	Universitas Negeri Surabaya Fakultas Matematika dan Ilmu Pengetahuan Alam Program Studi S1 Fisika	Kode Dokumen

RENCANA PEMBELAJARAN SEMESTER

MATA KULIAH (MK)	KODE	Rumpun MK	BOBOT (sks)			SEMESTER	Tgl Penyusunan
Fisika Atmosfer	4520102248	Mata Kuliah Pilihan Program Studi	T=2	P=0	ECTS=3.18	6	10 Oktober 2021

OTORISASI	Pengembang RPS	Koordinator RMK	Koordinator Program Studi
	Prof. Tjipto Prastowo, Ph.D	Prof. Tjipto Prastowo, Ph.D	Prof. Dr. Munasir, S.Si., M.Si.

Model Pembelajaran	**Project Based Learning**	
Capaian Pembelajaran (CP)	**CPL-PRODI yang dibebankan pada MK**	
	CPL-12	Memiliki kemampuan untuk meningkatkan ilmunya dan dapat melanjutkan studi ke jenjang yang lebih tinggi.
	CPL-14	Merumuskan sistem fisik sebagai model fisik dengan menggunakan matematika
	Capaian Pembelajaran Mata Kuliah (CPMK)	
	CPMK - 1	Understanding a systematic study of the atmosphere as a physical system and its roles in human life and living organisms.
	CPMK - 2	Understanding interdependence of human and the atmosphere.
	CPMK - 3	Understanding stably stratified layers of the atmosphere and the corresponding characteristics of each layer.
	CPMK - 4	Understanding the dynamics of the atmosphere associated with overturning circulation and transform of energy in the atmosphere.
	CPMK - 5	Understanding potential threats from hydrometeorological hazards associated with a coupled system of the ocean and atmosphere.
	Matrik CPL - CPMK	

CPMK	CPL-12	CPL-14
CPMK-1		
CPMK-2		
CPMK-3		
CPMK-4		
CPMK-5		

Matrik CPMK pada Kemampuan akhir tiap tahapan belajar (Sub-CPMK)

CPMK	Minggu Ke															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CPMK-1																
CPMK-2																
CPMK-3																
CPMK-4																
CPMK-5																

Deskripsi Singkat MK	Atmospheric Physics discusses problems in physics that are sourced from levels of knowledge and uses of atmospheric resources in Indonesia. Learning strategy in this course involves the introduction of atmospheric sciences through phenomenological approaches with emphasizes are placed on physical aspects. Class discussions include examination of a layered structure of the atmosphere and corresponding characteristics of each layer, atmospheric overturning circulation at low- and mid-latitudes (the Hadley Cell), planetary waves and associated transform of energy, ionospheric currents, air-sea interaction (El-Nino and La-Nina cases), hydrometeorological hazards (extreme weather, excessive rainfalls, floods, droughts, forest fires, atmospheric storms) related to a coupled physical system of the ocean and atmosphere, the crucial roles of the atmosphere in weather and climate systems at local, regional and global scales, climate change and global warming.	
Pustaka	**Utama :**	

	1. Vallis, G. K. 2006. Atmospheric and Oceanic Fluid Dynamics. Cambridge, UK: Cambridge University Press, pp.1-745. 2. Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526. 3. Lambeck, K. 2010. The Science of Climate Change: Questions and Answers. Canberra, Australia: Australian Academy of Science. pp.1-24. 4. Hare, S., Cresswell, L., Twigg, and Buchdahl, R. 2002. Air Pollution. Manchester, UK: Atmosphere, Climate and Environment (ACE) Information Programme, Manchester Metropolitan Uni. pp.1-153. 5. Cushman-Roisin, B. and Beckers, J-M. 2009. Introduction to Geophysical Fluid Dynamics. New Hampshire, US: Academic Press, pp.1-759.
	Pendukung :
	1. Some power point files and/or course materials relevant to Atmospheric Physics from the internet
Dosen Pengampu	Prof. Tjipto Prastowo, Ph.D. Arie Realita, M.Si. Muhammad Nurul Fahmi, S.Si., M.Si.

