm

Instructor
Robert Duffin, Ph.D.
rtd24@njit.edu

Office Hour: W 5-5:50 pm.
Office Hour Location: FMH 453

Email: Only email me from your email account. Please write A104 in the subject line.

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.

Required Textbook: Astronomy (An Open Stax textbook)

The electronic version of this textbook is available online at no cost.
Senior Contributing Authors: Andrew Fraknoi, David Morrison & Sidney C. Wolff
https://openstax.org/details/books/astronomy

Grade Details		
	Participation	5%
	Midterm 1	23%
	Midterm 2	23%
	Midterm 3	23%
	Final Exam	26%

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

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

Any student who cheats during quiz, examination or 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.

For an excused absence, student needs to contact the Dean of Students to have a verification sent to the instructor.

Midterm exams will be held during class time. There will be no "make-up" examinations. If you miss an examination, you will receive a grade of zero for that examination.

"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	Lecture	Exams
W Jan 18	Observing the Sky (Chapter 1 and 2) Orbits and gravity (Chapter 3)	
W Jan 25	Earth Moon and the Sky (Chapter 4) Radiation and Spectra (Chapter 5)	
W Feb 1	Astronomical Instruments (Chapter 6) Introduction to the Solar System (Chapter 7). Q&A	
W Feb 8	Midterm 1 (Chapter 1-7)	Midterm 1
W Feb 15	Earth and the other cratered worlds (Chapter 8 and 9) Venus and Mars (Chapter 10)	
W Feb 22	Giant Planets, Rings and Moons (Chapter 11 and 12) Comets, Asterioids, Samples (Chapter 13 and 14)	
W Mar 1	The Sun (Chapter 15 and 16). Q&A	
W Mar 8	Midterm 2 (Chapter 8-16)	Midterm 2
	Spring Break	
W Mar 22	Starlight and Stars (Chapter 17 and 18)	
W Mar 29	Distances, gas and Dust in Space (Chapter 19 and 20) Star and Planet Formation (Chapter 21)	
W Apr 5	Stars Adolescence to old age (Chapter 22) Death of Stars (Chapter 23)	
W Apr 12	Midterm 3 (Chapter 17-23)	Midterm 3
W Apr 19	Black Holes and Curved Space Time (Chapter 24). The Milky Way Galaxy (Chapter 25)	
W Apr 26	Galaxies (Chapter 26). The Big Bang (Chapter 29). Q&A	
TBD		Final

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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 draw cross-sections of 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 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.
Comprehend star formation from stardust to the main sequence.
Comprehend star evolution of low-mass and high-mass stars.
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.
Explain the history of the universe.