UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)			
Predmet:	Liejeve grupe		
Course title:	Lie groups		
Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Magistrski študijski program Matematika	ni smeri	1 ali 2	prvi ali drugi
Master's study programme Mathematics	none	1 or 2	first or second

Vrsta predmeta / Course type	izbirni / elective
Univerzitetna koda predmeta / University course code:	M2313

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike** **študija**	**Samost. delo** **Individ. work**		**ECTS**
45		**30**			**105**		**6**

Nosilec predmeta / Lecturer:	prof. dr. Franc Forstnerič, prof. dr. Janez Mrčun, prof. dr. Pavle Saksida

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene, angleški / English
	Vaje / Tutorial:	slovenski / Slovene, angleški / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v letnik študija.	Enrolment in the programme.
Vsebina:	**Content (Syllabus outline):**

Liejeva grupa in njena Liejeva algebra. Eksponentna preslikava. Adjungirano delovanje. Liejeva teorija. Homogeni prostori. Izrek o rezini. Kompaktne Liejeve grupe. Haarova mera. Maksimalni torusi. Možne dodatne vsebine: Weylova grupa. Korenski prostori. Upodobitve kompaktnih Liejevih grup. Rešljive, nilpotentne in polenostavne Liejeve grupe in Liejeve algebre. Harmonična analiza na Liejevi grupi.	Lie group and the associated Lie algebra. Exponential map. Adjoint action. Lie theory. Homogeneous spaces. Slice theorem. Compact Lie groups. Haar measure. Maximal tori. Other possible topics:: Weyl group. Root spaces. Representations of compact Lie groups. Solvable, nilpotent and semisimple Lie groups and Lie algebras. Harmonic analysis on a Lie group.

Temeljni literatura in viri / Readings:

J. F. Adams: Lectures on Lie Groups, W. A. Benjamin, New York-Amsterdam, 1969.

F. W. Warner: Foundations of Differentiable Manifolds and Lie Groups, Springer, New York-Berlin, 1983.

J. P. Serre: Lie Algebras and Lie Groups, 2nd edition, Springer, Berlin, 2006.

T. Bröcker, T. T. Dieck: Representations of Compact Lie Groups, Springer, New York, 2003.

•J. J. Duistermaat, J. A. C. Kolk: Lie Groups, Springer, Berlin, 2000.

Cilji in kompetence:	**Objectives and competences:**
Študent se spozna s pojmom Liejeve grupe in njene Liejeve algebre, ter z Liejevo teorijo. Posebej se seznani s teorijo upodobitev kompaktnih Liejevih grup in homogenih prostorov. Liejeve grupe so centralni pojem diferencialne geometrije, njihova uporaba pa sega v številna področja matematike in matematične fizike.	Student gets familiar with the basic concepts of Lie group with the associated Lie algebra, and with Lie theory. In particular, the student learns the basic theory of representations of compact Lie groups and homogeneous spaces. Lie groups are a central concept of differential geometry and are applied in many areas of mathematics and mathematical physics.

Predvideni študijski rezultati:	**Intended learning outcomes:**

Znanje in razumevanje: Poznavanje in razumevanje osnovnih pojmov in definicij iz teorije Liejevih grup. Uporaba: Uporaba teorije pri reševanju problemov. Refleksija: Razumevanje teorije na podlagi uporabe. Prenosljive spretnosti – niso vezane le na en predmet: Spretnosti uporabe domače in tuje literature in drugih virov, identifikacija in reševanje problemov, kritična analiza.	Knowledge and understanding: Knowledge and understanding of basic concepts and definitions of the theory of Lie groups. Application: Solving problems using the theory. Reflection: Understanding of the theory from the applications. Transferable skills: Skills in using the literature and other sources, the ability to identify and solve the problem, critical analysis.

Metode poučevanja in učenja:	**Learning and teaching methods:**
predavanja, vaje, domače naloge, konzultacije	lectures, exercises, homeworks, consultations

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): 2 kolokvija namesto pisnega izpita, pisni izpit ali domače naloge ustni izpit Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)	 50% 50%	Type (examination, oral, coursework, project): 2 midterm exams instead of written exam, written exam or homework oral exam Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

Franc Forstnerič:

FORSTNERIČ, Franc, ROSAY, Jean-Pierre. Approximation of biholomorphic mappings by automorphisms of C [sup] n. Inventiones Mathematicae, ISSN 0020-9910, 1993, let. 112, št. 2, str. 323-349. [COBISS.SI-ID 9452121]

FORSTNERIČ, Franc. Runge approximation on convex sets implies the Oka property. Annals of mathematics, ISSN 0003-486X, 2006, vol. 163, no. 2, str. 689-707. [COBISS.SI-ID 13908825]

FORSTNERIČ, Franc. Actions of (R,+) and (C,+) on complex manifolds. Mathematische Zeitschrift, ISSN 0025-5874, 1996, let. 223, št. 1, str. 123-153. [COBISS.SI-ID 6928729]

Janez Mrčun:

MRČUN, Janez. On isomorphisms of algebras of smooth functions. Proceedings of the American Mathematical Society, ISSN 0002-9939, 2005, vol. 133, no. 10, str. 3109-3113. [COBISS.SI-ID 13782361]

MOERDIJK, Ieke, MRČUN, Janez. Introduction to foliations and Lie groupoids, (Cambridge studies in advanced mathematics, 91). Cambridge, UK: Cambridge University Press, 2003. IX, 173 str., ilustr. ISBN 0-521-83197-0. [COBISS.SI-ID 12683097]

MOERDIJK, Ieke, MRČUN, Janez. On the integrability of Lie subalgebroids. Advances in mathematics, ISSN 0001-8708, 2006, vol. 204, iss. 1, str.101-115. [COBISS.SI-ID 14074201]

Pavle Saksida:

SAKSIDA, Pavle. Maxwell-Bloch equations, C Neumann system and Kaluza-Klein theory. Journal of physics. A, Mathematical and general, ISSN 0305-4470, 2005, vol. 38, no. 48, str. 10321-10344. [COBISS.SI-ID 13802073]

SAKSIDA, Pavle. Neumann system, spherical pendulum and magnetic fields. Journal of physics. A, Mathematical and general, ISSN 0305-4470, 2002, vol. 35, no. 25, str. 5237-5253. [COBISS.SI-ID 11920217]

SAKSIDA, Pavle. Lattices of Neumann oscillators and Maxwell-Bloch equations. Nonlinearity, ISSN 0951-7715, 2006, vol. 19, no. 3, str. 747-768. [COBISS.SI-ID 13932377]