NAZARBAYEV UNIVERSITY
SCHOOL OF SCIENCE AND TECHNOLOGY

Course Syllabus

PHYS 201 - Introductory Astronomy

Semester: Autumn 2018
Classroom: Green Hall, C2 building
Schedule: Mon, Wed, Fri - 9:00 to 9:50
Instructor: Dr. D. Malafarina, Associate Professor of Physics
Office: 7E.342, Extension building
Office hours: Monday, 10:00-11:00 and Wednesday: 10:00-12:00,
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Course Overview

In the course the students will learn the foundations of modern Astronomy. The main goals of the course are:

- Understand how Astronomy and scientific method originated and how they evolved into our modern way of thinking about the universe.
- Understand how scientists study the universe and produce new knowledge.
- Learn which tools scientists use to advance our understanding of the universe.
- Learn our present understanding of our place in the universe.
- Learn how the universe evolved and how it is structured from large galactic scales to smaller planetary scales.

Most of the course will be notion based. In these lectures we will explore the objects of research in Astronomy (like stars, planets and so on) and learn what is presently known about them.

The final grade will depend on final exam, 4 tests and 2 midterms

Mid-terms: Divided into two parts, the first part with 20 multiple choice questions and the second part with two questions to be answered.There may be an extra mid-term at the end of the semester for those who missed one.
Tests: Tests consist of 10 multiple choice questions.
The multiple choice questions have one correct answer among four possible choices.
The final exam will be a short oral exam with two topics. One topics freely chosen by the student and the other randomly selected from a list.

Activity	Weight
Mid-terms	40%
Tests	20%
Final exam	40%
Total	100 %

A few extra points may be given to students that showed consistent participation in class. There will be no curving or rescaling. The standard grading table will be applied.

Study material

- The textbook is 'Foundations of Astronomy', Michael Seeds and Dana Backman.
- Some notes and slides will be provided when necessary.
- Given the large amount of material, in order to succeed it is important to attend and study regularly after each class.

Tentative detailed content for a total number of Lectures ~ 42

<table>
<tr><td colspan="2">PART I - Methods (How we investigate)</td></tr>
<tr><td>1- Theoretical tools
Scientific method and Mathematics
Newtonian gravity
Electromagnetism and optics
Special relativity and General relativity</td><td rowspan="2">3- History of astronomy
Ancient astronomy
Greek science
Arabic astronomy
Middle ages
Scientific revolution
Modern astronomy</td></tr>
<tr><td>2- Experimental tools
The night sky
Telescopes
Visible light and other wavelengths
Multi messenger astronomy
Probes of the solar system</td></tr>
<tr><td colspan="2">PART II - Objects (What we investigate)</td></tr>
<tr><td>4- Solar system
Formation and structure
Planets and satellites
Dwarf planets, asteroids and comets
The two body problem (Kepler's laws)</td><td>5- Stars and interstellar medium
Nebulae and interstellar gas
Formation / Classification
Life cycle of stars
Extrasolar planets and astrobiology</td></tr>
<tr><td>6- Neutron stars and black holes
Supernovae
Relativistic astrophysics
NS properties and observations
BH properties and observations</td><td>7- Galaxies
Formation / classification
Large scale structure of the universe
Dark matter
Active Galactic Nuclei</td></tr>
<tr><td>8- Cosmology
Big bang models
CMB and experiments
Dark energy and inflation</td><td></td></tr>
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Cheating will not be tolerated. Any student caught cheating will be immediately reported and will automatically fail the course. Attendance is mandatory.