The Hong Kong University of Science and Technology

UG Course Syllabus

[Course Title]: Monitoring Changing Climate from Space

[Course Code]: CIVL1180

[No. of Credits]: 3

[Any pre-/co-requisites]: None

Name: [Instructor(s) Name]: Hui Su

Email: [Your Email Address]: cehsu@ust.hk

Office Hours: [Specify Office Hours and Location]

M W: 2:30-3:30pm, Room 4607, lift 29/30

Course Description

[Briefly describe the course content, key topics or themes, objectives, methods of instruction, e.g., lectures, discussions, projects].

This course introduces the fundamental principles of satellite remote sensing and its role in monitoring our changing climate and environment. It covers the science underlying remote sensing, various remote sensing methods and technologies, observational evidence of climate change from space, and use of satellite data to advance science understanding and assist decision-making. The characteristics of satellite data and common methods to process and analyze satellite data will be introduced. It includes lectures and in-class lab sessions.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Explain remote sensing principles, approaches, and methods
2. Describe satellite observations of climate change and associate the changes to human activities
3. Discuss and evaluate the complexity of physical science, and recognize limitation and future developments
4. Process, analyze, and interpret spatiotemporally varying data
5. Assess the soundness of climate-related policies using scientific knowledge
6. Write technical reports with creative thinking and quantitative evidence

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Homework	30%	Week 2, 4, 6, 10, 12
Mid-Term Exam	30%	Week 8
Final Project	40%	Week 15

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Homework	ILO1, ILO2, ILO4, ILO5	Homework assesses students' ability to explain fundamental remote sensing concepts and methodologies (ILO1), describe and associate satellite-derived climate data with human activities (ILO2), process and analyze spatiotemporal datasets through practical programming exercises (ILO4), and assess real-world climate policies using scientific evidence in short-answer case studies (ILO5).
Mid-term Exam	ILO1, ILO2, ILO3	The mid-term exam assesses students' ability to explain core remote sensing principles and methods from memory (ILO1), describe the connection between satellite observations and climate change (ILO2), and evaluate the complexity and limitations of different scientific approaches (ILO3), demonstrating the higher-order thinking skills of analysis and synthesis under timed conditions.
Final Project	ILO2, ILO3, ILO4, ILO5, ILO6	The final project assesses students' ability to process, analyze, and interpret complex spatiotemporal satellite data through applied programming (ILO4), evaluate the soundness of climate policies and discuss scientific limitations using evidence from their analysis (ILOs3&5), and synthesize their findings into a technically rigorous and creatively reasoned report (ILOs2&6), demonstrating comprehensive mastery of the course material through higher-order integration, critical evaluation, and professional communication.

Grading Rubrics

[Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.]

Final Grade Descriptors:

[As appropriate to the course and aligned with university standards]

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive and nuanced grasp of remote sensing principles and their application to climate science (ILO1, 2). Excels in processing and interpreting complex spatiotemporal data, showing innovation in methodological approach (ILO 4). The final project report synthesizes evidence masterfully to assess policies and discuss limitations with exceptional critical insight and creativity (ILO3, 5, 6). Work is of professional quality,

		consistently exceeding core requirements with a high degree of autonomy and scholarly rigor.
B	Good Performance	Shows a solid understanding of core subject matter and can accurately describe satellite observations and their linkages to climate change (ILO1, 2). Competently processes and analyzes data to solve familiar problems (ILO4). The final project report effectively uses quantitative evidence to support conclusions and demonstrates a good ability to evaluate policies and discuss project limitations (ILO3, 5, 6). Work is thorough, motivated, and meets all requirements at a high standard.
C	Satisfactory Performance	Possesses adequate knowledge of fundamental remote sensing concepts and can describe basic climate data trends (ILO1, 2). Demonstrates the capacity to process and analyze data with guidance but may struggle with more complex or novel interpretation (ILO4). The final project report presents findings and assesses policies at a basic level, but analysis may lack depth, critical evaluation, or clear evidence-based reasoning (ILO3, 5, 6). Work meets the minimum requirements to pass and shows persistence in engaging with the core learning goals.
D	Marginal Pass	Displays a partial and fragmented understanding of core principles, with limited ability to describe or connect climate observations (ILO1, 2). Shows a developing but inconsistent capacity to execute basic data processing, with significant errors in analysis or interpretation (ILO4). The final project report demonstrates a threshold ability to structure a technical document but lacks synthesis, critical assessment, and supporting evidence for claims (ILO3, 5, 6). Work is incomplete or flawed but shows a baseline engagement with the material and the potential to develop essential skills.
F	Fail	Fails to demonstrate an understanding of fundamental remote sensing principles or the description of climate data (ILO1, 2). Lacks the technical skill to process or analyze data correctly (ILO 4). The final project is incomplete, critically flawed, or does not demonstrate the ability to write a technical report, assess policies, or discuss scientific concepts (ILO3, 5, 6). Work shows insufficient effort, does not meet the threshold requirements for passing, and exhibits minimal engagement with the course's learning goals.

Course AI Policy

It is not allowed to use generative artificial intelligence tools to complete assessment tasks.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include strengths and areas for improvement. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

[If applicable, explain the policy for resubmitting work or reassessment opportunities, including conditions and deadlines.]

- ❖ A missed homework will receive a mark of zero.
- ❖ Make-up homework is allowed only under the most exceptional circumstances. (e.g., medical reason with doctor's note)
- ❖ A late penalty will be given based on the delayed date (10% reduction per day).
- ❖ Make-up for mid-term and final project must be approved by the instructor prior to the exam week.
- ❖ Homework and final report must be done individually.

Required Texts and Materials

None

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

[Optional] Additional Resources

- Remote Sensing and Global Environmental Change, by S. J. Purkis and V. V. Klemas
- Open-source online course: https://courses.imperativemoocs.com/monitoring-climate-fromspace