

Course number		U-LAS61 10020 LE14					
Course title (and course title in English)	Environmental Monitoring for Humanosphere-E2 :Introduction to Humanosphere			Instructor's name, job title, and department of affiliation	Research Institute for Sustainable Humanosphere Professor,Luce, Hubert		
	Environmental Monitoring for Humanosphere-E2 :Introduction to Humanosphere						
Group	Interdisciplinary Sciences		Field(Classification)		Environmental Sciences		
Language of instruction	English		Old group			Number of credits	2
Number of weekly time blocks	1	Class style	Lecture (Face-to-face course)		Year/semesters	2026 • Second semester	
Days and periods	Fri.4		Target year	Mainly 1st & 2nd year students	Eligible students	For all majors	
[Overview and purpose of the course]							
The rapid development of human societies has increasingly contributed to environmental degradation and the disruption of ecosystems. Moreover, population growth has increased human vulnerability to natural disasters, many of which are intensified by anthropogenic climate change. To safeguard the environment for future generations and protect human life, it is essential to understand environmental conditions in a systematic and scientific manner, an objective aligned with several of the United Nations Sustainable Development Goals (SDGs). Environmental monitoring (the systematic observation and study of the environment) plays a pivotal role in addressing environmental pressures, supporting sustainable development, assessing risks, and issuing early warnings in the event of natural disasters. This course introduces the fundamental principles, methods, and applications of environmental monitoring.							
[Course objectives]							
By the end of this course, students will be able to: - Understand the concept and scope of environmental monitoring. - Identify the fundamental components required to design and implement an environmental monitoring project. - Recognize the importance of environmental monitoring in diagnosing environmental problems, issuing alerts, and supporting remediation efforts. - Comprehend the basic principles of in situ and remote sensing techniques, the core methods of environmental monitoring. - Become familiar with major international organizations involved in environmental monitoring. - Analyze and interpret environmental data based on an example to demonstrate the practical value of monitoring systems.							
[Course schedule and contents]]							
Weeks 1-2: Introduction to Environmental Monitoring - Definition, purpose, and scope - Importance for the humanosphere (protection, management, and sustainability) - Key concepts and approaches to monitoring Week 3: Examples of Environmental Monitoring - Climate monitoring - Air, water, and soil quality monitoring							
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- Biodiversity monitoring
- Natural disaster monitoring

Week 4: Key Environmental Parameters

- Physical and chemical parameters (e.g., temperature, pH)
- Major pollutants (e.g., CO₂, particulate matter, heavy metals)
- Biological indicators (e.g., indicator species)

Weeks 5-7: Methods and Techniques

- In situ monitoring methods
- Remote sensing techniques (active and passive systems)
- Data collection and sampling methodologies

Week 8: Technological Advances in Monitoring

- Monitoring platforms (e.g., balloons, aircraft, satellites)
- Automated ground stations
- Data analysis and modeling tools
- Emerging technologies (AI, machine learning)

Week 9: Data Management and Interpretation

- Ensuring data quality, accuracy, and reliability
- Analytical tools (e.g., GIS, statistical software)
- Communication and dissemination of environmental information

Weeks 10-12: Case Studies of Environmental Monitoring

- Stratospheric ozone depletion: detection and global response
- Acid rain: monitoring and mitigation strategies
- Climate change: identifying anthropogenic drivers through monitoring

Weeks 13-14: Practical Data Analysis

- Analysis of environmental databases
- Identification of environmental trends (e.g., CO₂ increase, temperature anomalies)
- Interpretation and presentation of findings

Week 15: Final Examination

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: 20 pts

Assignments/projects at home: 40 pts

Final examination: 40 pts

[Textbooks]

Not used. Slide handouts will be distributed.

[References, etc.]

(References, etc.)

J. Artiola, I. L. Pepper, M. L. Brusseau 『Environmental Monitoring and Characterization』 (Elsevier Science & Technology Books, March 2004,) ISBN:0120644770

[Study outside of class (preparation and review)]

Course materials are made available prior to class.

Students are encouraged to study the materials before and after each session to pick up technical or uncommon words.

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

[Other information (office hours, etc.)]

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

[Essential courses]