



2020-21 Ewha Online International Winter College

Course Syllabus

[Course Title]

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Dept.: Physics

Description: Visualization is one of the most efficient way of conveying information. Visualization of scientific information is very important in public relation and education. In the era of big data and megascience, visualization of the small or large amount of data in terms of graphs and images becomes one of the most important steps in scientific activities. Astronomy has been in the frontier in visualizing the observation (of our universe) since ancient times. Contemporary art actively adapts techniques and motives from astronomy/astrophysics and vice versa.

This lecture is designed for all students who are interested in astronomy and visualization of information (a.k.a data) using computers.

In the first half of the lecture course, students will be introduced highlights of latest progresses made in astronomy, astrophysics, and cosmology. In the second part of the course, students will be able to understand basics of Python 3 and matplotlib. Study will learn how to create graphs and animation with Python 3 by examples of important astronomical data introduced earlier in the lecture.

Objective: Students will be introduced to

- historical background and latest progresses in astronomy, astrophysics, and cosmology
- basics of Python 3 and matplotlib
- how to read scientific data and to create simple graphs & animations using Python on the Google Colab

Prerequisite::

- basic math, logical thinking, curiosity to the nature & passion to learn
- Accessibility to Zoom will be required for participating in the course
- For Python lectures, the followings will be required
 - a personal computer
 - a Chrome web browser
 - a Google account (we will use a Google drive and Google colaboratory for Python lectures)

Credits	3	Contact Hours	45
Week 1	1/20(Wed)	Introduction (realtime zoom) + What is astronomy ? (pre-recorded lecture)	
	1/21(Thu)	history of astronomy and civilizations	
	1/22(Fri)	Our Solar system	
Week 2	1/25(Mon)	Heliocentric model vs Geocentric model	
	1/26(Tue)	stars	
	1/27(Wed)	galaxies	
	1/28(Thu)	Building blocks of the universe, large-scale structure of the universe	
	1/29(Fri)	Edwin Hubble and the birth of cosmology, accelerating universe	
Week 3	2/1(Mon)	Midterm exam (realtime Zoom, online exam on Cybercampus)	
	2/2(Tue)	How to make a plot with Python and matplotlib	
	2/3(Wed)	Exercise: let's make a plot the Earth-Sun orbit	
	2/4(Thu)	Exercise: let's make an animation of the Earth-Sun orbit (realtime Zoom + pre-recorded video)	
	2/5(Fri)	Exercise: let's make a plot/animation of the Earth-Sun orbit	
Week 4	2/8(Mon)	Multimessenger astronomy and visualization	
	2/9(Tue)	Earth, exoplanets, extraterrestrial life (assignment due)	

Evaluation(%)	Midterm	Final	Attendance	Assignments	Participation	Etc.
	35	0	20	40	5	

※ Any student who misses 1/3 or more of the class hours will automatically fail the course.

※ The course will be graded on a P/F basis.