Mg Ke-	**Kemampuan akhir tiap tahapan belajar (Sub-CPMK)**	**Penilaian**		**Bantuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]**		**Materi Pembelajaran [Pustaka]**	**Bobot Penilaian (%)**
		Indikator	**Kriteria & Bentuk**	**Luring (*offline*)**	**Daring (*online*)**		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1	Being able to understand the atmosphere as a physical system with crucial roles in life	Students can explain the atmosphere as a physical system with crucial roles in life.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Atmospheric Physics is a counterpart of Physical Oceanography in weather and climate systems at all scales. **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	1%
2	Being able to understand interdependence of human on the dynamics of the atmosphere	Students can explain interdependence of human on the dynamics of the atmosphere.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Introduction to atmospheric sciences through phenomenological approaches **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.* **Materi:** Use of atmospheric resources in Indonesia **Pustaka:** *Some power point files and/or course materials relevant to Atmospheric Physics from the internet*	1%
3	Being able to understand basic features of the atmosphere, a layered structure of its own physical characteristics in each layer	Students can explain basic features of the atmosphere, a layered structure of its own physical characteristics in each layer.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya melalui Google meet 2 x 50	**Materi:** The atmosphere is a physical system; A stably stratified structure with its own characteristic in each layer. **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	1%

4	Being able to understand basic features of the atmosphere, a layered structure of its own physical characteristics in each layer	Students can explain basic features of the atmosphere, a layered structure of its own physical characteristics in each layer.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** The atmosphere is a physical system; A stably stratified structure with its own characteristic in each layer. **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	1%
5	Being able to understand meridional circulation in the atmosphere, the corresponding Hadley Cell and atmospheric parameters	Students can explain meridional circulation in the atmosphere, the corresponding Hadley Cell and atmospheric parameters.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Atmospheric overturning circulation; Meridional circulation at low- and mid-latitudes; The Hadley Cell **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%
6	Being able to understand meridional circulation in the atmosphere, the corresponding Hadley Cell and atmospheric parameters	Students can explain meridional circulation in the atmosphere, the corresponding Hadley Cell and atmospheric parameters.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Atmospheric overturning circulation; Meridional circulation at low- and mid-latitudes; The Hadley Cell **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%
7	Being able to understand mid- and low-latitudes atmospheric circulation in terms of zonally-averaged atmospheric circulation	Students can explain mid- and low-latitudes atmospheric circulation in terms of zonally-averaged atmospheric circulation.	**Kriteria:** kriteria penilaian tersedia **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Atmospheric overturning circulation; Meridional circulation at low- and mid-latitudes; The Hadley Cell **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%
8	Mid Semester Exam	Mid Semester Exam	**Kriteria:** 1. 2.kriteria penilaian tersedia **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Mid Semester Exam 2 X 50	Mid Semester Exam 2 x 50	**Materi:** Materi pertemuan 1-7 **Pustaka:**	20%
9	Being able to understand planetary waves in the atmosphere, propagation and interaction of Rossby and Kelvin waves	Students can explain planetary waves in the atmosphere, propagation and interaction of Rossby and Kelvin waves.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Propagation and interaction of Rossby and Kelvin waves; Ionospheric currents **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%

10	Being able to understand effects of air-sea interaction with respect to wind-forcing pattern on atmospheric conditions at local, regional and global scales	Students can explain effects of air-sea interaction with respect to wind-forcing pattern on atmospheric conditions at local, regional and global scales.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** A coupled system of the ocean and atmosphere; Air-sea interaction; Wind-forcing pattern; Weather and climate systems; El-Nino and La-Nina **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%
11	Being able to understand effects of air-sea interaction with respect to wind-forcing pattern on atmospheric conditions at local, regional and global scales	Students can explain effects of air-sea interaction with respect to wind-forcing pattern on atmospheric conditions at local, regional and global scales.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya dengan Google meet	**Materi:** A coupled system of the ocean and atmosphere; Air-sea interaction; Wind-forcing pattern; Weather and climate systems; El-Nino and La-Nina **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%
12	Being able to understand potential threats from atmospheric hazards associated with a coupled system of ocean hydrological cycle and atmospheric dynamics	Students can explain potential threats from atmospheric hazards associated with a coupled system of ocean hydrological cycle and atmospheric dynamics.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	Kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Hydrometeorological hazards; Extreme weather, excessive rainfalls; Floods and droughts; Forest fires; Atmospheric storms **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%
13	Being able to understand potential threats from atmospheric hazards associated with a coupled system of ocean hydrological cycle and atmospheric dynamics	Students can explain potential threats from atmospheric hazards associated with a coupled system of ocean hydrological cycle and atmospheric dynamics.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Aktifitas Partisipasif	Contextual Learning Class discussion Q & A 2 X 50	kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Hydrometeorological hazards; Extreme weather, excessive rainfalls; Floods and droughts; Forest fires; Atmospheric storms **Pustaka:** *Ahrens, C. D. 2011. Essentials of Meteorology: An Invitation to the Atmosphere. Melbourne, Australia: Cengage Learning, pp.1-526.*	2%
14	Being able to understand posters relevant to atmospheric physics with emphasis upon the crucial roles of the atmosphere in weather and climate systems at local, regional and global scales	Students can explain posters relevant to atmospheric physics with emphasis upon the crucial roles of the atmosphere in weather and climate systems at local, regional and global scales.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Poster Presentation for Project-Based Learning Discussion Q & A 2 X 50	kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** presentasi poster **Pustaka:**	30%

