SYLLABUS

1. Course title:

PHYSICS

2. Code:

3. Cycle of study:

1

4. ECTS credits:

5

5. Type of course:

Mandatory

6. Prerequisites:

7. Class restrictions:

8. Duration / semester(s):

1 I

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)	
9.1. Lectures	2		Classes:	45	
9.2. Seminars	1		Individual work:	81	
9.3. Laboratory / Practice classes	1		In total:	126	

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Production, Energy Engineering and Mechatronics

12. Lecturer:

Prof. dr. sc. Izet Gazdić

13. Course aims:

One of the main objectives is that students expand their knowledge of the basic laws of physics of oscillatory and wave motion, optics and the structure of atoms and to know to establish causal relationships among these phenomena. Also to be able to establish quantitative relationships between the relevant physical parameters that define this phenomenon that

these laws, and to develop skills for independent and team work.

14. Learning outcomes:

At the end of the semester/course students, who during the entire period of teaching continuously perform their duties, will be able to:
understand the formation of mechanical and electromagnetic oscillations and their extensive application in science and technology, know how to explain and apply the laws of optical, optical instruments, and to know the wave and particle graphic distribution of light and its dualism. Also, after successfully completing the course students should know how to analyze a variety of physical problems related to the course material and to successfully test physical laws covered by this course curriculum.

15. Course content:

Overview of the teaching units by week:
1. Oscillatory motion. Speed and acceleration of harmonic oscillators. Energy of harmonic oscillations.
2. Mathematical pendulum. Damped and forced oscillations. Origin and types of waves. Flux density, energy and intensity of waves. 3. Wave equation. Sound waves. Objective and subjective characteristics of sound. Ultrasound. Doppler effect in sound
4. Nature of brightness. Speed of light. Laws of geometric optics: rectilinear propagation and independence of propagation
5. Law of reflection: Plane, concave and convex mirror.
6. Law of refraction of light. Total reflection.
7. Lenses: division of lenses, general formula of lenses, construction of an image on a lens. Combined lenses. Optical instruments.
8. Test I
9. Interference of light. Fresnel experiments. Interference on sheets.
10. Young's experiment. Diffraction of light. Polarization of light
11. Photoelectric effect. Compton effect. Models of atoms
12. Bohr's postulates. Bohr's theory of the hydrogen atom. Wave nature of particles. Schrodinger's equation. Quantum-mechanical model of the atom.
13. Structure of the atomic nucleus. Mass defect and binding energy.
14. Law of radioactive decay. Nuclear reactions. Nuclear fission and fusion.
15. Test II
During the Auditory exercises, computational problems from the mentioned chapters are solved, following the above weekly dynamics.
It is planned that students during Laboratory classes do the following exercises using the appropriate experimental methods:
1. Determination of the source frequency using the air column,
2. Determination of the acceleration of gravity using mathematical pendulum,
3. Determination of the third wavelength laser light using optical gratings,
4. Determining the Rydberg constant,
5. Acquisition of Planck's constant using the photoelectric effect,
6. Designate focal length lenses - direct methods
7. Determining the focal length of the lens -Bessel's method
8. Determination of elemental charge using electrolysis of copper sulfate,
9. Determination of the absorption coefficient of γ - ray using GM counter,
10. Checking the law of radioactive decay by computer simulation.

16. Learning methods:

The learning methods to be applied in this course are:
- Lectures using multimedia means, and active learning techniques with the active participation and discussion of students;
-Theoretical exercises (calculations, problem solving) with the use of logical-mathematical learning styles and use of specific knowledge and experience,
- An experimental exercise, experimental preparation with constant activity of observation and consideration, and the creation of abstract concepts by the active experimentation.

17. Assessment methods:

After half of the semester, students take the writing test (the first term exam), which includes previously treated topics with lectures and auditory exercises. The test consists of computing problems and theoretical questions. Computing problems will be scored, with 10 points, a theory also with 10 points, so that a student on the first partial exam can get 20 points. In the last week of the semester students take the writing test (the second term exam) which covers the prepared topics with lectures and exercises in the second part of the semester. The concept and the scoring of the test is the same as the first, so that students on the second partial exam can get 20 points.
During the semester, students are given homework assignments (a total of five tasks). Each task is scored with 1 point, respectively, a student at the tasks can achieve a maximum of 5 points.
For continuous work on laboratory exercises in the course of the semester, the student can achieve from 0 to 5 points.

After experimentally completing each laboratory exercise, students will colloquate the exercise. The right to take the final exam is given to students who completed the Laboratory exercises succesfully.
The final exam consists of 4 computing problems and 4 theoretical questions. Computing problem carry 25 points, as well as the theory questions. The maximum number of points a student can achieve on the final exam is 50.
In order to pass the course the student must achieve a minimum of 54 cumulative points.

18. Assessment components:

Grading is based on the total number of points student earns by completing pre-exam requirements and final exam, as follows:

Pre-exam requriements:

Homework	**5**
Laboratory exercises	**5**
The first partial exam	**20**
The second partial exam	**20**
Total on pre-exam requirements	**50**
Final exam	**50**
Total maximum points	**100**

Grading scale is as follows:

Grade	Description	Letter/Points
5 (five)	**Does not meet minimum criteria**	**F <54**
6 (six)	**Meets minimum criteria**	**E 54-64**
7 (seven)	**Generally good, but with significant shortcomings**	**D 65-74**
8 (eight)	**Average, with noticeable errors**	**C 75-84**
9 (nine)	**Above average, with some errors**	**B 85-94**
10 (ten)	**Exceptional with no or minor errors**	**A 95-100**

19. Mandatory reading list:

1. I. Gazdić, Fizika-odabrana poglavlja za tehničke fakultete, Ars grafika, Tuzla, 2009
2. V. Vučić, D. Ivanović, Fizika I, II i III, Beograd 1998.
3. G. Dimić, I. Mitrinović, Zbirka zadataka iz fizike (D), 7 izdanje, Naučna knjiga, Beograd,1998

20. Additional reading list:

1. R. Fazlić, A. Kasumović, Praktikumlaboratorijskih vježbi iz Fizike I, Harfo-graf, Tuzla, 2008

21. Web sources:

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: