COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	GRADUATE		
COURSE CODE	**M251**	**SEMESTER**	**1**
COURSE TITLE	MICROMETEOROLOGY		

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**
	3	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/specialized 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/course/view.php?id=1415

(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 offers an overview of the phenomena and the underlying dynamics in the Atmospheric Boundary Layer (ABL). Upon completion of the course the students will be able to:

- Describe the various characteristics of the ABL and its depth as well as their spatiotemporal variability
- Describe the sources of turbulence in the ABL and their characteristics
- Calculate the conditions under which static instability occurs based on the equations of motion and on the thermodynamics of atmospheric flows
- Produce the characteristics of turbulence produced by static instability
- Describe the statistical dynamics of the ABL and the associated closure problem of the dynamical system governing the evolution of the turbulence statistics
- Describe the first order closure (Prandtl's mixing length theory) and the second order closure as well as the influence of the turbulent eddies on the mean state in the ABL

- Calculate based on the first order closure the mean state (wind, temperature) in the ABL
- Recognize the energy balance in the turbulent ABL and the influence of the turbulent momentum and heat fluxes
- Calculate the influence of the ABL on the free atmosphere
- Describe the various parameterizations of the ABL and their use in numerical simulation models for weather and climate prediction

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. Working independently. Criticism and self-criticism. Production of free, creative and inductive thinking. Respect for the natural environment.

(3) SYLLABUS

The Atmospheric Boundary Layer (ABL): description and importance. Source of turbulence in the ABL. Equations of motion and thermodynamics of fluids. Qualitative and quantitative description of static instability as the main source of turbulence in the ABL. Statistical description of the ABL. Prandtl's mixing length theory. Ekman layer (and Ekman spiral). Surface layer and logarithmic wind. Monin-Obukhov similarity theory for the neutral and the stably stratified ABL. ABL influence on the free atmosphere. Energetics in the ABL. Parameterization of the ABL.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of Moodle on-line learning platform for the dissemination of notes, problem sets as well as contacting the students
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.*	

Activity	*Semester workload*
Lectures	26
Tutorials	13
Bibliography study	35
Non-guided study	23
Exams	3

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		
	Course total	***100***
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 exam at the end of the course containing theory and problem solving	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

Suggested bibliography :

- The atmospheric boundary layer, J. Garratt, Cambridge University Press
- Introduction to micrometeorology, P. Arya, Academic Press
- An introduction to dynamic meteorology, J. Holton, Academic Press