UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	FIZIKA
Course Title:	PHYSICS

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
VSŠP Kemijska tehnologija, 1. stopnja	**/**	**1.**	**1.**
PSP Chemical Technology, 1st Cycle	**/**	**1st**	**1st**

Vrsta predmeta / Course Type:	obvezni / Mandatory
Univerzitetna koda predmeta / University Course Code:	KT102

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
60	**/**	**15 SV**	**/**	**/**	**75**	**5**

Nosilec predmeta / Lecturer:	doc. dr. Aleš Mohorič / Dr. Aleš Mohorič, Assistant Professor

Jeziki / Languages:	**Predavanja / Lectures:**	**slovenski / Slovenian**
	Vaje / Tutorial:	**slovenski / Slovenian**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	The course has to be assigned to the student.

Vsebina:	**Content (Syllabus outline):**
Kinematika: Premo in krivo gibanje. Kroženje in nihanje. Dinamika delca: Newtonovi zakoni. Zakona o ohranitvi gibalne in vrtilne količine. Gravitacijski zakon. Merjenje sil. Delo in moč. Energija, izrek o ohranitvi energije. Potencialna energija. Togo telo in sistem teles: Težišče. Vrtenje, navor in vztrajnostni moment. Rotacijska energija. Ravnotežje sil in navorov. Elastomehanika: Hookov zakon, elastične konstante. Mehanika tekočin in plinov: Tlak, stisljivost, vzgon, površinska napetost, viskoznost, Bernoullijeva enačba. Sila upora, Reynoldsovo število. Valovanje: Hitrost potovanja motnje, zapis valovanja. Interferenca, odboj, lom in uklon	Kinematics: linear and general motion. Circular motion, oscillation. Dynamics: Newton's laws. Linear and angular momentum. Gravitational law. Force. Work, power. Energy, conservation of energy. Gravitational potential energy. Rigid body, system of bodies: center of gravity. Rotation, torque, moment of inertia. Rotational kinetic energy. Static: force and torque balance. Elastomechanics: Hook's law, moduli. Fluid dynamics: pressure, compressibility, buoyancy, surface tension, viscosity, Bernoulli equation. Resistance, the Reynolds number. Waves: speed, mathematical expression. Interference, reflection, refraction, diffraction. Heat:

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valovanja.

Toplota:
Energijski zakon: Kelvinova temperaturna skala. Temperaturno raztezanje. Toplota kot energija. Specifična in latentne toplote, entalpija. Kalorimetrija. Izotermne, izobarne, izohorne in adiabatne spremembe idealnega plina. Toplotni stroji. Entropija. Prevajanje toplote.

Elektrika in magnetizem:
Coulombov zakon: Sile med električnimi naboji. Električno polje. Gaussov zakon. Električno delo in električna apetost. Kondenzator, kapaciteta, energija električnega polja. Snov v električnem polju, dielektričnost.

Kirchoffovi zakoni. Električni tok in upor. Ohmov zakon.
Merjenje toka, napetosti in upora. Viri električne napetosti. Istosmerni in izmenični tok.

Magnetno polje: Magnetna sila in navor, magnetni moment.

Indukcija: Indukcijski zakon (samo) induktivnost. Energija magnetnega polja. Snov v magnetnem polju: Dia-, para- in feromagnetizem. Elektromotor in generator. Transformator. Histerezna zanka. Elektromagnetna nihanja in valovanja: Nihajni krog. Elektromagnetno valovanje. Spekter elektromagnetnega valovanja. Svetloba.

Geometrijska in valovna optika: Odbojni in lomni zakon. Optični instrumenti. Interferenca in uklon. Optična mreža. Polarizacija.

First law of thermodynamics. Absolute temperature. Thermal expansion. Heat as energy. Specific and latent heat, enthalpy. Calorimetry. Isothermal, iosobaric, izohoric and adiabatic changes of ideal gas. Heat engines. Entropy. Heat conduction.

