Course number	U-LAS70 10002 SE50		
Course title (and course title in English)	ILAS Seminar-E2 :Fundamentals of Earth's atmosphere dynamics and climate（地球大気の力学と気候の基礎） ILAS Seminar-E2 :Fundamentals of Earth's atmosphere dynamics and climate	**Instructor's name, job title, and department of affiliation**	Research Institute for Sustainable Humanosphere Professor,Luce, Hubert
Group	Seminars in Liberal Arts and Sciences	**Number of credits**	2
Number of weekly time blocks	1		
Class style	seminar (Face-to-face course)	**Year/semesters**	2024・First semester
Quota (Freshman)	5 (5)		
Target year	Mainly 1st year students	**Eligible students**	For all majors
Days and periods	Fri.5		
Classroom	23, Yoshida-South Campus Academic Center Bldg. West Wing	**Language of instruction**	English
Keyword	Atmosphere / weather / climate		

[Overview and purpose of the course]

This seminar proposes an introduction to atmosphere physics with the purpose to be understandable by everyone. Based on fundamental concepts and principles, it is made for all the students who wish to understand the structure of the atmosphere and its dynamics, including the current climates, weather and cloud systems and extreme events, without complex theoretical modellings. They will also have the tools necessary to better understand certain aspects of the climate change, one of the objectives of the Sustainable Development Goals (SDG13: climate action) of the United Nations.

[Course objectives]

In this seminar, the students will get insights into the main mechanisms responsible for the state and dynamics of the atmosphere, cloud life cycle, weather systems and extreme events (such as tropical cyclones and tornadoes). Students will also acquire the physical backgrounds for understanding how human activities can affect these processes.

[Course schedule and contents)]

1. (Weeks 1-2)
Composition and vertical structure of the atmosphere:
- Composition of the air and its origins.
- Temperature, density and pressure: the hydrostatic equilibrium.

2. (Weeks 3-5)
Terrestrial and solar radiations: energetic balances.
- The radiative balance of the Earth
- Greenhouse effect: a simplified model
- A complication: effects of convection
- How do our activities affect these balances?

3. (Weeks 6-8)
Contribution of water:
- The water in all its phases

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- Principle of saturation, latent heat.
- Cloud formation and precipitation
-Thermal gradient of the troposphere and stability.

4.(Weeks 9-11)
Atmospheric circulations and weather systems:
- The main features and prevailing winds
- The monsoons
- The mid-latitude circulations
- Some extreme weather systems.

5. (Weeks 12-13)
Ocean-atmosphere coupling:
- The role of the ocean in the climate system.
- Example 1: El Nino-southern oscillation (ENSO)
- Example 2: North Atlantic Oscillation (NAO)

6. (Week 14)
Cryosphere-atmosphere coupling:
- The role of the ice in the climate system.
-The impact of melting ice on the climate.

7. (Week 15)
Final Examination.

8. (Week 16)
Feedback.

[Course requirements]

This lecture only requires scientific backgrounds in natural sciences of high school levels.

[Evaluation methods and policy]

Evaluation will be:
Active participation in class: 30 pts
Assignments/projects at home: 30 pts
Final examination: 40 pts

[Textbooks]

There is no specific textbook for this course. Its content will be based on multiple references (books, websites) that will be mentioned during the course.

[References, etc.]

（References, etc.）

Introduced during class

[Study outside of class (preparation and review)]

Materials (pdf files) are made available before class.
Students are encouraged to study materials before and after each class for assimilating technical or uncommon words.

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Depending on the topic, the study of the materials and the preparation of the report for the evaluation may take a few hours a week.

[Other information (office hours, etc.)]

Materials (pdf files) are available on Kulasis website. Communication by emails are possible for questions outside of class hours.