COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	PHYSICS DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**402**	**SEMESTER**	**6/8**
COURSE TITLE	ATMOSPHERIC PHYSICS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	4
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	*special background, specialised general knowledge*
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/enrol/index.php?id=554

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course provides students with advanced knowledge necessary for a deep understanding of physical parameters, laws and processes and phenomena occurring into the Eartrh's atmosphere. More specifically, upon successful completion of the course, the student is expected to:

- know the definition, the units and the meaning of the main atmospheric parameters
- be aware of the main properties and characteristics of terrestrial atmosphere and more specifically of its structure and composition
- know the spatial and temporal distribution and changes of the different atmospheric components as well as of its main atmospheric physical parameters (pressure, density, temperature)
- learn what are the main layers of the atmosphere and to describe their physical properties and phenomena taking place within them (for example, the stratospheric ozone layer and the ozone hole)

- have an integrated knowledge of the behavior of the mixture of atmospheric air and its components as ideal gas and to also have the ability to describe the atmospheric air as such using its state equation
- know the thermodynamic behavior of atmospheric air and the relevant physical laws
- know the principles and criteria regulating the atmospheric stability/instability and their consequences

Also, upon the successful completion of the course and his practice during the laboratory courses within the framework of the course, the student is expected to:

- be familiar with various classical instruments used for measurements of main atmospheric parameters, namely pressure (barometers), temperature (thermometers), humidity (hygrometers) and wind (anemometers)
- know the operational principles of the above mentioned instruments
- use these instruments to measure the relevant atmospheric parameters, especially for monitoring specific physical processes (for example, transfer of heat) and to be familiar with the instruments' daily practical use in the framework of atmospheric sciences
- analyze experimental measurements and to derive quantitative results for atmospheric physical parameters (e.g. heat transfer coefficient, atmospheric pressure and humidity) and conclude on the possible effects of different physico-geographical or meteorological parameters (e.g. altitude, wind) on atmospheric parameters

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Respect for the natural environment
Working independently
Team work
Criticism and self-criticism
Project planning and management
Production of free, creative and inductive thinking

(3) SYLLABUS

The scope of Atmospheric Physics. Main atmospheric parameters. Atmospheric pressure, density and composition of the atmosphere. Constant and variable atmospheric air gases. Thermal structure of the atmosphere. Atmospheric boundary layer. Free troposphere. Stratosphere and ozone hole. Pressure variations and their mathematical expression. Water in the atmosphere (latent heats, Clausius-Clapeyron

equation, water phase changes). The first law of thermodynamics for atmospheric air. Temperature variations in the atmosphere and their mathematical expression (temperature lapse rate). Potential temperature. Stability/instability criteria for atmospheric air.

Four laboratory courses in groups into the Laboratory (laboratory theoretical teaching, conduction of experiments/projects, analysis of measurements, and report writing).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT Moodle remote teaching platform for distributing and exchanging course notes, exercises and practice activities with students and for informing and communicating with them.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Written examinations at the end of the semester, in greek language, including open-ended questions, short-answer questions, multiple-choice questionnaires and problem solving. In addition, at the end of the semester, there is an oral examination in the framework of the laboratory part of the course, including checks of students' knowledge on the instruments used in the experiments and also the students' perception of how to utilize these instruments to measure main atmospheric parameters and processes (studied during the laboratory classes).

Activity	*Semester workload*
Lectures	39
Laboratory practice	13
Study and analysis of bibliography	25
Project/essay writing	20
Examinations	3
Course total	***100***

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Atmospheric Physics (in greek), B. D. Katsoulis and N. Hatzianastassiou, Ioannina University Press, Ioannina, Greece (2006).
- General Meteorology (in greek), H. S. Sahsamanoglou and T. Makrogiannis, Zitis Publications, Thessaloniki, Greece (1998).
- Electronic notes, N. Hatzianastassiou (yearly updated).