15	Being able to understand posters relevant to atmospheric physics with emphasis upon the crucial roles of the atmosphere in weather and climate systems at local, regional and global scales	Students can explain posters relevant to atmospheric physics with emphasis upon the crucial roles of the atmosphere in weather and climate systems at local, regional and global scales.	**Kriteria:** Menyelesaikan tugas dengan tepat waktu **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Poster Presentation for Project-Based Learning Discussion Q & A 2 X 50	kuliah tatap muka maya dengan Google meet 2 x 50	**Materi:** Presentasi poster **Pustaka:**	30%
16	Final Exam	Final Exam	**Kriteria:** Menyelesaikan tugas dengan tepat waktu	Final Exam 2 x 50	Final Exam 2 x 50	**Materi:** Presentasi poster **Pustaka:**	30%

Rekap Persentase Evaluasi : Project Based Learning

No	Evaluasi	Persentase
1.	Aktifitas Partisipasif	20%
2.	Penilaian Hasil Project / Penilaian Produk	80%
		100%

Catatan

1. **Capaian Pembelajaran Lulusan PRODI (CPL-PRODI)** adalah kemampuan yang dimiliki oleh setiap lulusan PRODI yang merupakan internalisasi dari sikap, penguasaan pengetahuan dan ketrampilan sesuai dengan jenjang prodinya yang diperoleh melalui proses pembelajaran.
2. **CPL yang dibebankan pada mata kuliah** adalah beberapa capaian pembelajaran lulusan program studi (CPL-PRODI) yang digunakan untuk pembentukan/pengembangan sebuah mata kuliah yang terdiri dari aspek sikap, ketrampulan umum, ketrampilan khusus dan pengetahuan.
3. **CP Mata kuliah (CPMK)** adalah kemampuan yang dijabarkan secara spesifik dari CPL yang dibebankan pada mata kuliah, dan bersifat spesifik terhadap bahan kajian atau materi pembelajaran mata kuliah tersebut.
4. **Sub-CP Mata kuliah (Sub-CPMK)** adalah kemampuan yang dijabarkan secara spesifik dari CPMK yang dapat diukur atau diamati dan merupakan kemampuan akhir yang direncanakan pada tiap tahap pembelajaran, dan bersifat spesifik terhadap materi pembelajaran mata kuliah tersebut.
5. **Indikator penilaian** kemampuan dalam proses maupun hasil belajar mahasiswa adalah pernyataan spesifik dan terukur yang mengidentifikasi kemampuan atau kinerja hasil belajar mahasiswa yang disertai bukti-bukti.
6. **Kreteria Penilaian** adalah patokan yang digunakan sebagai ukuran atau tolok ukur ketercapaian pembelajaran dalam penilaian berdasarkan indikator-indikator yang telah ditetapkan. Kreteria penilaian merupakan pedoman bagi penilai agar penilaian konsisten dan tidak bias. Kreteria dapat berupa kuantitatif ataupun kualitatif.
7. **Bentuk penilaian:** tes dan non-tes.
8. **Bentuk pembelajaran:** Kuliah, Responsi, Tutorial, Seminar atau yang setara, Praktikum, Praktik Studio, Praktik Bengkel, Praktik Lapangan, Penelitian, Pengabdian Kepada Masyarakat dan/atau bentuk pembelajaran lain yang setara.
9. **Metode Pembelajaran:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, dan metode lainnya yg setara.
10. **Materi Pembelajaran** adalah rincian atau uraian dari bahan kajian yg dapat disajikan dalam bentuk beberapa pokok dan sub-pokok bahasan.
11. **Bobot penilaian** adalah prosentasi penilaian terhadap setiap pencapaian sub-CPMK yang besarnya proposional dengan tingkat kesulitan pencapaian sub-CPMK tsb., dan totalnya 100%.
12. TM=Tatap Muka, PT=Penugasan terstruktur, BM=Belajar mandiri.

RPS ini telah divalidasi pada tanggal 29 Mei 2024

Koordinator Program Studi S1 Fisika

Prof. Dr. Munasir, S.Si., M.Si.
NIDN 0017116901

UPM Program Studi S1 Fisika

Diah Hari Kusumawati, S.Si., M.Si.
NIDN 0018047302


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