Electricity and magnetism:
Coulomb's law, electrostatic forces. Electric field. Gauss' law. Electric work and voltage. Capacitor, capacity, electric field energy. Electric field in matter, dielectricity. Kirchhoff's laws. Electrical resistance and current. Ohm's law. Measuring current, voltage and resistivity. Electrical sources. AC, DC.

Magnetic field: magnetic force and torque, magnetic dipole moment.

Induction: induction law, inductance. Magnetic field energy. Magnetic field in matter, Dia, para and fero magnetism. Electric motor and generator. Transformer. Hysteresis. Electromagnetic oscillation and waves: electric oscillator circuit. EMW spectra. Light.

Geometric and wave optics: refraction and reflection laws. Optical instruments. Interference, diffraction. Diffraction grating. Polarization.

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Temeljna literatura in viri / Readings:

- J. Strnad, Fizika I in II, DMFA
- R. Kladnik, Visokošolska fizika, DZS
- I. Kuščer, A. Moljk,…, Fizika za srednje šole I, II in III, DZS
- A. Mohorič, V. Babič, Fizika 1, 2 in 3, MK

Cilji in kompetence:

Cilji: Nadgradnja srednješolskih osnov fizike, razumevanje osnovnih zakonov s področja mehanike, toplote, elektrike in magnetizma, optike

Objectives and Competences:

Objectives: Upgrade on the secondary school physics, comprehension of basic laws in mechanics, thermodynamics, electricity,

in atomike. Obvladovanje kvantitativnih povezav med fizikalnimi količinami v enostavnih primerih, na katere naleti diplomant pri poklicnem delu. **Kompetence**: Sposobnost poenostavitve nalog v obliko, kjer je mogoča enostavna računska obravnava. Sposobnost uporabe osnovnega matematičnega znanja pri reševanju zastavljenih nalog. Sposobnost iskanja dodatnih informacij po strokovni literaturi in na svetovnem spletu.	magnetism, optics and atomics. Understanding of quantitative links between physical quantities in simple cases encountered by the graduate in his/hers profession. **Competences**: The ability to simplify the tasks of design as possible to make calculus simpler. Ability to apply mathematical knowledge in solving the set tasks. Ability to search for additional information in the literature and on the internet.

Predvideni študijski rezultati:	**Intended Learning Outcomes:**
Znanje in razumevanje Poznavanje osnovnih pojmov in zakonov fizike. Neambiciozen študent, ki se je pripravljen zadovoljiti z nizko oceno, bo obvladal povezave med posameznimi fizikalnimi količinami z memoriranjem, bolj ambiciozen študent pa bo pridobil na osnovi izpeljav enačb iz osnovnih zakonov globlji vpogled v naravne zakone, kar mu bo omogočilo temeljito razumevanje snovi.	Knowledge and Comprehension Knowledge of basic concepts and laws of physics. Unambitious student who is willing to settle for the low rating, will handle the connection between physical quantities with memorizing, more ambitious student will gain through derivation of equations from basic laws deeper insight into the laws of nature, which will allow a thorough understanding of the syllabus.
Uporaba Uporaba že osvojenega teoretičnega znanja fizike v realnih, praktičnih situacijah.	Application Applying existing theoretical knowledge of physics to real, practical situations.
Refleksija Razumevanje tehnoloških rešitev in primerov iz vsakdanjega življenja v luči fizikalnih naravnih zakonov.	Analysis Understanding of technology solutions and examples from everyday life in the light of the physical laws of nature.
Prenosljive spretnosti Predmet Fizika je najprimernejše področje, kjer študent lahko preverja in utrjuje svoje matematično znanje.	Skill-transference Ability The subject of physics is the preferred subject where students can verify and consolidate their mathematical knowledge.

