

Module Name	Meteorology and Climatology
Module level, if applicable	
Code, if applicable	GEL 1201
Semester(s) in which the module	First (1 st) Semester
Person responsible for the module	Dr. Emilya Nurjani, S.Si., M.Si
Lecturer	Prof. Dr. H.A. Sudibyakto, M.S Dr. Emilya Nurjani, S.Si., M.Si Dr. Tjahyo Nugroho Adji, M.Sc. Tech Prof. Dr. Ig. L. Setyawan Purnama, M.Si
Language	Bahasa Indonesia
Relation to curriculum	For Geography and Enviromental Science students only, specialize Meteorology and Climatology, and one of elective class to be taken. This class available for third semester or higher.
Type of teaching, contact hours	STAR (<i>Student Teacher Aesthetic Role-Sharing</i>) is an optimal combination between SCL (<i>Student Centered Learning</i>) and TCL (<i>Teacher Centered Learning</i>). Lecture (1400 minutes) Mid Semester Examination: 100 minutes Final Semester Examination: 120 minutes
Workload	Lecturer, including homework and discussion = 14 meetings x 100 minutes each Mid Semester Examination: 100 minutes Final Semester Examination: 120 minutes Total workload = 1620 minutes
Credit points	2
Requirements according to the examination regulations	Must attend lecture for more than 70%
Recommended prerequisites	-
Module objectives/intended learning aoutcomes	<ol style="list-style-type: none"> After following the lecture topic Concept of Meteorology-Climatology and Atmosphere, students are able to: <ol style="list-style-type: none"> Explain the definition of climate and weather Explain the elements of climate Explain the composition of atmosphere and its layers After following the lecture topic Radiation, students are able to: <ol style="list-style-type: none"> Explain the concept of radiation and wavelenght Explain the processes of how solar radiation is received by the Earths's surface and influencing factors Explain the radiation equilibrium Explain the effect of green house effect and green house gases (GHG) Explain the adiabatic processes that occur in the Earth's atmosphere After following the lecture topic Air Mass, students are able to:

	<ol style="list-style-type: none"> a. Explain the concept of air mass, including the source area, the classification, and the modification of air masses b. Explain several types of fronts, including stationary fronts, warm fronts, cold fronts, and front occlusion c. Explain the concept of cyclones and anticyclones, the development of cyclones and anticyclones, as well as Polar Front Theory <ol style="list-style-type: none"> 4. After following the lecture topic General Circulation of the Atmosphere, students are able to: <ol style="list-style-type: none"> a. Explain the scales of motion of the atmospheric circulation b. Explain the concept of winds formation c. Explain several types of local wind systems d. Explain several global circulation on atmosphere e. Explain the effect of the oceans on atmospheric circulation 5. After following the lecture topic Cloud and Precipitation, students are able to: <ol style="list-style-type: none"> a. Explain the definition of clouds and types of clouds b. Explain the concept of precipitation and the types of precipitation c. Explain the measurement and distribution of precipitation 6. After following the lecture topic Climate Classification, students are able to: <ol style="list-style-type: none"> a. Explain the concept of climate classification b. Explain the world climate classification methods c. Explain the methods of climatic classification in Indonesia 7. After following the lecture topic Climograph, students are able to: <ol style="list-style-type: none"> a. Explain the concept of climograph b. Explain the application of climograph c. Explain some climographic patterns in various regions in Indonesia 8. After following the lecture topic Climate and Buildings, students are able to: <ol style="list-style-type: none"> a. Explain the concept of climate and buildings b. Explain the climatic classification techniques for housing c. Explain the effect of Urban Heat Island 9. After following the lecture topic Climate and Hydrological Conditions of Territories, students are able to: <ol style="list-style-type: none"> a. Explain the link between climate and hydrological conditions b. Explain the effects of climate change on hydrological conditions
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	<ul style="list-style-type: none"> c. Explain several methods of anticipating the effects of climate change on hydrological conditions <ol style="list-style-type: none"> 1. After following the lecture topic Climate and Physical Aspects, students are able to: <ul style="list-style-type: none"> a. Explain the relationship between climate and humans in general b. Explain the link between climate and agriculture c. Explain the link between climate and vegetation 11. After following the lecture topic Paleoclimate, students are able to: <ul style="list-style-type: none"> a. Explain the definition of paleoclimate b. Explain the types of climate proxies c. Explain the procurement of climate proxies with ice cores d. Explain the proxy acquisition of climate with oxygen isotope e. Explain the acquisition of climate proxies with pollen f. Explain the acquisition of climate proxies with speleothem g. Explain the acquisition of climate proxies based on tree rings h. Explain the acquisition of climate proxies based on dendrochronology
Content	<ol style="list-style-type: none"> 1. Concept of Meteorology-Climatology and Atmospheric Concepts (lecture contrasts, climate, weather, and atmosphere) 2. Radiation (the concept of heat transfer through radiation, the concept of black body, wavelength, and solar radiation) 3. Air Mass (the concept of air mass, air mass classification, and front) 4. Air Mass (cyclone and anticyclone, formation processes, and polar front theory) 5. General Circulation Atmosphere (scale of atmospheric movement, principle of wind movement, local wind, and global atmospheric circulation) 6. Clouds and Precipitation (cloud forming concepts, high cloud types, moderate clouds, low clouds, and vertical clouds) 7. Clouds and Precipitation (precipitation types, concepts and measurement of rain, the process of rain formation) 8. Climatic Classification (concept of climate classification, global climatic classification, climatic classification in Indonesia) 9. Climograph (Climographic concept, climographic analysis, climographic manufacture) 10. Climate and Buildings (linkage between climate and buildings, examples of links between climate and buildings, urban heat island effects)

