Imperial College London

Module Specification (Curriculum Review)

Basic details

			Earliest cohort	Latest cohort
UID		Cohorts covered	2024-25	

Long title	Atmospheric Physics
New code	PHYS70013
New short title	
Brief description of module *(approx. 600 chars.)*	The module will provide students with an understanding of the physics behind the structure, the dynamics, and the energetics of planetary atmospheres, with the main emphasis being on the Earth's atmosphere and its changing climate.

231 characters

Available as a standalone module/ short course? N

Statutory details

	ECTS	CATS	Non-credit
Credit value	7.5	15	N

HECOS codes:

FHEQ level: Level 7

Allocation of study hours

	Hours	
Lectures	26	
Group teaching	0	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	0	
Other scheduled	20	*Incl. project supervision, fieldwork, external visits.*
Independent study	141.5	*Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.*
Placement	0	*Incl. work-based learning and study that occurs overseas.*
Total hours	187.5	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed? No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term		Other	Term 2, exam in term 3

Ownership

Primary department	Physics
Additional teaching departments	None

Delivery campus	South Kensington

Collaborative delivery

Collaborative delivery?	N

External institution	N/A
External department	N/A
External campus	N/A

Associated staff

Role	CID	Given name	Surname
Module Leader		Paulo	Ceppi

Learning and teaching

Module description

Learning outcomes	On completing the Atmospheric Physics course, students will: • Be able to describe the basic structure of an atmosphere and the climate system. • Be able to use fundamental thermodynamics to derive expressions for the variation of temperature, pressure, and air density with height. • Understand the concept of buoyancy and potential temperature, and how they relate to static stability of the atmosphere. • Know the components of the Earth's radiation balance. • Understand the concepts of optical depth and transmissivity. • Be able to write down Schwarzschild's equation of radiative transfer and to solve it for both solar and thermal radiation under representative atmospheric conditions. • Derive a simple model of the greenhouse effect. • Know the forces acting on a parcel of air and apply Newton's 2nd Law to deduce the equations of motion for a compressible gas on a rotating planet. Appreciate the fundamental role of vorticity in the dynamics of the motions. • Know how to apply scale approximations to the equations of motion (e.g. hydrostatic and geostrophic approximations). • Be able to identify the main anthropogenic and natural constituents that influence the Earth's climate. • Be familiar with how fundamental atmospheric physics is represented in complex climate models, and how such models and observations are used for weather forecasting, climate simulation, and investigations of the causes and impacts of climate change.
Module content	Five chapters covering important aspects of atmospheric physics, organised as described below: • General knowledge of main characteristics of the atmosphere • Atmospheric Radiation • Atmospheric Thermodynamics • Atmospheric Dynamics • Climate Change
Learning and Teaching Approach	Students will be taught over one term using a combination of lectures, office hours and directed exercises on theoretical and practical work.

Assessment Strategy	100% of summative assessment is based on a final exam: a written exam of 2 hours that will evaluate competences in the following topics: • General knowledge of main characteristics of the atmosphere • Atmospheric Radiation • Atmospheric Thermodynamics • Atmospheric Dynamics • Climate Change
Feedback	Problem Sheets are provided weekly or fortnightly with questions and examples students can practise with.
Reading list	Lecture notes are provided to students. The notes are designed to be self-contained, and there is no designated textbook required for this module. There are however also some excellent textbooks, which are suggested as supplementary or complementary reading for those of you wishing to explore further some aspects of the module. All those textbooks are fully optional. The primary one is the following: Atmospheric Science: An Introductory Survey, Wallace and Hobbs, 2002.

Quality assurance

Date of first approval	
Date of last revision	
Date of this approval	
Module leader	Paulo Ceppi

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

Notes/ comments

Template version 16/06/2017

Programme structure
Associated modules

UID	Legacy code	Module title	Requisite type

Assessment details

		Pass mark
Grading method	Numeric	50%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Examination	2 hour written examination	100%	50%	N
		100%		