Spring 2023

**PHYS 202 - 006: Introductory Astronomy and Cosmology**

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New Jersey Institute of Technology  
College of Science and Liberal Arts  
Department of Physics  
Introductory Astronomy and Cosmology, Section 006  
Phys 202–006  
Spring 2023  
Mondays, 01:00 p.m. to 02:20 p.m.  
Kupfrian Hall, Room 210  
Wednesdays, 08:30 a.m. to 09:50 a.m.  
Kupfrian Hall, Room 202

Textbook

Grade
Your final grade will be based upon three examinations (25% each) and one Final Examination (25%). The examinations will be administered on the following dates.

First Examination  Monday, February 20, 2023
Second Examination  Monday, March 27, 2023
Third Examination  Monday, April 24, 2023
Final Examination  to be announced

If you miss an examination, you will receive a grade of zero that will be calculated into your final grade. There are no make-up examinations. The following table will determine your final grade.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>85% to 100%</td>
</tr>
<tr>
<td>B+</td>
<td>80% to 84%</td>
</tr>
<tr>
<td>B</td>
<td>70% to 79%</td>
</tr>
<tr>
<td>C+</td>
<td>65% to 69%</td>
</tr>
<tr>
<td>C</td>
<td>50% to 64%</td>
</tr>
<tr>
<td>D</td>
<td>40% to 49%</td>
</tr>
<tr>
<td>F</td>
<td>0% to 39%</td>
</tr>
</tbody>
</table>

The examination grades will not be curved, nor will the final grades be curved. Each examination, including the Final Examination, will consist of multiple-choice and/or true-false questions, all of which will come directly from topics discussed in class, topics discussed in the textbook, and topics discussed in the online notes. Each examination, including the Final Examination, will be closed book and closed notes. No formula sheet or cheat sheet will be provided, nor will either be permitted for any of the examinations.

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.
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 everyday 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 blueshifts and redshifts
- 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 the Kepler 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 Special Relativity Theory and General Relativity Theory)
- 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