

	UNIVERSITAS PENDIDIKAN INDONESIA
	SEMESTER LEARNING PLAN (RPS)

COURSE IDENTITY

Course Name	Course Code	Credits	Workload	Course Group	Semester	Prerequisite Course
REMOTE SENSING FOR THE ATMOSPHERE	SA509	2	90	Study Programme Core Competency Course (MKKP)	5	Basic Remote Sensing

Prepared by Course Lecturer	Reviewed by Study Programme QA Team	Approved by Head of Study Programme
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COURSE DESCRIPTION AND GRADUATE LEARNING OUTCOMES (CPL)

Course Description	This is an advanced course for students of the Geographic Information Science programme, examining the acquisition of atmospheric parameters through remote sensing, along with the analysis and visualisation of atmospheric information. The Remote Sensing for the Atmosphere course consists of theory and practicum sessions. The methods employed include lectures, Q&A, assignments, practicum, and projects. Assignments take the form of topic deepening and case studies (case method) conducted individually and in groups. Assessment consists of practicum reports, mid-semester examinations, final semester examinations, and projects.
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Graduate Learning Outcomes (CPL) Assigned to This Course

No.	Graduate Learning Outcomes (CPL) Assigned to This Course
1	To possess a good understanding of the concepts and implementation of remote sensing for the atmosphere.
2	To be capable of identifying the parameters required to solve problems using a spatial approach.
3	To be capable of conducting observations, measurements, and field data collection to support problem-solving.
4	To be proficient in using remote sensing software for the atmosphere.
5	To be capable of presenting measurement and analysis data as readily comprehensible information.

Course Learning Outcomes (CPMK)

No.	Course Learning Outcomes (CPMK)
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1	Students are able to master the basic concepts of the atmosphere.
2	Students are able to understand atmospheric observation through in-situ methods and remote sensing.
3	Students are able to conduct atmospheric observations using remote sensing for various applications.
4	Students are able to process atmospheric RS data using software.
5	Students are able to present and analyse Atmospheric Remote Sensing data.

Sub-CPMK

N o.	CPMK Ref.	Sub-CPMK Formulation
1	CPMK - 1	Students are able to understand the definition, general overview, and parameters of Atmospheric Remote Sensing.
2	CPMK - 2	Students are able to understand atmospheric observation equipment, both in-situ and through remote sensing.
3	CPMK - 3	Students are able to apply the use of atmospheric remote sensing for meteorology and climatology.
4	CPMK - 3	Students are able to apply the use of atmospheric remote sensing for air pollution and greenhouse gases.
5	CPMK - 4	Students are able to utilise software for atmospheric data processing.
6	CPMK - 5	Students are able to present Atmospheric Remote Sensing data and analyse it for various needs.

Course Materials

N o.	Course Materials
1	Syllabus and RPS
2	Definition of the atmosphere, its contents and composition, and the layers of the atmosphere.
3	In-situ atmospheric observation equipment for meteorology and air pollution.
4	Basic concepts of remote sensing for the atmosphere and introduction to atmospheric remote sensing satellites (satellite types, resolution, etc.).
5	Atmospheric meteorology science: meteorological parameters, applications for supporting human activities, and disaster mitigation.
6	Himawari-8 image data acquisition and GrADS installation.
7	Plotting and interpretation of Himawari data, NOAA satellite data, and ECMWF data.
8	Atmospheric science of air pollution, greenhouse gases, and case studies.
9	Interpretation of Sentinel-5P, GEMS, MODIS, and MERRA imagery for air pollution data.
10	Case study: forest fires using HYSPLIT modelling and Google Earth Engine.
11	Plotting of field station data and satellite time-series for air quality.
12	Correlation analysis between field station data and air quality satellite imagery.
13	Discussion: applications of atmospheric remote sensing to address everyday problems.
14	Project-Based Learning.

