

SEE3201: ATMOSPHERIC SCIENCE - AN INTRODUCTORY SURVEY

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Atmospheric Science - An Introductory Survey

Subject Code

SEE - School of Energy and Environment

Course Number

3201

Academic Unit

School of Energy and Environment (E2)

College/School

School of Energy and Environment (E2)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Any one of the following courses:

1. PHY1200 Foundation Physics
 2. PHY1201 General Physics I
 3. SEE2001 Electromagnetic Principles for Energy Engineers or equivalent
- and

Any two of the following MA courses:

1. MA1200 Calculus and Basic Linear Algebra I
2. MA1201 Calculus and Basic Linear Algebra II
3. MA1300 Enhanced Calculus and Linear Algebra I
4. MA1301 Enhanced Calculus and Linear Algebra II

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details**Abstract**

This advanced undergraduate course is designed for undergraduate students majoring in Environmental Science and Management, Energy Science and Engineering, and also those taking the Atmospheric and Climate Science Minor. It will provide students with knowledge of physical processes occurring in the atmosphere and the climate system, and enable them to discover and analyze issues related to the atmospheric environment and global climate change. Special reference will also be made to phenomena prevalent in Hong Kong and the South China region.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the thermal and dynamical structure of the atmosphere, the atmospheric general circulation, and the key components of the Earth's climate system	12.5		x	
2	Relate basic thermodynamic and radiative processes in the atmosphere to the underlying physical laws	37.5		x	
3	Relate basic chemical and dynamical processes in the atmosphere to the underlying physical laws	37.5		x	
4	Discover and describe some climate change phenomena and explain them in terms of basic physical processes	12.5		x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will learn key concepts, such as theories related to atmospheric and weather system	1, 2, 3, 4

2	Tutorials	Students will solidify concepts with practice (Explain the physical processes occurring in the atmosphere related to the daily weather information)	1, 2, 3, 4	
3	Project	Project presentation on an important topic in atmospheric science	2, 3, 4	

Additional Information for LTAs

Scheduled activities: 2 hrs lecture + 1 hr tutorial. A tutorial will be given following the presentation of each complete topic within a CILO.

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Mid-term There will be 1 midterm exam for instructor to assess students' learning progress on the concepts as outlined in LTA.	1, 2, 3, 4	20	-	No
2	Assignment Several assignments will be given throughout the semester. Through the assignments, students will demonstrate their understanding of the underlying concepts of the thermal and dynamical processes of the atmosphere.	1, 2, 3	20	-	Yes
3	Project Students will consolidate their learnings to identify, analyze, and discuss their findings on an atmospheric science-related issue in the form of a project presentation.	1, 2	10	-	Yes

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

Examination duration: 2 hrs Percentage of continuous assessment, examination, etc.: 50% by continuous assessment; 50% by exam To pass a course, a student must do ALL of the following: 1) obtain at least 30% of the total marks allocated towards continuous assessment (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable); 2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and 3) meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)

Assessment Task

1. Assignment

Criterion

Ability to evaluate and analyse questions related to atmospheric science

Excellent (A+, A, A-)

Excellent understanding of concepts and ability to analyse and solve problems related to atmospheric science

Good (B+, B, B-)

Good understanding of concepts and ability to analyse and solve problems related to atmospheric science

Fair (C+, C, C-)

Acceptable understanding of concepts and ability to analyse and solve problems related to atmospheric science

Marginal (D)

Marginally acceptable understanding of concepts and ability to analyse and solve problems related to atmospheric science

Failure (F)

Poor understanding of concepts and ability to analyse and solve problems related to atmospheric science

Assessment Task

2. Project

Criterion

Ability to analyse questions related to atmospheric science

Excellent (A+, A, A-)

Excellent understanding of concepts and ability to analyse and solve problems related to atmospheric science

Good (B+, B, B-)

Good understanding of concepts and ability to analyse and solve problems related to atmospheric science

Fair (C+, C, C-)

Acceptable understanding of concepts and ability to analyse and solve problems related to atmospheric science

Marginal (D)

Marginally acceptable understanding of concepts and ability to analyse and solve problems related to atmospheric science

Failure (F)

Poor understanding of concepts and ability to analyse and solve problems related to atmospheric science

Assessment Task

3. Examination

Criterion

Ability to analyse questions related to some atmospheric science and climate change phenomena and explain them in terms of basic physical processes

Excellent (A+, A, A-)

Excellent understanding of concepts and ability to analyse and solve problems related to the chemical and thermodynamics process of the atmosphere

Good (B+, B, B-)

Good understanding of concepts and ability to analyse and solve problems related to the chemical and thermodynamics process of the atmosphere

Fair (C+, C, C-)

Acceptable understanding of concepts and ability to analyse and solve problems related to the chemical and thermodynamics process of the atmosphere

Marginal (D)

Marginally acceptable understanding of concepts and ability to analyse and solve problems related to the chemical and thermodynamics process of the atmosphere

Failure (F)

Poor understanding of concepts and ability to analyse and solve problems related to the chemical and thermodynamics process of the atmosphere

Part III Other Information

Keyword Syllabus

- The Earth' Atmosphere
Composition of the atmosphere, structure of the atmosphere, greenhouse gases, and air pollutants
- The Earth' Changing Climate
Radiative transfer, solar and terrestrial radiation, climate change
- Air temperature, Humidity, Condensation and Clouds
- Thermodynamics of the atmosphere
Applications of the first and second laws of thermodynamics, potential temperatures, adiabatic processes, thermodynamic diagrams.
- Atmospheric chemistry

Stratosphere ozone, tropospheric oxidizing power, air pollution

- Atmospheric circulations

Three cell model: Hadley Cell, Ferrel Cell, Polar Cell, Jet Streams

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	Atmospheric Science–An introductory survey, J.M. Wallace & P.V. Hobbs (Academic press/Elsevier, 2nd edition, 2006)
2	An Introduction to Dynamic Meteorology, J R Holton (Academic Press, 3rd edition, 1992)
3	Atmosphere, Ocean and Climate Dynamics: An Introductory Text, J. Marshall and R. A. Plumb (Academic Press, 2007)
4	The Physics of Atmospheres, J T Houghton (Cambridge, 3rd edition, 2002)
5	Understanding Weather and Climate, E Aguado and J E Burt (Prentice Hall 2001)
6	Introduction to Atmospheric Chemistry, Daniel J. Jacob, Princeton University Press, 1999