

# Seminar 1

## Session 08: Reading software documentation

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# Today's activity

- Today, we are going to have a practice for reading software documentation.
- We read the official documentation of “Astropy” package.
- And then, we try to write some Python scripts and execute them.

**Before starting today's activity,  
there are some comments to your  
oral presentation.**

## About previous oral presentation. . .

- If you did not finish reading the whole chapter. . .
  - Read the whole chapter.
  - Arrange enough time for reading the whole paper for next oral presentation.
- If you do not finish reading the whole paper by the day of next oral presentation, tell us about it at the beginning of your talk.
  - I mentioned about this before. Check previous material.

## About previous oral presentation. . .

- If you find any English word that you do not know. . .
  - Use a dictionary to check the meaning of the word.
- If you find any technical term that you do not know. . .
  - Use 樂詞網 of 國家教育研究院 to find out Chinese translation.  
<https://terms.naer.edu.tw/>
  - Use Encyclopaedia Britannica (or any other encyclopedia) to learn about it.

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Introduction to the collected data

<https://terms.naer.edu.tw/>

## About previous oral presentation. . .

- If you find basic math, physics, astronomy that you do not know. . .
  - Go to the Library of our University to find a textbook about it and read a relevant chapter.
- If you find an English sentence that you do not understand. . .
  - Ask someone who is good at English.
  - And, start studying English.

## About previous oral presentation. . .

- If you learn lots of things from “OpenStax Astronomy 2e” . . .
  - It is probably a good idea to read the whole textbook.
  - If it is not easy to read the textbook alone, come and talk to me. We may be able to arrange a group reading activity.
  - You may think that you are now very busy. But, you will be much more busy next year. If you think you need to study basic astronomy, start now. Now, you still have some time to study basic astronomy.
- If you have already studied things written in “OpenStax Astronomy 2e” before, then you are probably ready to take courses offered at our Institute.



## About previous oral presentation. . .

- If you think you need to improve your English reading skill. . .
  - Start daily English reading activity today.
  - If you start now, you probably see a significant improvement of your English reading 2 or 3 months later.
  - If you do not start now, the situation is the same even after 2 or 3 months.
  - If you do not know what to do, come and talk to me.

# About previous oral presentation. . .

- If you cannot answer to a question. . .
  - You can say “I don’t know”.
  - Don’t be quiet.
- Don’t be nervous even if you do not know something about astronomy.
  - It’s actually not a big problem even if you do not know something about astronomy.
  - It’s fine to say “I don’t know”.
  - You may study about it after the class.
  - You are here because you still do not know many things about astronomy and are willing to learn about them, right?

## For next oral presentation

- Start your preparation as soon as possible, if you have not yet started.
- Don't wait until a few days before the day of your presentation.
- If you find any difficulty, come and talk to me.
- Read previous course material again.

# Today's activity

# How to write Python scripts and execute them?

- There are 3 different methods to write and execute Python scripts for this activity.
- Method 1
  - Write a Python script using your favourite text editor on your computer.
  - Then, execute the script you have written on a terminal emulator.
  - For this method, Astropy has to be installed on your computer.
- Method 2
  - Start Jupyter Lab (or Jupyter Notebook) on your computer.
  - Download Jupyter Notebook file for this activity from the GitHub repository.
  - [https://github.com/kinoshitadaisuke/ncu\\_seminar1\\_202209](https://github.com/kinoshitadaisuke/ncu_seminar1_202209)
  - Write a Python script on Jupyter Lab (or Jupyter Notebook) and execute it.
  - For this method, Astropy has to be installed on your computer.

# How to write Python scripts and execute them?

- Method 3

- Visit GitHub repository for this activity.
- [https://github.com/kinoshitadaisuke/ncu\\_seminar1\\_202209](https://github.com/kinoshitadaisuke/ncu_seminar1_202209)
- Then, jump to the Binder page.
- Open Jupyter Notebook file for this activity.
- Write and execute Python scripts on the Binder.
- For this method, you do not need to install Python and Astropy on your computer. If you do not know how to install Python and Astropy, use this method.

# Exercise 1

- Go to Simbad website.  
`https://simbad.unistra.fr/simbad/`
- Choose “basic search”.
- Search for the ICRS (J2000) coordinate of Betelgeuse.