Demonstrable Learning Outcomes at the End of the Course	Students are able to demonstrate their learning outcomes through tangible products such as thematic maps, trend graphs, or spatial-temporal analyses of atmospheric satellite data (e.g., MODIS, Sentinel-5P, or Himawari-8). Evidence is presented in the form of case studies, such as air pollution detection, haze/smoke analysis, or assessment of climate phenomenon impacts, presented in brief reports, scientific posters, or presentations as indicators of learning achievement.
Learning Strategy	Case Method ✓ Team-based Project Other
General Description of Learning Steps	To understand the concepts and implementation of remote sensing for the atmosphere; to identify the parameters required to solve problems using a spatial approach; to conduct observations, measurements, and field data collection to support problem-solving; to be proficient in using remote sensing software for the atmosphere; to present measurement and analysis data as readily comprehensible information.
References	1. Guzzi, R. (Ed.). (2003). Exploring the atmosphere by remote sensing techniques (Vol. 607). Springer Science & Business Media. 2. Liu, Y., Wang, J., & Torres, O. (Eds.). (2018). Remote Sensing of Atmospheric Pollution. MDPI. 3. Fymat, A. L., & Zuev, V. E. (1979). Remote sensing of the atmosphere: inversion methods and applications. 4. WMO (2008). Guide to Meteorological Instruments and Methods of Observation. 5. Burrows, J. P., Goede, A. P. H., Muller, C., & Bovensmann, H. (2011). SCIAMACHY – the need for atmospheric research from space. SCIAMACHY-Exploring the Changing Earth's Atmosphere, 1–17. 6. Platt, U., Stutz, J., Platt, U., & Stutz, J. (2008). Differential absorption spectroscopy (pp. 135–174). Springer Berlin Heidelberg.

LEARNING PLAN

Week	Sub-CPMK	Sub-CPMK Achievement Indicators	Course Materials	Assessment Form (test/no n-test)	Assessment Weight (%)	Synchronous (face-to-face and virtual)	Asynchronous (individual and group assignments)	Duration	Reference No.	Access Time
1	Students are able to understand the definition, general overview, and parameters of Atmospheric Remote Sensing.	Students are able to understand the objectives, scope, and procedures of the course, including assignment and examination explanations, question types, and sources.	Syllabus and RPS.	Attitude Scale	5	Face-to-face; Expository lecture	Independent material exploration	2×50	1,2,3	01-09-2025 07:00
2	Students are able to understand the definition, general overview, and parameters of Atmospheric Remote Sensing.	Students are able to understand the definition, general overview, and parameters of Atmospheric Remote Sensing.	Definition of the atmosphere, its contents and composition, and the layers of the atmosphere.	Essay	5	Face-to-face; Expository with interactive media	Independent material exploration	2×50	1,2,3	08-09-2025 07:00
3	Students are able to understand atmospheric observation equipment, both in-situ and through remote sensing.	Students are able to understand atmospheric observation equipment, both in-situ and through remote sensing.	In-situ atmospheric observation equipment for meteorology and air pollution.	Observation	5	Face-to-face; Expository with interactive media	Independent material exploration	2×50	5	15-09-2025 07:00
4	Students are able to utilise software for atmospheric data processing.	Students are able to understand atmospheric observation equipment, both in-situ and through remote sensing.	Basic concepts of remote sensing for the atmosphere and introduction to atmospheric remote sensing satellites.	Observation	5	Face-to-face; Expository with interactive media	Independent material exploration	2×50	5,6	22-09-2025 07:00
5	Students are able to apply the use of atmospheric remote sensing for meteorology and climatology.	Students are able to apply the use of atmospheric remote sensing for meteorology and climatology.	Atmospheric meteorology science: meteorological parameters, applications for supporting human activities, and disaster mitigation.	Participatory	5	Face-to-face; Expository with interactive media	Independent material exploration	2×50	4,5	29-09-2025 07:00

