

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)						
Predmet:		Izbrana poglavja iz didaktike matematike				
Course title:		Topics in didactics of mathematics				
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year	Semester Semester	
Doktorski študijski program Matematika in fizika		Matematika		1 ali 2	prvi ali drugi	
Doctoral study programme Mathematics and Physics		Mathematics		1 or 2	first or second	
Vrsta predmeta / Course type				izbirni / elective		
Univerzitetna koda predmeta / University course code:				M3137		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30					150	6
Nosilec predmeta / Lecturer:		doc. dr. Andreja Drobnič-Vidic, doc. dr. Damjan Kobal, prof. dr. Sašo Strle, prof. dr. Peter Šemrl				
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):		

<p>V odvisnosti od interesov in usmerjenosti študentov bo izvajalec izbral in kombiniral med temami:</p> <p>Teorije učenja: Behavioristične, kognitivne, konstruktivistične, interakcijske teorije učenja, Koncept matematičnega znanja, cilji poučevanja matematike, učenje matematike in procesiranje informacij, brunerjeva teorija reprezentacij, klasične in sodobne teorije reševanja matematičnih problemov, šolska praksa.</p> <p>Motivacija v razredu: Zanimivi naslovi popularizacije matematike, matematika v računalništvu, matematika v tehnologiji, matematika v avtomobilizmu, matematika moderne digitalne zvočne tehnike, matematika v biologiji, matematika v medicini ...</p> <p>Izobraževalna orodja s področja IKT: Računalnik pri pouku matematike, prosojnice, latex, risanje v latexu, splet, interaktivna spletna orodja, orodja za simbolno računanje, orodja za dinamično geometrijo, interaktivna tabla.</p> <p>Matematične vsebine z IKT: Primeri obdelave poglavji klasične geometrije s programi za dinamično geometrijo: geometrija kroga in trikotnika, klasični izreki: Simson, Feuerbach, Cantor, Morley, Napoleon, Apolonij, inverzija, Möbiusove preslikave.</p> <p>Druge primerne vsebine.</p>	<p>Depending on the focus and interest of students the course will follow the following chapters:</p> <p>Theories of Learning: Behavioristic, cognitive, constructivistic, interactivistic theories of learning. The concept of mathematical knowledge. The goals of mathematics teaching. Learning of mathematics and informations management. Bruner's theory of representations. Classical and modern theories of solving of mathematical problems. Classroom practice.</p> <p>Classroom motivation: Interesting titles in the popularization of mathematics, Mathematics and Computer Sciences, Mathematics and Technology, Mathematics in Automotive Technology, Mathematics and Digital Sound Technology, Mathematics in Biology, Mathematics in Medicine, ...</p> <p>Learning Technologies: The use of Computer in Mathematics Classroom, Slides, Latex, Drawing in Latex, Internet, Interactive Web Tools, Tools for Symbolic Calculations, Dynamic Geometry Programs, Interactive Board.</p> <p>Mathematical content with a computer: Chapters in Classical Geometry with Dynamic Geometry Programs. The Geometry of Circle and Triangle. Classical Theorems: Simson, Feuerbach, Cantor, Morley, Napoleon, Apollonius, Inversion, Möbius transformations.</p> <p>Other relevant contents.</p>
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Temeljni literatura in viri / Readings:

- S. G. Krantz, How to Teach Mathematics, American Mathematical Society, 1951.
- H. Freudenthal, Mathematics as an Educational Task, Dordrecht-Holland, 1973.
- J. Mason, Learning and Doing Mathematics, Macmillan, 1988.
- H. W. Heymann, Why Teach Mathematics, Kluwer, 2003.
- Orton, Learning Mathematics: Issues, Theory and Classroom Practice, London, 1992.
- Orton, G. Wain, Issues in Learning Mathematics, London 1994.
- M. P. Driscoll, Psychology of Learning for Instruction, Boston, 1993.
- L. Burton, Learning Mathematics: From Hierarchies to Networks, Kluwer 1999.
- J. Mason, Fundamental Constructs in Mathematics Education, New York, 2004.
- Bezen: Osnove didaktike, 1993.
- Burton, Mason, Stacey: Thinking Mathematically, 1985.
- Cooney, Davis, Henderson: Dynamics of Teaching Secondary School Mathematics, 1975.
- Costello: Teaching and Learning Mathematics, 1991.
- Gavosto, Krantz, McCallum: Contemporary Issues in Mathematics Education, 1999.
- J. Hadamard: The Mathematician's Mind, 1996.
- Lang: The Beauty of Doing Mathematics, 1985.
- Polya: Mathematics and plausible reasoning, 1990.
- Skovsmose: Towards a Philosophy of Critical Mathematics Education, 1994.
- Cipra & All, What's Happening in the Mathematical Sciences, 1994-2006.
- J. Tanton, Solve this – Math activities for students and clubs, MAA, 2001.
- A. Fusaro, P. C. Kenshaft, Environmental Mathematics in the Classroom, MAA, 2003.
- P. Straffin, Applications of Calculus, MAA 1999.
- L. Hahn, Complex numbers & Geometry, MAA 1994.
- M. Hohenwarter, Geogebra, <http://www.geogebra.org/cms/>.

