F007	**General Physics I**	L	S	P	ECTS 7
		4	1	2	

Course objective. Adopt the basic knowledge and concepts in the field of kinematics and dynamics (mechanics), statics, relativistic mechanics, fluid mechanics and oscillations. Prepare for the courses that follow and which require knowledge of natural laws in specified fields.

Prerequisites. Obtained competences in physics and mathematics at the previous levels of education; enrolled the university undergraduate study.

Course content.

1. Introduction to physics. Physical units.
2. Motion; speed, velocity, acceleration, free fall, slope, vertical projectile motion, slant projectile motion, circular motion.
3. Dynamics; Newton's laws. Conservation of linear momentum.
4. Gravitation. Dynamics law for two systems in relative motion. The Galilean transformations, system in circular motion, Coriolis force.
5. Elastic force. Friction. Work. Energy; law of conservation of mechanical energy. Power. Collision.
6. Relativistic mechanics. Lorentz transformations, length contraction, time dilation, relativistic energy and momentum.
7. Statics; center of gravity, handle, rotation of a rigid object about a fix axis, parallel-axis theorem, law of conservation of angular momentum, rotation of a rigid object about free axis.
8. Fluid statics; hydraulic and atmospheric pressure, buoyant force, surface tension, capillarity.
9. Fluid dynamics; the equation of continuity, Bernoulli's equation, viscosity, flow of real fluid within tube, motion of a body in fluids. Viscosity measurement, errors of measurements.
10. Oscillations; the pendulum, Lissajous figures, damped harmonic oscillations, forced harmonic oscillations, the physical pendulum.

LEARNING OUTCOMES

No.	LEARNING OUTCOMES
1.	Define and describe terms in the field of kinematics and dynamics.
2.	Analyse a given motion, analyse and compare types of motion (linear and circular).
3.	Apply Newton's laws and conservation laws to specific problems and predict the outcomes of physical situations.
4.	Solve a physical problem in two ways: through kinematic quantities and using conservation laws.
5.	Compare and associate Kepler's laws, Newton's law of gravitation and conservation laws and apply them to solve physical problems.
6.	Analyze inertial and noninertial systems.
7.	Apply the laws of statics and rotation of a rigid body and compare translational and rotational motions.
8.	Apply the laws of statics and dynamics of ideal and real fluids.

9.	Analyze the properties and parameters of a free, damped and forced harmonic oscillator.
10.	Discuss phenomena and concepts in the field of special theory of relativity.
11.	Interpret graphical representation of physical quantities and their mutual dependence.
12.	Describe and interpret demonstration experiments in the above areas.
13.	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	1-13	Class attendance	Evidence list (handwritten signature of the student)	5	10
Colloqium (midterm exams)	2	1-13	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	1-13	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	1-13	Solving numerical problems.	Checking and discussions on the following	5	10

				exercises or consultation.		
Final exam	3	1-13	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 1, Školska knjiga, Zagreb, 2005.
2. Cindro, N., Fizika 1, Školska knjiga, Zagreb, 1988.
3. Kulišić, P., Mehanika i toplina, Školska knjiga, Zagreb, 1990.
4. http://www.fizika.unios.hr/of1/

Recommended literature:

1. Paić, M., Gibanje, Sile, Valovi, Liber, Zagreb, 1997.
2. Kittel, C., Knight, W., Ruderman, M., Mehanika, Tehnička knjiga, Zagreb, 1986.
3. Young, H., Freedman, R., University Physics, Addison-Wesley Publ., New York, 1996.
4. Halliday, D., Resnick, R., Walker, J., Fundamentals of physics, John Wiley & Sons, Hoboken, 2003.
5. E. Babić, R. Krsnik i M. Očko, Zbirka riješenih zadataka iz fizike, Školska knjiga, Zagreb 2004.
6. P. Kulišić, L. Bistričić, D. Horvat, Z. Narančić, T. Petrović i D. Pevec, Riješeni zadaci iz mehanike i topline, Školska knjiga, Zagreb, 2002.