

City University of Hong Kong

**Information on a Course
offered by School of Energy and Environment
with effect from Semester A in 2014 / 2015**

Part I

Course Title: Atmospheric and Climate Science

Course Code: SEE5201

Course Duration: One semester

No of Credit Units: 3

Level: P5

Medium of Instruction: English

Prerequisites: Nil

Precursors: Nil

Equivalent Courses: Nil

Exclusive Courses: Nil

Part II

Course Aims:

This course is designed for students in the M.Sc. Energy and Environment programme. It will provide students with a comprehensive knowledge of physical processes occurring in the atmosphere and climate system, and enable them to discover and analyze atmospheric environment and climate change issues.

Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

No	CILOs	Weighting (if applicable)
1	Describe the thermal and dynamical structure of the atmosphere, the atmospheric general circulation, and the key components of the Earth's climate system	1
2	Relate basic thermodynamic and radiative processes in the atmosphere to the underlying physical laws	3
3	Relate basic dynamical processes in the atmosphere to the underlying physical laws	3
4	Describe some climate change phenomena and explain them in terms of basic physical processes	1

Teaching and Learning Activities (TLAs)

(designed to facilitate students' achievement of the CILOs)

TLAs	Lectures	Group Discussion	Tutorials	Total no of hours
CILO 1	2	-	1	3
CILO 2	10	2	3	15
CILO 3	12	2	4	18
CILO 4	2	-	1	3
Total (hrs)	26	4	9	39

Scheduled activities: 2 hrs lecture + 1 hr tutorial

Assessment Tasks/Activities

(designed to assess how well the students achieve the CILOs)

Examination duration: 2 hrs

Percentage of coursework, examination, etc.: 50% by coursework; 50% by exam

ATs	Assignment (%)	Midterm Quiz (%)	Final Exam (%)	Term Paper/mini project (%)	Total (%)
CILO 1	2	5	-		7
CILO 2	8	15	10	2	35
CILO 3	7	-	30	4	41
CILO 4	3	-	10	4	17
Total	20	20	50	10	100

To pass a course, a student must do ALL of the following:

- 1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper or mini project, 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 Grading of Student Achievement.

Grading of Student Achievement: Refer to Grading of Courses in the Academic Regulations for Taught Postgraduate Degrees.

The grading is assigned based on students' performance in assessment tasks/activities.

Grade A

The student completes all assessment tasks/activities and the work demonstrates excellent understanding of the scientific principles and the working mechanisms. He/she can thoroughly identify and explain how the principles are applied to science and technology for solving physics and engineering problems. The student's work shows strong evidence of original thinking, supported by a variety of properly documented information sources other than taught materials. He/she is able to communicate ideas effectively and persuasively via written texts and/or oral presentation.

Grade B

The student completes all assessment tasks/activities and can describe and explain the scientific principles. He/she provides a detailed evaluation of how the principles are applied to science and technology for solving physics and engineering problems. He/she demonstrates an ability to integrate taught concepts, analytical techniques and applications via clear oral and/or written communication.

Grade C

The student completes all assessment tasks/activities and can describe and explain some scientific principles. He/she provides simple but accurate evaluations of how the principles are applied to science and technology for solving physics and engineering problems. He/she can communicate ideas clearly in written texts and/or in oral presentations.

Grade D

The student completes all assessment tasks/activities but can only briefly describe some scientific principles. Only some of the analysis is appropriate to show how the principles are applied to science and technology for solving physics and engineering problems. He/she can communicate simple ideas in writing and/or orally.

Grade F

The student fails to complete all assessment tasks/activities and/or cannot accurately describe and explain the scientific principles. He/she fails to identify and explain how the principles are applied to science and technology for solving physics and engineering problems objectively or systematically. He/she is weak in communicating ideas and/or the student's work shows evidence of plagiarism.

Part III

Keyword Syllabus:

- *Basic structure of the atmosphere*
Composition of the atmosphere, greenhouse gases, three-dimensional temperature and wind distributions of the atmosphere, general circulation, large-scale circulation patterns.
- *Atmospheric thermodynamics and radiative transfer*
Planck's law, radiative transfer, solar and terrestrial radiation, applications of the first and second laws of thermodynamics, potential temperature, adiabatic processes, thermodynamic diagrams.
- *Hydrostatics of the atmosphere*
Hydrostatic equation, thermodynamic structure of the atmosphere, atmospheric stability.
- *Basic atmospheric dynamics*
Dynamics of horizontal flow, geostrophic wind, thermal wind, pressure as vertical coordinate, primitive equations.
- *Climate variability*
Climate variability, natural and anthropogenic climate change, greenhouse warming.

Recommended Reading:

Books:

- *Atmospheric Science-An introductory survey*, J.M. Wallace & P.V. Hobbs (Academic press/Elsevier, 2nd edition, 2006)
- *The Atmosphere and Ocean: A Physical Introduction*, N. Wells (Wiley, 1997).
- *An Introduction to Dynamic Meteorology*, J.R. Holton (Academic Press, 3rd edition, 1992)
- *Atmosphere, Ocean and Climate Dynamics: An Introductory Text*, J. Marshall and R. A. Plumb (Academic Press, 2007)
- *Fundamentals of Atmospheric Physics*, M.L. Salby (Academic Press, 1996)

Online Resources:

- http://www.hko.gov.hk/education/edu01met_e.htm
- <http://www.metoffice.gov.uk/learning/learn-about-the-weather>
- <http://www.metoffice.gov.uk/climate-guide>