COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10EK301**	**SEMESTER**	**7**
COURSE TITLE	**AIR QUALITY**		

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**
Lectures (theory and exercises)	4	6

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised Knowledge.
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes, in the Greek language for Erasmus students
COURSE WEBSITE (URL)	eclass: https://eclass.uoa.gr/courses/PHYS220**/**

(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 the student with an understanding of the mechanisms associated with Atmospheric Environment in terms of its quality. Upon completion of the course the student will be able to:

• recognize the problems of air pollution and formulate a research plan for the assessment of the prevailing situation, taking into account natural, chemical and dynamic mechanisms,
• Identify sources and sinks of pollutants released into the atmosphere either due to anthropogenic activities or due to natural processes,
• classify pollutants (primary pollutants, primary and secondary), sources and sinks of pollution,
• understand the physical and chemical processes that occur in the atmosphere,
• recognize the cleaning mechanisms of the atmosphere,
• describe the thermodynamic processes in the atmosphere that determine the stability and instability of the atmosphere and therefore the upward or downward movement of a polluted air mass,
• describe the photochemical cycle and know the specific parameters that affect it,
• define and explain the structure of the atmospheric boundary layer, its spatial and temporal evolution and the turbulent diffusion processes of the pollutants,
• examine diffusion problems based on simplified dispersion models (GAUSS model) and equations,
• calculate the various categories of motion in the atmosphere, and in particular medium-scale movements (sea breezes, anchorages - catwalks, valley-wind winds) and interpret their contribution to diffusion - dispersion of pollutants,
• describe measurements of physical parameters and atmospheric pollutants,
• know the mechanisms and parameters that define and define the urban microclimate,
• understand the urban heat island phenomenon and calculate energy flows,
• explain, based on the above, the links between air quality and the urban microclimate.

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…*
	…….

The course aims at the following general competences:
Search for, analysis and synthesis of data and information, with the use of the necessary technology
Decision-making
Working independently
Respect for the natural environment
Production of free, creative and inductive thinking
Analytical and synthetic thinking
Critical thinking
Problem solving

(3) SYLLABUS

- Anthropogenic and natural sources of air and particle pollutants. Troposphere photochemistry. Troposphere chemistry.
- Chemical equilibrium. Enthalpy. Entropy. Free energy of chemical reactions. Chemical kinetics. Reaction rate. Reaction mechanisms.
- Basic definitions of air pollution estimation. Theories of atmospheric diffusion. The Gauss equation Diffusion equation.
- Introduction to pollutant diffusion and dispersion models: Principles, basic parameters, input data, applications.
- Methodology of measuring physical parameters and atmospheric pollutants. Measurements of atmospheric parameters. Measurements of atmospheric pollution.
- Cleaning mechanisms of the atmosphere. Air pollution in urban areas.
- Quality of atmospheric environment and urban micro climate.

(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*	Yes Electronic communication with the students using ICT (Information and Communications Technology), Computer-aided lectures, use of Overhead Projectors, eclass platform
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*	

Activity	Semester workload
Lectures	26
Exercises	26
Individual Study/ Study and Analysis of bibliography / Preparation	98
Course Total	**150**

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.*	Final written exams in Greek Open-ended questions, Problem solving – Examinations on the basis of four problems of equivalent weight covering the entire course Solved problems and problems from previous examination periods uploaded to e-class platform

(5) ATTACHED BIBLIOGRAPHY

Recommended bibliography:

- Environmental Physics, P. Kassomenos, KLEIDARITHMOS Editions, 2017.
- Air Pollution, A. Triantafyllou, THALIS Editions, 2017.

Relevant scientific journals:

- ATMOSPHERE
- ATMOSPHERIC ENVIRONMENT
- ATMOSPHERIC POLLUTION RESEARCH
- OPEN JOURNAL OF AIR POLLUTION