COURSE OUTLINE

(1) GENERAL

SCHOOL	Science		
ACADEMIC UNIT	Department of Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**31**	**SEMESTER**	**3**
COURSE TITLE	Waves		

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**
	5	6
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*	General background
PREREQUISITE COURSES:	non
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.phd?id=85

(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*

This course gives to the student the skills to develop an understanding of the phenomena of Wave Physics, in particular phenomena of harmonic motion, production and propagation of elastic and electromagnetic waves, as well as linear and non linear optics. The course targets to the development of effective and efficient self directed study skills, problem solving skills, presentation skills and teamwork/group skills. On successful completion of this course, the student will be able to:

- analyze a complex mechanical and/or electrical oscillating system of many degrees of freedom
- describe the production and propagation of harmonic elastic waves, longitudinal or transverse, and apply successfully their properties and the properties of sound waves
- deal with Doppler effect for elastic waves and arrive to the corresponding conclusions.
- explain and describe interference of elastic waves, beats and standing waves in

strings air columns or membranes, as well as the resonant behavior of these systems

- work with the Maxwell equations in order to understand how these equations lead to the wave equation for electromagnetic waves and describe their properties
- handle effects related to linear Optics as reflection, refraction, total reflection, lenses, mirrors, prisms, microscopes, telescopes
- explain and describe interference and diffraction (intensity distribution and Interference patterns from slits and diffraction gratings), and their application on interferometers and thin films
- handle effects of polarization of waves and particularly light and deal with the Fresnel equations and their effect on reflection and refraction.
- describe successfully the properties of birefringent materials and phase retarders, as well as their applications in the optical technology

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,
- Team work,
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking

(3) SYLLABUS

Harmonic vibration. Waves in elastic media. Types of waves, quantitative properties of waves, wave equation. Harmonic waves. Interference, standing waves, dispersion. Transmission velocity in elastic media. Resistance of a medium. Sound waves. Maxwell equations and electromagnetic waves. Nature and propagation of light. Reflection, diffraction, Fresnel equations, refraction, interference. Polarization, birefringence

(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 and communication with students**

Use of ICT in teaching, laboratory education, communication with 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.

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	52
tutorials	13
Study of bibliography	60
Non-directed study	22
exams	3
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.

-written exams for the evaluation of conclusive understanding and problem solving capabilities
-middle term exam
-oral presentation of selected topics

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Teaching notes (available in the website of the course).
- D. Halliday ,R. Resnick, R. Walker, “Physics”, Vol. 2, Hellenic Edition, ISBN: 978-960-01-1594-9, Gutenberg Publications, 2013, Athens, Greece.
- Hugh, D. Young, R. A. Freedman “University Physics with Modern Physics”, Vol. B, (Electromagnetism-Optics) 2d Hellenic Edition, ISBN978-960-02-2473-3, Papazisis Publications, 2010, Athens, Greece