

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	MEHANIKA LETA
Course title:	MECHANICS OF FLIGHT

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Strojništvo, tretja stopnja, doktorski	Konstruktivno mehanske inženirske znanosti (smer)		Celoletni

Univerzitetna koda predmeta/University course code:

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
90					160	10

Nosilec predmeta/Lecturer:

Izvajalci predavanj:	<input type="text" value="Tadej Kosel"/>
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:

Jeziki/Languages:	Predavanja/Lectures:	Slovenščina, Angleščina
	Vaje/Tutorial:	Slovenščina, Angleščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Veljajo splošni pogoji za doktorski študij.	General prerequisites for the third level studies.

Vsebina:	Content (Syllabus outline):
<ul style="list-style-type: none"> • Aerodinamika zrakoplovov • Propelerji in rotorji • Sposobnosti zrakoplovov • Dinamika leta • Stabilnost zrakoplovov (vzdolžna, prečna, smerna); statična in dinamična stabilnost • Stabilnostni koeficienti • Krmarljivost zrakoplovov • Omejitve • Vplivi pogona, prožnosti strukture, spremembe mase in hitrosti leta • Aeroelastični pojavi (statični in dinamični) • Pasivne in aktivne metode preprečevanje in dušenja aeroelastičnih pojavov • Predpisi in zahteve za pridobitev plovnosti zrakoplova • Statični in dinamični preiskusi nosilnosti elementov in strukture zrakoplovov 	<ul style="list-style-type: none"> • Aircraft aerodynamics • Propellers and rotors • Aircraft performance • Dynamics of flight • Aircraft stability (longitudinal, lateral, directional), static and dynamic stability • Stability coefficients • Aircraft control • Restrictions and limitations • Influence of the powerplant, structure elasticity, mass distribution and speed of flight • Aeroelasticity, static and dynamic • Active and passive methods of reducing aeroelastic phenomena • Regulations for airworthiness • Static and dynamic tests of structure elements and airframe • Aircraft tests on ground and in the air

<ul style="list-style-type: none"> • Postopki preiskovanja zrakoplovov na zemlji in v zraku • Aerodinamični preizkusi sklopov in celotne strukture zrakoplovov v zraku 	<ul style="list-style-type: none"> • Aerodynamic tests of structure elements and airframe during flight
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Temeljna literatura in viri/Readings:

<p>[1] Barnard R. H. and Philpott D. R.: Aircraft Flight, Longman 1989</p> <p>[2] Coyle S.: The Arte and Science of Flying Helicopters, Iowa State University Press, 1997</p> <p>[3] Etkin B.: Dynamics of Flight, stability and Control, John Wiley & Sons, inc. 1996</p> <p>[4] Kermode A.C.: Mechanics of Flight, Longman 1996</p> <p>[5] Khoury G.A., Gillett J.D.: Airship Technology, Cambridge University Press 1999</p> <p>[6] Leishman J.G.: Principles of Helicopter Aerodynamics, Cambridge University Press 2000</p> <p>[7] Nelson C.R.: Flight Stability and Automatic Control, Longman 1989</p> <p>[8] Padfield G.D.: Helicopter Flight Dynamics, Blackweel Science 1996</p> <p>[9] Pallett E.H.J., Coyle S.: Automatic Flight Control, Blackwell Science 1995</p> <p>[10] Russell, J.B.: Performance and Stability of Aircraft, Arnold 1996</p> <p>[11] Roskam, J.: Airplane design. Part VII, Determination of stability, control and performance characteristics, 1991</p> <p>[12] Kimberlin R.D.: Flight Testing of Fixed Wing Aircraft, AIAA 2003</p> <p>[13] Ward D.T.: Introduction to flight test engineering, Elsevier 1993</p>
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Cilji in kompetence:

<p>Cilji: Študentu prikazati vlogo in pomen mehanike leta pri majhnih in velikih hitrostih v procesu snovanja zrakoplovov. Poudarek je na statični in dinamični stabilnosti in krmljivosti ter vplivi vseh posameznih delov zrakoplova (propeler, trup, podvozje, idr.) na stabilnost in krmljivost ter povezavi z ostalimi lastnostmi zrakoplova. Na koncu se študent seznani s postopki in načini testiranja novega zrakoplova.</p> <p>Kompetence: Študent osvoji vsa potrebna znanja za preračun lastnosti, stabilnosti ter krmljivosti zrakoplovov, tako na zemlji kot v zraku.</p>	<p>Objectives and competences:</p> <p>Goals: The principal goal is to show the importance of mechanics of flight at high and low speeds in the process of aircraft design. The emphasis is on the aircraft static and dynamic stability and control and influence of aircraft parts as propeller, fuselage, undercarage etc. on aircraft stability and control. Student is also introduced in aircraft testing principles.</p> <p>Competences: The student acquires knowledge for calculating aircraft performance, aircraft stability and control and testing on the ground and in the air.</p>
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Predvideni študijski rezultati:

Študent osvoji vsa potrebna znanja za preračun lastnosti, stabilnosti ter krmljivosti zrakoplovov, tako na zemlji kot v zraku.	Intended learning outcomes: The student acquires knowledge for calculating aircraft performance, aircraft stability and control and testing on the ground and in the air.
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Metode poučevanja in učenja:

Predavanja, laboratorijske vaje, seminarsko delo, e-izobraževanje, konzultacije. Seminarsko delo v čim večji meri navezuje se na področje doktorskega raziskovanja. Študij z uporabo priporočene literature.	Learning and teaching methods: Lectures, laboratory practice & seminar work, e-education, consulting. The seminar work is related, as much as possible, to the student's doctoral research field. Study on a recommended literature basis.
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Načini ocenjevanja:

Način (seminar, naloge, ustni izpit) • Seminar (40%) • Naloge (30%) • Ustni izpit (30%)	Delež/Weight	Assessment: Method (seminar, assignments, oral examination) • seminar (40%) • assignments (30%) • oral examination (30%)
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Reference nosilca/Lecturer's references:

<p>izr.prof.dr. Tadej KOSEL</p> <p>KOSEL, Franc, VIDENIČ, Tomaž, KOSEL, Tadej, BROJAN, Miha. Elasto-plastic springback of beams subjected to repeated</p>

bending/unbending histories. *Journal of materials engineering and performance*, ISSN 1059-9495, Aug. 2011, vol. 20, no. 6, str. 846-854, doi: 10.1007/s11665-010-9706-1.

VIŠNJIĆ, Goran, NOŽAK, Dejan, KOSEL, Franc, KOSEL, Tadej. Shear-lag influence on maximum specific bending stiffness and strength of composite I-beam wing spar. *Proceedings of the Institution of Mechanical Engineers. Part G, Journal of aerospace engineering*, ISSN 0954-4100, 2011, vol. 225, no. 5, str. 501-511, doi: 10.1177/09544100JAERO866.

JAKOMIN, Marko, KOSEL, Franc, KOSEL, Tadej. Thin double curved shallow bimetallic shell of translation in a homogenous temperature field by non-linear theory. *Thin-walled structures*, ISSN 0263-8231. [Print ed.], 2010, vol. 48, no. 3, str. 243-259. <http://authors.elsevier.com/offprints/TWST3440/90f66335ccc8d7cef2de9bb9fdad3e39>