F009	**General Physics III**	L	S	P	ECTS
		4	1	2	7

Course objective. Understanding of the basic physical concepts and relations connected with oscillations, waves, optics and atomic physics.

Prerequisites. Competences acquired in General Physics I, General Physics II, Differential and integral calculus.

Course content.

1. Waves; longitudinal waves – equation, standing waves, transverse waves.
2. Acoustics; standing waves in air, speed of sound, transmission of energy in progressive waves. Doppler effect.
3. Sources of sound. Sensitivity of human ear. Shock waves.
4. Optics; basic laws of geometrical optics. Plane mirror, spherical mirrors. Prism. Dispersion of light. Spherical dioptre.
5. Optical systems: eye, magnifier, microscope, binoculars.
6. Photometry.
7. Physical optics; interference of light. Fresnel's mirrors. Lloyd's mirror, interference at planparallele plate. Newton's rings. Michelson interferometer.
8. Diffraction of light; Fraunhoffer diffraction, diffraction grating, Fresnel's diffraction.
9. Polarized light. Malus' law. Optical activity.
10. Atomic line spectra and energy levels. Structure of atom. Lasers.

LEARNING OUTCOMES

No.	LEARNING OUTCOMES
1.	Define and describe basic concepts and laws in the field of waves, acoustics and geometric and wave optics.
2.	Derive the wave equation and solve it for some specific cases.
3.	Discuss how the musical instruments work.
4.	Describe wave phenomena (reflection, refraction, diffraction, interference).
5.	Describe and apply relations for the Doppler effect.
6.	Apply the laws of geometric optics.
7.	Construct image formation in optical systems, optical instruments, and the human eye.
8.	Mathematically describe the wave properties of light and their application.
9.	Compare wave and particle theory of light.
10.	Apply basic concepts of photometry.
11.	Explain Bohr's model of the atom and its contribution to the development of science.
12.	Interpret a graphical representation of the physical quantities and their mutual dependence.
13.	Describe and interpret demonstration experiments in the above areas.
14.	Evaluate the results obtained by solving tasks.

RELATING THE LEARNING OUTCOMES, ORGANIZATION OF THE EDUCATIONAL PROCESS AND ASSESSMENT OF THE LEARNING OUTCOMES

TEACHING ACTIVITY	ECTS	LEARNING OUTCOME **	STUDENT ACTIVITY*	EVALUATION METHOD	POINTS	
					min	max
Class attendance	0.5	1-14	Class attendance	Evidence list (handwritten signature of the student)	5	10
Colloqium (midterm exams)	2	1-14	Expressions of definitions and physical laws. Performs mathematical expressions for certain physical quantities. Describing demonstration experiments performed in class. Solving numerical problems.	Written midterms (3 exams per semester).	15	30
Seminars	1	1-14	The research on a given topic and writing text seminars. Drawing up a presentation and an oral presentation of the seminar.	Rating of the written seminar (up to 5 points), and oral presentation score (up to 5 points).	5	10
Homework	0.5	1-14	Solving numerical problems.	Checking and discussions on the following exercises or consultation.	5	10
Final exam	3	1-14	Numerical exercises as written and oral assessment test understanding of physical laws.	Written and oral examination.	20	40
TOTAL	7				50	100

Teaching methods and knowledge assessment.
Lectures (60 hours) with the use of Power Point presentations, interactive simulation, the performance of demonstration experiments, addressing selected sample assignments, individual and group work, discussions and tests to check knowledge. Numerical exercises instructed by an assistant (30 hours) with the lead of the assistant. Within the auditory exercises students receive additional tasks for the exercise, which are solved alone for the homework. Checking solutions and discussion on the tutorials. Student presentations and discussions of specific topics at the seminar (15 hours). Students have the opportunity to take the numerical problems and theories through three exams (colloquium) per semester. If for each area in each colloquium achieve more than 60% of the points are exempt from the written and oral examination. Other students take a written and oral exam.

Can the course be taught in English: Yes

Basic literature:

1. Planinić, J., Osnove fizike III., Valovi – akustika – optika - uvod u atomsku fiziku, Filozofski fakultet Osijek, 2005.
2. http://www.fizika.unios.hr/of3
3. Henč-Bartolić, V., Kulišić, P., Valovi i optika, Školska knjiga, Zagreb, 1991.
4. Cindro, N., Fizika 1, Školska knjiga, Zagreb, 1988.
5. Henč-Bartolić, V., Baće, M., Bistričić, L., Horvat, D., Kulišić, P., Rješeni zadaci iz valova i optike, Školska knjiga, Zagreb, 1992.

Recommended literature:

1. Paić, M., Gibanje, Sile, Valovi, Liber, Zagreb, 1997.
2. Paić, M., Osnove fizike, IV dio, Sveučilišna naklada Liber, Zagreb, 1983.
3. Halliday, D., Resnick, R., Walker, J., Fundamentals of physics, John Wiley & Sons, Hoboken,2003.
4. Young, H., Freedman, R., University Physics, with modern physics Addison-Wesley Publ., New York, 2008.
5. Giambattista, A i suradnici, College physics, McGraw Hill, 2007.
6. E. Babić, R. Krsnik i M. Očko. Zbirka riješenih zadataka iz fizike. Školska knjiga, Zagreb 2004.
7. V. Henč-Bartolić et. al. Riješeni zadaci iz valova i optike, Školska knjiga, Zagreb, 2002.
8. V. Lopac, P. Kulišić, V. Volovšek i V. Danani, Riješeni zadaci iz elektromagnetskih pojava i strukture tvari, Školska knjiga, Zagreb, 1992.