F001	Obligatory Semester 4	**Elementary Physics I**	L+P+S 2+2+0	ECTS 4

Course objectives. Understanding the fundamental concepts and laws of physics as a whole scientific opinion, which not only explains the vast majority of phenomena in nature, but also allows prediction of new laws.

Course prerequisites. First-year mathematics courses.

Syllabus.

1. Mathematical introduction. Vectors, the elements of calculus.
2. Mechanics. Introduction to physics. Units of physical quantities. Motion: velocity, acceleration, free fall, slope, vertical shot, projectile motion, circular motion. Dynamics: Newton's laws, conservation of momentum. Gravity. The laws of dynamics for the two systems in relative motion, Galilean transformations, circular motion, Coriolis force. Elastic force. The force of friction. Work. Energy. Conservation of mechanical energy.
3. Statics. Center of gravity, leverage, rotation of the body about a fixed axis, parallel axis theorem, conservation of angular momentum, rigid body rotating around a free axis.
4. Oscillations. Mathematical pendulum, Lissajous figures, damped, forced harmonic oscillator, the physical pendulum.
5. Fluids. Fluid statics; equilibrium for more fluids in the field of gravity, hydraulic pressure, buoyancy, air pressure, surface tension, capillarity. Fluid dynamics: continuity equation, Bernoulli's equation, viscosity, flow of real fluids through a tube, the motion of bodies in a fluid, viscosity measurement and measurement error.
6. Heat. Thermodynamic laws. Thermal properties of matter. Cyclic processes. The kinetic theory of gases.

Expected learning outcomes:

After completing the course, students are expected to:

- interpret and distinguish the ways of body motion correctly;
- define the basic physical concepts in mechanics;
- interpret the concept of gravity, weight, force friction and elastic force correctly;
- describe and interpret oscillations in the case of the harmonic oscillator and mathematical pendulum;
- describe the basic principles of statics and dynamics of fluids;
- describe physical states and interpret changes of the physical state;
- interpret the changes of gas;
- explain the kinetic-molecular theory of gases;
- apply the acquired knowledge to solve problem tasks.

Teaching methods and student assessment: Lectures and exercises are obligatory. The final examination consisting of a written and an oral part takes place upon completion of lectures and exercises. During the semester, knowledge of students is assessed by mid-term exams, which, if done successfully, can replace the written part of the final examination.

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. B. Vuković, Reviewed teaching materials available at: http://www.fizika.unios.hr/~branko/feedback.htm

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. E. Babić, R. Krsnik, M. Očko. Zbirka riješenih zadataka iz fizike, Školska knjiga, Zagreb, 2004.
5. P. Kulišić, L.Bistričić, D. Horvat, Z. Narančić, T. Petrović, D. Pevec. Riješeni zadaci iz mehanike i topline, Školska knjiga, Zagreb, 2002.