Cilji in kompetence:

Namen predmeta je seznaniti študente s teoretičnimi in praktičnimi vidiki teorij učenja matematike. Predmet je usmerjen v spoznavanje temeljnih izobraževalnih teorij s posebno referenco na poučevanje matematike in praktičnim prikazom tako metod, sodobnih pripomočkov pri poučevanju kot tudi raznolikih matematičnih idej.

Objectives and competences:

The main purpose of the subject is to provide students with the theoretical and practical background of the modern theories of learning and trends in mathematics teaching. The emphasis is given to practical mathematics teaching issues which relate to new methods, to new learning technologies and to diverse ideas of relevant mathematical contents.

Predvideni študijski rezultati:

Znanje in razumevanje predstavljenih konceptov. Sposobnost uporabe pridobljenega znanja in spretnosti.

Intended learning outcomes:

Knowledge and comprehension of presented concepts. Ability to use acquired knowledge and skills.

Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja, konzultacije, reševanje problemov	Lectures, consultations, problem sessions
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Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Pisni izpit (domače naloge), ustni izpit		Written exam (homeworks), oral exam
	100 %	

Reference nosilca / Lecturer's references:

Andreja Drobnič Vidic:
DROBNIČ VIDIC, Andreja. First-year students' beliefs about context problems in mathematics in university science programmes. International journal of science and mathematical education, ISSN 1571-0068, str. 1-27. [COBISS.SI-ID 1709359]
DROBNIČ VIDIC, Andreja. Using a problem-based learning approach to incorporate safety engineering into fundamental subjects. Journal of professional issues in engineering education and practice, ISSN 1052-3928, 2016, vol. 142, iss. 2, art. 04015013 (9 str.). [COBISS.SI-ID 17557081]
DROBNIČ VIDIC, Andreja. Impact of problem-based statistics course in engineering on students' problem solving skills. International journal of engineering education, ISSN 0949-149X, 2011, vol. 27, no. 4, str. 885-896. [COBISS.SI-ID 35450885]

Damjan Kobal:
KOBAL, Damjan. The Power of Geometry in the Concept of Proof, Workshop, 13th International Congress on Mathematical Education, ICME-13, Hamburg, July 24-31, 2016.
KOBAL, Damjan. Technology and Simple Math Ideas Inspire Teaching, Workshop at 12th International Congress on Mathematics Education, Seoul, Koreja, 2012
KOBAL, Damjan, et al.. Integrating Algebra and Geometry with Complex Numbers, International Seminar in Mathematics Education, Park City Math Institute ~ Institute for Advanced Study, Park City, ZDA, 2011.

Peter Šemrl:
ŠEMRL, Peter, Seminar "Moderni izzivi poučevanja matematike", Fakulteta za matematiko in fiziko, Ljubljana, 20.-21. januar 2014. Baze vektorskih prostorov. Ljubljana, 21. 1. 2014. [COBISS.SI-ID 17226073]
ŠEMRL, Peter. The optimal version of Hua's fundamental theorem of geometry of rectangular matrices. Memoirs of the American Mathematical Society, ISSN 0065-9266, 2014, vol. 232, no. 1089, str. 1-74. [COBISS.SI-ID 16947545]
GEHÉR, György Pál, ŠEMRL, Peter. Isometries of Grassmann spaces. Journal of functional analysis, ISSN 0022-1236, 2016, vol. 270, iss. 4, str. 1585-1601. [COBISS.SI-ID 17641561]

Sašo Strle

LEVINE, Adam Simon, RUBERMAN, Daniel, STRLE, Sašo, GESSEL, Ira M. Nonorientable surfaces in homology cobordisms. *Geometry & topology*, ISSN 1465-3060, 2015, vol. 19, no. 1, str. 439-494. [COBISS.SI-ID 17557337],

STRLE, Sašo, Seminar "Moderni izzivi poučevanja matematike", Fakulteta za matematiko in fiziko, Ljubljana, 20.-21. januar 2014. Verižni ulomki in funkcije. Ljubljana, 20. 1. 2014. [COBISS.SI-ID 17225561]

DRINOVEC-DRNOVŠEK, Barbara, STRLE, Sašo. Naloge iz analize 1 : z odgovori, nasveti in rešitvami, (Izbrana poglavja iz matematike in računalništva, 46). 2. izd. Ljubljana: DMFA - založništvo, 2012. 285 str., ilustr. ISBN 978-961-212-251-5. [COBISS.SI-ID 264047360]