	<p>11. Climate and Hydrological Conditions Areas (climatic associations with hydrological conditions, impacts of climate change on hydrology, mitigation and hydrological adaptation)</p> <p>12. Climate and Physical Aspects (the link between climate with humans in general, climatic link with agriculture, the link between climate and vegetation)</p> <p>13. Paleoclimate (paleoclimate concept, proxy concept, ice core and oxygen as climate proxy)</p> <p>14. Paleoclimate (climate proxies: pollen, speleothem, tree rings, and dendrochronology)</p>
Study and examination requirements and forms of examination	<p>Cognitive aspects: Quiz (5 %), participation (5 %), assignment (20 %), discussion (10 %), mid-semester examination (30 %) dan final examination (30 %). Examination is formed in written test.</p> <p>Sumatif aspects: Participation (5 %), discussion (10 %) Participation is assessed based on: 1) attendance, and 2) student's inquiries on lectures given, 3) delays. Discussion is assessed based on : 1) initiator in discussion, 2) presenter of discussion, 3) questioner from other group in presentation of result of discussion.</p>
Media employed	<ul style="list-style-type: none"> - ELISA website - Internet - Computers - Interactive video - LCD projector
Reading list	<p>Ahrens, C. D. 2007. <i>Essential of Meteorology: An Introduction to The Atmosphere</i>. USA: Cengage Learning.</p> <p>Ahrens, C. D. 2009. <i>Meteorology Today (9theds)</i>. USA: Cengage Learning.</p> <p>Prawirowardoyo, Susilo. 1996. <i>Meteorologi</i>. Bandung: Penerbit ITB.</p> <p>Tjasyono, Bayong. 2004. <i>Klimatologi</i>. Bandung: Penerbit ITB.</p> <p>Seyhan, Ersin. 1990. <i>Dasar-Dasar Hidrologi</i> (diterjemahkan oleh Sentot Subagyo). Yogyakarta: Gadjah Mada University Press.</p> <p>Strahler, A. N. 1969. <i>Physical Geography (3rd eds)</i>. New York. John Wiley and Sons</p>