## Exercise 2

- Go to Astropy website.  
`https://www.astropy.org/`
- Jump to “Documentation” of “Current Release”.  
`https://docs.astropy.org/en/stable/`
- Click the link “Astronomical Coordinate Systems (astropy.coordinates)” .  
`https://docs.astropy.org/en/stable/coordinates/`
- Read the documentation for “Astronomical Coordinate Systems (astropy.coordinates)” .  
`https://docs.astropy.org/en/stable/coordinates/`
- Create a SkyCoord object for Betelgeuse.



## Exercise 3

- Read “Coordinate Access” part of “Astronomical Coordinate Systems (astropy.coordinates)”  
<https://docs.astropy.org/en/stable/coordinates/#coordinate-access>
- Print RA and Dec of Betelgeuse in decimal degree format using the SkyCoord object you have created.

## Exercise 4

- Read “Transformation” part of “Astronomical Coordinate Systems (astropy.coordinates)”  
<https://docs.astropy.org/en/stable/coordinates/#transformation>
- Print Galactic longitude and latitude of Betelgeuse using the SkyCoord object you have created.

## Exercise 5

- Read “Convenience Methods” part of “Astronomical Coordinate Systems (astropy.coordinates)”

<https://docs.astropy.org/en/stable/coordinates/#convenience-methods>

- Read “Determining and plotting the altitude/azimuth of a celestial object”

[https://docs.astropy.org/en/stable/generated/examples/coordinates/plot\\_obs\\_planning.html](https://docs.astropy.org/en/stable/generated/examples/coordinates/plot_obs_planning.html)

- Read “EarthLocation”

<https://docs.astropy.org/en/stable/api/astropy.coordinates.EarthLocation.html>

- Make a EarthLocation object for Mauna Kea, Hawaii.

## Exercise 6

- Read “Time and Dates (astropy.time)”  
<https://docs.astropy.org/en/stable/time/>
- Make a Time object for 12:00:00 (UT) on 09/Nov/2022.

## Exercise 7

- Read “Determining and plotting the altitude/azimuth of a celestial object”

[https://docs.astropy.org/en/stable/generated/examples/coordinates/plot\\_obs-planning.html](https://docs.astropy.org/en/stable/generated/examples/coordinates/plot_obs-planning.html)

- Calculate the position of Betelgeuse in horizontal coordinate system at Mauna Kea on 12:00:00 (UT) on 09/Nov/2022. Print altitude and azimuth of Betelgeuse.

## Exercise 8

- Read “Determining and plotting the altitude/azimuth of a celestial object”

[https://docs.astropy.org/en/stable/generated/examples/coordinates/plot\\_obs-planning.html](https://docs.astropy.org/en/stable/generated/examples/coordinates/plot_obs-planning.html)

- Calculate the position of the Southern Cross at Lulin Observatory on 16:00:00 (UT) on 25/Mar/2023. Print altitude and azimuth of the Southern Cross.
- Are we able to see the Southern Cross at Lulin Observatory?

## Exercise 9

- First, read following document from the beginning to the end.  
<https://docs.astropy.org/en/stable/coordinates/solarsystem.html>
- Find RA and Dec of the Sun at 12:00:00 (UT) on 09/Nov/2022 as observed at NCU main campus.
- Find altitude and azimuth of the Sun at that time.

# Exercise 10

- Find the RA and Dec of the Galactic Centre.



# Today's attendance check

- Find altitude and azimuth of the Moon at 22:00:00 (local time) on 09/Nov/2022 as observed at NCU main campus.
- Show the source code of your Python script.
- Show the outputs of your Python script.
- Make a PDF file and submit via Google Forms.
- Find a link to the Google Forms at following web page.  
[https://s3b.astro.ncu.edu.tw/seminar1\\_202209/material/](https://s3b.astro.ncu.edu.tw/seminar1_202209/material/)
- Deadline: 10:00 on 16/Nov/2022
- If you cannot write a Python script to calculate altitude and azimuth of the Moon...
  - Describe what you have done,
  - Describe difficulties you have faced,
  - and submit a PDF file.