6	Students are able to utilise software for atmospheric data processing.	Students are able to utilise software for atmospheric data processing.	Himawari-8 image data acquisition and GrADS installation.	Participatory	5	Face-to-face; Expository with interactive media	Independent material exploration	2×50	3,4	06-10-2025 07:00
7	Students are able to utilise software for atmospheric data processing.	Students are able to utilise software for atmospheric data processing.	Plotting and interpretation of Himawari data, NOAA satellite data, and ECMWF data.	Essay	5	Face-to-face; Expository with interactive media	Independent material exploration	2×50	5	13-10-2025 07:00
8	Students are able to present and analyse Atmospheric Remote Sensing data.	Students are able to apply the use of atmospheric remote sensing for air pollution and greenhouse gases.	Atmospheric science of air pollution, greenhouse gases, and case studies.	Participatory	5	Face-to-face; Expository with interactive media	Independent processing with provided module	2×50	3	20-10-2025 07:00
9	MID-SEMESTER EXAMINATION (UTS)									15
10	Students are able to utilise software for atmospheric data processing.	Students are able to utilise software for atmospheric data processing.	Interpretation of Sentinel-5P, GEMS, MODIS, and MERRA imagery for air pollution data.	Participatory	5	Face-to-face; Expository with interactive media	Image processing practicum and practicum report	3×50	3	03-11-2025 07:00
11	Students are able to utilise software for atmospheric data processing.	Students are able to utilise software for atmospheric data processing.	Case study: forest fires using HYSPLIT modelling and Google Earth Engine.	Participatory	5	Face-to-face; Expository with interactive media	Independent processing with provided module	2×50	3	10-11-2025 07:00
12	Students are able to understand the definition, general overview, and parameters of Atmospheric Remote Sensing.	Students are able to utilise software for atmospheric data processing.	Atmospheric meteorology science: meteorological parameters, applications for supporting human activities, and disaster mitigation.	Participatory	5	Face-to-face; Expository with interactive media	Independent material exploration	2×50	3	17-11-2025 07:00
13	Students are able to utilise software for atmospheric data processing.	Students are able to utilise software for atmospheric data processing.	Correlation analysis between field station data and air quality satellite imagery.	Participatory	5	Face-to-face; Expository with interactive media	Image processing practicum and practicum report	2×50	3	24-11-2025 07:00
14	Students are able to understand the	Students are able to present and analyse	Discussion: applications of atmospheric remote	Participatory	5	Face-to-face;	Image processing	2×50	3	01-12-2025

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STUDENT STUDY TIME (WORKLOAD)

Category	Activity	Synchronou s	Asynchrono us	Total (min/hrs)
Learning	Lectures/Tutorials	14×90 min = 1,260 min	-	1,260 min (21.0 hrs)
	Project-based Learning	-	8×90 min = 720 min	960 min (16.0 hrs)
	Discussion (case-based)	8×60 min = 480 min	-	720 min (12.0 hrs)
SUBTOTAL				2,940 min (49.0 hrs)
Assessment	Participation during learning	16×60 min = 960 min	-	960 min (16.0 hrs)
	Project work	-	8×90 min = 720 min	720 min (12.0 hrs)
	Assignments	-	8×60 min = 480 min	480 min (8.0 hrs)
	Quizzes	4×30 min = 120 min	-	120 min (2.0 hrs)
	Formative			90 min (1.5 hrs)
	Summative			90 min (1.5 hrs)
SUBTOTAL				2,460 min (41.0 hrs)
TOTAL WORKLOAD				5,400 min (90 hrs)
Credits				2
Conformity with Credit Hours	CONFORMS			

CPMK ASSESSMENT CRITERIA

N o .	CPMK	CP L Tax on om y	Weig ht	Achievement Criteria
1	Students are able to master the basic concepts of the atmosphere.	1	20	75% of all students obtain a minimum score of 65 (on a scale of 100).
2	Students are able to understand atmospheric observation through in-situ methods and remote sensing.	2	5	75% of all students obtain a minimum score of 65 (on a scale of 100).
3	Students are able to conduct atmospheric observations using remote sensing for various applications.	3	5	75% of all students obtain a minimum score of 65 (on a scale of 100).
4	Students are able to process	6	30	75% of all students obtain a

	atmospheric RS data using software.			minimum score of 65 (on a scale of 100).
5	Students are able to present and analyse Atmospheric Remote Sensing data.	4	10	75% of all students obtain a minimum score of 65 (on a scale of 100).

COLLABORATIVE ASSIGNMENT PLAN

Course Name	Course Code	Credits	Workload	Course Group	Semester	Prerequisite Course
REMOTE SENSING FOR THE ATMOSPHERE	SA509	2	90	Study Programme Core Competency Course (MKKP)	5	Basic Remote Sensing

Assignment Title	Atmospheric Remote Sensing Practicum
Learning Method	Team-based Project
Duration (minutes)	
Assessment Weight	30
Sub-CPMK	Students are able to understand the definition, general overview, and parameters of Atmospheric Remote Sensing.
Assignment Description	Students carry out the practicum, practise the procedures, and conduct analysis to produce a practicum report.
Assignment Steps	1. Students observe the practicum demonstration. 2. Students practise the procedures. 3. Students analyse the practicum results. 4. Students prepare the practicum report.
Final Output	Practicum report.
Indicators, Criteria, and Assessment Weight	1. Attendance 2. Report
Implementation Schedule	To be determined.
Other Notes	-

REFERENCES

1. Fymat, A. L., & Zuev, V. E. (1979). Remote sensing of the atmosphere: inversion methods and applications.