COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics Department		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10EKA01**	**SEMESTER**	**4**
COURSE TITLE	**INTRODUCTION TO ASTROPHYSICS**		

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)	5	7
Laboratory	1	

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SPECIAL BACKGROUND
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.uoa.gr/courses/PHYS280/

(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 the necessary familiarity with basic concepts of Astrophysics.

Upon successful attendance and completion of the course, students:

– acquire basic knowledge of measuring distances in Astrophysics, of describing the radiation field and its propagation in a medium, as well as the main physical processes of emission and absorption that take place in stars and other astrophysical systems.

– acquire the necessary knowledge of spectral formation and spectral classification of stars, and become familiar with one of the most important diagrams in Astrophysics, the Hertzsprung–Russell diagram.

– become aware of the physical principles that determine the internal structure of stars such as the Sun and become familiar with the mathematical equations of stellar structure.

– acquire basic knowledge about the formation of protostars and the evolution of stars like the Sun, as well as about solar activity.

– acquire the necessary knowledge for the physical description of galaxies and are able to recognize the morphological types of galaxies.

– acquire basic knowledge of Cosmology, such as the expanding Universe and dark matter.

Therefore, students acquire the skill and ability to:
To understand the interaction of light with matter and the physical processes that take place in the stars.
To explain physical phenomena related to stars and galaxies.
To understand the basic principles that govern the Universe.
To cultivate synthetic thinking.
To solve simple problems related to all of the above.

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

The course aims at the following general competences

Production of free, creative and inductive thinking
Analytical and synthetic thinking
Critical thinking
Time management
Planning
Taking initiative/responsibility
New Technology skills
Creativity
Determination
Communication skills
Information management
Meeting Deadlines and Keeping Schedules
Flexibility / Adaptability
Problem solving

(3) SYLLABUS

- Introductory concepts: radiation, flux, brightness, luminosity, sizes, scale of distances in the Universe.
- Stars: propagation of radiation, black body, stellar temperature, spectral types, HR diagram, stellar interior, stellar evolution for solar-type stars.
- Sun: solar activity, solar system
- Interstellar space and star formation: Jeans criterion, homologous collapse, protostars, protoplanetary disks
- Galaxies: types, kinematics, creation, evolution, active galaxies
- Cosmology: distance scales, universe expansion, dark matter

(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 video 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*	
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.*	1. Final written exams in Greek Open-ended questions, Problem solving 2. Online quiz during the semester that count as bonus to the final grade depending on the performance

Activity	Semester workload
Lectures	52
Exercises	13
Laboratory	13
Individual Study/ Study and Analysis of bibliography / Preparation	47
Quiz	20
Preparation for the Laboratory and writing report	30
Course Total	**175**

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography

- Introduction to Modern Astrophysics, B. W. Carroll & D. A. Ostlie, Gutenberg Publications, 2021 (IN GREEK)

- Astrophysics: Structure and Evolution of the Universe: Stars Volume I: F. Shu, Crete University Press, 2009, Heraclion of Crete, Greece, (IN GREEK)