COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10YKO35**	**SEMESTER**	**5**
COURSE TITLE	**THEORY OF SPECIAL RELATIVITY**		

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*	Special background
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)	url of eclass: https://eclass.uoa.gr/courses/PHYS268/

(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 student acquires the necessary knowledge for the understanding of the principles of relativity, the notion of spacetime and four-vectors and the physical meaning of using the Lorentz transformations.

With the completion of the course the student is able to

Describe various physical quantities in the form of four-vectors.
Recognize the types of four-vectors.
Combine the physical quantities that are known in a frame of reference in order to compute them in another frame of reference.

Explain the difference of measurements in different frames of reference.
Calculate the transformed quantities by means of Lorentz transformations.

Be able to explain the relations between measurements in different frames.
Be able to combine the formulae in various types of problems related with relativistic velocities.

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 new research ideas
Production of free, creative and inductive thinking
Analytical and synthetic thinking
Critical thinking
Problem solving

(3) SYLLABUS

- Tensors (covariant and contravariant four-vectors, metric).
- Spacetime (space-like, time-like, light-like four-vectors).
- Relativistic Kinematics and dynamics (Lorentz transformations, invariant quantities, four-velocity, four-acceleration, four-momentum).
- Paradoxes in special relativity and their analysis.
- Relativistic particle reactions (conservation of four-momentum).
- Special relativity and electrodynamics (covariant formulation of Maxwell equations, electric and magnetic field transformations).

(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 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

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Lecturers' notes
- Lecture notes of Christodoulakis & Korfiatis (Theory of Special Relativity, Kallipos, in Greek)
- Theory of Special Relativity Part B (M. Tsambarlis) in Greek
- Introduction to Special Relativity (W. Rindler) translated to Greek
- Theory of Special Relativity and its Applications (K. Christodoulidis, in Greek)