COURSE LAYOUT

1. GENERAL

SCHOOL	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
DEPARTMENT	NATURAL RESOURCES MANAGEMENT & AGRICULTURAL ENGINEERING		
STUDY LEVEL	*Undergraduate*		
COURSE CODE	**565**	**SEMESTER**	1st
COURSE TITLE	PHYSICS FOR ENGINEERS		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
LECTURES	3	3.4
PRACTICAL EXERCISES	2	2.6
TOTAL	5	5

COURSE TYPE	Background
PREREQUISITES	Secondary education Physics & First semester university Mathematics
LANGUAGE	Greek with English support in terminology
IS THE COURSE OFFERED for ERASMUS STUDENTS?	YES(in English) (Physics for Engineers)
COURSE WEB PAGE	https://oeclass.aua.gr/eclass/courses/2680/

2. LEARNING OUTCOMES

Learning Outcomes

The course is the main University-level introductory course in Physics. The course aims at introducing students to the basic concepts and methodologies of Physics which are a necessary background in the study of more advanced subjects such as Soil Physics, Agricultural Mechanics, Sensors/Automations and, in general, in Science and its applications. The material focuses on areas of Physics that have not been sufficiently taught in secondary education and are related to Agricultural Engineering such as Solid Mechanics, Wave theory and Optics. It also introduces concepts in measurement methodologies and statistical data analysis that are necessary in almost all sciences.
Upon successful completion of the course the student will
- understand and describe basic principles of Physics, various natural phenomena and various physical systems related to mechanics, waves and optics.
- develop an understanding of basic quantities of Physics related to the areas of Physics mentioned, their units of measurement, their usefulness, how they are measured experimentally and how to calculate them using mathematical formulas.
- be able to construct simple, approximate mathematical models that describe natural phenomena and, at a basic level, to apply calculus in Physics.

- be familiar with the basic principles of experimental Physics methodologies applied to issues related to biological sciences.
- collect experimental Physics data and analyze them with basic statistical analysis methods such as the least squares method.
- be adequate in presenting the results and conclusions of a relevant experimental study.

General Competences

Gaining knowledge of terminology and develop skills for correct description.
Development of analytical & critical skills.
Develop skills for solving problems.

Search, analyze and compose data and information, using the necessary technologies.

Linking knowledge to real life and applications.
Develop skills for decision making, effective teamwork and adaptation to new situations.
Demonstration of social, professional and moral responsibility.
Respect for the work and natural environment.

Promoting free, creative and inductive thinking.

3. COURSE CONTENT

Theory

Mechanics: Models, measurements, vectors, translation and rotation of tri-orthogonal systems. Introductory elements of robotic systems as applied to physical phenomena. Plane and 3-D motion. Newton's laws and its applications. Work, energy and its conservation. Momentum and its conservation. Kinematics and dynamics of rotational motion. Torque, moment of inertia and angular moment.
Waves: Parameters of waves. Wave equation. Overlap and contribution of waves. Introductory elements of telecommunication signals.
Optics: Nature and propagation of light. Photometry. Reflection and refraction. Geometric optics. Mirrors and lenses. Optical instruments. Introductory elements of digital images and three dimensional vision.

Laboratory

Measurement errors. Graphical representation of measurements and method of least squares. Analysis of emission and absorption spectra in the visible region. Use of a polarimetry in materials. Capillary action. Measurement of viscosity. Measurement of specific heat of liquid. Light diffraction.

4. TEACHING and LEARNING METHODS - Evaluation

TEACHING METHOD	In suitably equipped teaching rooms
USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES	Use of powerpoint presentations and Phet simulations in lectures, use of e-class website and videos to inform, educate and communicate with students, distribution of educational material, delivery & grading of laboratory exercises, evaluation with tests before laboratory exercises.
TEACHING ORGANISATION	

Activity	*Work Load*
Lectures	39
Laboratory exercises	14
Group and/or individual assignments	28
Independent study	42
Final Exam	2
Course total (25 hours of student work loadper ECTS)	*125*

STUDENTS EVALUATION	I. Theory: Written final examination (100%) comprising of problem solving and short answer

	questions. Optional homework exercises (bonus 10% of grade) II. Laboratory: Tests before each laboratory session (15%), written team assignments on the laboratory exercises (40%), written final examination (45%).

5. BIBILIOGRAPHY

1) Fundamentals of Physics (in Greek) (Φυσική: Βασικές Αρχές), Halliday-Resnick-Walker, Εκδόσεις Gutenberg 2021.
2) Essential University Physics (in Greek) (Θεμελιώδης Πανεπιστημιακή Φυσική), Richard Wolfson, Εκδόσεις Κριτική 2019.
3) Physics for Scientists and Engineers (in Greek) (Φυσική για Επιστήμονες και Μηχανικούς), R. A. Serway-J. W. Jewett, Εκδόσεις Κλειδάριθμος 2012.