Metode poučevanja in učenja:	**Learning and Teaching Methods:**
Predavanja, vaje, domače naloge, konzultacije.	Lectures, exercises, homework, consultations.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
- Pisni izpit (nadomestita ga lahko dva pozitivno ocenjena kolokvija) - ustni izpit. ocene od 6-10 (pozitivno) oz. 1-5 (negativno).	**50%** **50%**	- Written examination (can be replaced by two positive tests) - oral examination. grades 6-10 (positive) and 1-5 (negative).

Reference nosilca / Lecturer's references:

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- STEPIŠNIK, Janez, LAHAJNAR, Gojmir, ZUPANČIČ, Ivan, **MOHORIČ, Aleš**. Study of translational dynamics in molten polymer by variation of gradient pulse-width of PGSE. Journal of magnetic resonance, ISSN 1090-7807, 2013, vol. 236, str. 41-46, doi: 10.1016/j.jmr.2013.08.003. [COBISS.SI-ID 27404327]
- STEPIŠNIK, Janez, FRITZINGER, Bernd, SCHELER, Ulrich, **MOHORIČ, Aleš**. Self-diffusion in nanopores studied by the NMR pulse gradient spin echo. Europhysics letters, ISSN 0295-5075, 2012, vol. 98, no. 5, str. 57009-p1-57009-p4. http://iopscience.iop.org/0295-5075/98/5/57009. [COBISS.SI-ID 2434404]
- STEPIŠNIK, Janez, **MOHORIČ, Aleš**, SERŠA, Igor, LAHAJNAR, Gojmir. Analysis of polymer dynamics by NMR modulated gradient spin echo. V: VOLOVŠEK, Vesna (ur.), BISTRIÈIAE, Lahorija (ur.). Polymer spectroscopy July 2011, (Macromolecular Symposia, ISSN 1022-1360, Special issue, Volume 305, Issue Basel [etc.]: Hüting & Wepf Verlag, 2011, vol. 305, str. 55-62, doi: 10.1002/masy.201000120. [COBISS.SI-ID 2362212]
- VAN DEN DOEL, L. R., **MOHORIČ, Aleš**, VERGELDT, Frank, VAN DUYNHOVEN, John, BLONK, Han, VAN DALEN, Gerard, VAN AS, Henk, VAN VLIET, Lucas J. Mathematical modeling of water uptake through diffusion in 3D inhomogeneous swelling substrate. AIChE journal, ISSN 0001-1541. [Print ed.], 2009, vol. 55, no. 7, str. 1834-1848, doi: 10.1002/aic.11930. [COBISS.SI-ID 2175844]
- **MOHORIČ, Aleš**, VERGELDT, Frank, GERKEMA, Edo, VAN DALEN, Gerard, VAN DEN DOEL, L. R., VAN VLIET, Lucas J, VAN AS, Henk, VAN DUYNHOVEN, John. The effect of rice kernel microstructure on cooking behaviour : a combined [mi]-CT and MRI study. Food chemistry, ISSN 0308-8146. [Print ed.], 2009, vol. 115, str. 1491-1499, doi: 10.1016/j.foodchem.2009.01.089. [COBISS.SI-ID 2157412]
- **MOHORIČ, Aleš**, STEPIŠNIK, Janez. NMR in the Earth's magnetic field. Progress in nuclear magnetic resonance spectroscopy, ISSN 0079-6565. [Print ed.], 2009, vol. 54, str. 166-182, doi: 10.1016/j.pnmrs.2008.07.002. [COBISS.SI-ID 2157156]
- STEPIŠNIK, Janez, LASIČ, Samo, **MOHORIČ, Aleš**, SERŠA, Igor, SEPE, Ana. Velocity autocorrelation spectra of fluid in porous media measured by the CPMG sequence and constant magnetic field gradient. V: Proceedings of the 8th International Bologne Conference on Magnetic Resonancein Porous Media, Bologna, 2006, (Magnetic resonance imaging, ISSN 0730-725X, vol. 25, no. 4). New York: Pergamon Press, 2007, vol. 25, no. 4, str. 517-520. [COBISS.SI-ID 1987428]

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