

科目ナンバリング		U-LAS70 10002 SE50					
授業科目名 <英訳>	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			担当者所属 職名・氏名	生存圏研究所 教授 Luce , Hubert		
群	少人数群	単位数	2単位	週コマ数	1コマ	授業形態	ゼミナール (対面授業科目)
開講年度・開講期	2025・前期	受講定員 (1回生定員)	5 (5) 人	配当学年	主として1回生	対象学生	全学向
曜時限	金5	教室	1共04			使用言語	英語
キーワード	Atmosphere / weather / climate						
【授業の概要・目的】							
This seminar provides an accessible introduction to the physics of the Earth's atmosphere. Based on fundamental concepts and principles, it is designed for all students who want to understand the structure and dynamics of the atmosphere. Topics will include current climate, weather patterns, cloud systems, and extreme weather events, all presented without complex theoretical modeling. The students will also have the necessary tools to better understand various aspects of climate change, in line with the United Nations Sustainable Development Goals (SDG13: Climate Action).							
【到達目標】							
In this seminar, students will gain insight into the main mechanisms responsible for the state and dynamics of the atmosphere, the life cycle of clouds, weather systems, and extreme events (such as cyclones, thunderstorms, and tornadoes). Students will also acquire the physical background for understanding how human activities can affect these processes.							
【授業計画と内容】							
1. (Weeks 1-2) Composition and Vertical Structure of the Atmosphere <ul style="list-style-type: none"> - Composition of the air and its origins - Temperature, density, and pressure: Hydrostatic equilibrium 2. (Weeks 3-5) Terrestrial and Solar Radiation: Energy Balances <ul style="list-style-type: none"> - Radiative balance of the Earth - Greenhouse effect: A simplified model - Complications: Effects of convection - How our activities impact these balances 3. (Weeks 6-8) Contribution of Water <ul style="list-style-type: none"> - Water in all its phases - Principles of saturation and latent heat - Cloud formation and precipitation - Thermal gradient of the troposphere and atmospheric stability 4. (Weeks 9-11)							
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Atmospheric Circulations and Weather Systems

- Key features and prevailing winds
- Monsoons
- Mid-latitude circulations
- Examples of 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 ice in the climate system
- The impact of melting ice on climate

7. (Week 15)

Final Examination

8. (Week 16)

Feedback

【履修要件】

This course requires a high school level science background. Although mathematical modeling is kept to a minimum, students should be familiar with the fundamentals of vector analysis and differential calculus. These tools are nonetheless provided in appendices.

【成績評価の方法・観点】

Evaluation will be:

Active participation in class: 40 pts

Assignments/projects at home: 30 pts

Final examination: 30 pts

【教科書】

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.

【参考書等】

(参考書)

授業中に紹介する

【授業外学修 (予習・復習) 等】

Materials (pdf files) will be made available before class.

Students are encouraged to study the materials before and after each class in order to assimilate technical or uncommon words.

Depending on the topic, studying the materials and preparing the report for evaluation may take several hours per week.

【その他（オフィスアワー等）】

Materials (pdf files) are available on the Kulasis website. Email communication is available for questions outside of class time.

【主要授業科目（学部・学科名）】