COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10YK101**	**SEMESTER**	**7**
COURSE TITLE	**STELLAR 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)	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 English language for Erasmus students
COURSE WEBSITE (URL)	https://eclass.uoa.gr/courses/PHYS233/

(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*

In this course the students acquire the necessary knowledge regarding the formation, internal structure and evolution of stars, radiative transfer, and the physics of stellar atmospheres.
They also become acquainted with the physics of compact objects (such as white dwarfs, neutron stars, and black holes) and supernova explosions.

Successful completion of the course allows the student to:
Recognize the way the basic laws of Physics come into play in star formation, structure and evolution.
Recognize the differences between various star classes (evolutionary stages)
Understand spectroscopic differences in stars
Calculate stellar spectra using the principles of radiative transfer.
Understand the different evolutionary paths between stars of small and large mass.
Distinguish the differences between stars at the end of stellar evolution: white dwarfs, neutron stars and black holes.
Explain astrophysics in terms of basic Physics.

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

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

(3) **SYLLABUS**

- Radiative transfer: Specific intensity, flux, pressure, equation of radiative transfer, simple case solutions, optical depth, scattering, mean free paths, black-body properties, thermodynamical equilibrium, Einstein coefficients.
- Stellar interiors. Post main-sequence evolution. Massive Stars. Variable Stars.
- Star formation. Protostars. Hayashi Track.
- Stellar Atmospheres.
- Binary Stars. Mass determination and evolution. Examples of evolved binary stars.
- Compact stars: White dwarfs, neutron stars, pulsars, interior and magnetospheres, supernova explosions and remnants, black holes, X-ray binary systems.

(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/ Exercises	52
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 (or in English for Erasmus students): Open-ended questions, Problem solving -Wriiten work

(5) **ATTACHED BIBLIOGRAPHY**

- Suggested bibliography

- An introduction to Modern Astrophysics, B.W. Carroll & D.A. Ostlie, Cambridge University Press, 2017
- The physical Universe – An introduction to Astronomy, Frank Shu, University Science Books, 1982

- Related academic journals:

- Physical Review Letters
- Astrophysical Journal
- Nature, Nature Astronomy
- Annual Reviews of Astronomy and Astrophysics
- Astronomy and Astrophysics
- Monthly Notices of the Royal Astronomical Society