Univerza v Novi Gorici
Fakulteta za naravoslovje

University of Nova Gorica
School of Science

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet	Fizika II
Course name	Physics II

Študijski program in stopnja **Study program and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Fizika in Astrofizika I. stopnja	/	1	2
Physics and Astrophysics I. level	/	1	2

Vrsta predmeta / Course type	obvezni / mandatory
Univerzitetna koda predmeta / University course code	1FAF06

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Lab. work**	**Teren. vaje** **Field work**	**Samost. delo** **Indiv. work**	**ECTS**
45	/	45	/	/	180	9

Nosilec predmeta / Lecturer	Doc. dr. Jonathan Paul Lundquist	
Jeziki / Languages	**Predavanja / Lectures**	Slovenščina / English
	Vaje / Tutorial	Slovenščina / English

Pogoji za opravljanje študijskih obveznosti	**Prerequisites**
Mehanika. Zakoni o ohranitvi energije. Funkcije več spremenljivk, odvodi.	Mechanics. Energy conservation laws. Multivariable functions, derivatives.

Vsebina	**Syllabus outline**
1. **Mehanika tekočin:** Tekočine, gostota in tlak Hidrostatika Hidrodinamika 2. **Termodinamika, temperatura, toplota** 0. zakon termodinamike; Merjenje temperature; Termično raztezanje trdnih snovi in tekočin; Temperatura in toplota; Toplota in delo; Prvi zakon termodinamike, notranja energija sistema; Prevajanje toplote po snovi; Prenos toplote s konvekcijo; Prenos toplote s sevanjem; Termodinamski potenciali: Entalpija, Entropija,	1. **Fluids** Fluids, gases, density, pressure Hydrostatics Hydrodynamics 2. **Thermodynamics, temperature, heat** 0th Law of Thermodynamics; Measurement of temperature; Thermal expansion of solids and fluids; Temperature and heat; Heat and work; 1st Law of Thermodynamics, Internal Energy of system; Conduction of heat; Transfer of heat with convection; Transfer of heat with radiation; Thermodynamic potentials: Enthalpy, Entropy,

Prosta energija, Prosta entalpija. Maxwellove relacije 3. **Kinetična teorija plinov:** Avogadrovo število, idealni plin, plinska enačba; Delo in sprememba notranje energije pri termodinamskih spremembah idealnega plina; Tlak, temperatura in lastnosti molekul plina; Adiabatna in prosta ekspanzija idealnega plina. 4. **Entropija in 2. zakon termodinamike:** Reverzibilne in ireverzibilne spremembe; Entropija, sprememba entropije, entropija kot funkcija stanja; Drugi zakon termodinamike; Toplotni stroji, koncept delovanja; Hladilniki, koncept delovanja; Statistični pogled na entropijo. 5. **Električni naboj in električna sila** Zakon o ohranitvi naboja, Coulombov zakon, električna sila posameznega naboja in dipola, Električno polje 6. **Električni tok in magnetna sila** Magnetna sila gibajočega se naboja. Magnetna sila okoli ravnega vodnika. Magnetna sila v osi okrogle zanke. Tuljava. Magnetno polje. Indukcija (Lenzovo pravilo). 7. **Električni upor, kapaciteta in induktivnost** Električni krog, Kirchhoffovi zakoni, Ohmov zakon, prevodnost polprevodnikov, superprevodnik. RLC circuits.	Free Energy, Free Enthalpy. Maxwell's relations. 3. **Kinetic theory of gases:** Avogadro number, ideal gas, gas equation; Work and change in internal energy during thermodynamic changes of ideal gas; Pressure, temperature and properties of ideal gas; Adiabatic and free expansion of ideal gas. 4. **Entropy and 2nd Law of Thermodynamics:** Reversible and irreversible changes; Entropy, changes of entropy, entropy as function of state; 2nd Law of Thermodynamics; Heat engines, concept of operation; Refrigerators, concept of operation; Statistical interpretation of entropy. 5. **Electric charge and electric force** Charge conservation law, Coulombs law, Electric force of single charge and dipole, Electric field. 6. **Electric current and magnetic force** Magnetic force of moving charge. Magnetic force of a straight conductor. Magnetic force in the axis of a round loop. Coil. Magnetic field. Induction (Lenz's law) 7. **Electric resistance, capacitance and inductance** Electric circuits, Kirchhoff's laws. Ohm's law, conductivity of semiconductors, superconductor. RLC circuits.

Temeljni literatura in viri / Basic readings
D. Halliday, R. Resnick, J. Walker, *Fundamentals of Physics*. J. Wiley & Sons (2005). I. Arčon, *Vprašanja in naloge za preverjanje znanja iz fizike*, UNG (2004). R. Kladnik, H. Šolinc: Zbirka fizikalnih problemov z rešitvami, DZS, Ljubljana (1991). M. Gros, M. Hribar, A. Kodre, J. Stmad, *Naloge iz fizike,* DMFA, Ljubljana (1993).

Cilji in kompetence	**Objectives and competences**
Študenti pri tem predmetu obravnavajo osnovne pojme iz klasične fizike iz področja mehanike tekočin, termodinamike in elektromagnetizma. Pri vajah študentje osvojijo osnovne računske tehnike za samostojno kvantitativno obravnavo	In this course the students learn basic principles of classical physics with an emphasis on fluid mechanics, thermodynamics and electromagnetism. In numerical exercises the students will learn the techniques for

elementarnih fizikalnih pojavov.	independent problem solving and quantitative description of physics laws.

Predvideni študijski rezultati	**Intended learning outcomes**
Do konca tega predmeta bo študent sposoben: - razumevanja osnovnih pojavov hidrostatike in hidrodinamike; - ločiti med koncepti temperature, toplote, dela in entropije; - uporabiti primerne termodinamske potenciale za opis termodinamskih sprememb - miselnih eksperimentov znotraj mikroskopske slike, ki jo nudi kinetična teorija plinov. - razumevanje osnovnih pojavov elektromagnetizma in električnih tokokrogov.	At the end of the course the student is expected to master: - understanding of basic phenomena of hydrostatics and hydrodynamics; - distinguish between the concepts of temperature, heat, work, and entropy; - select appropriate thermodynamic potential to describe thermodynamic processes - thought experiments within the microscopic interpretation of kinetic theory of gases. - understanding of basic phenomena of electromagnetism and electronic circuits.

Metode poučevanja in učenja	**Learning and teaching methods**
- predavanja - računske vaje	- lectures - tutorial

Načini ocenjevanja	**Utež / Weight (%)**	**Assessment**
- kolokviji, pisni izpit - ustni izpit	50 50	- written tests, writen exam - oral exam

Reference nosilca / references of the course principal
Dr. Jonathan Paul Lundquist je docent za področje fizike na Univerzi v Novi Gorici. Jonathan Paul Lundquist is an associate professor of physics at the University of Nova Gorica.