UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)			
Predmet:	Teorija iger		
Course title:	Game theory		
Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Interdisciplinarni univerzitetni študijski program Računalništvo in matematika	ni smeri	3	prvi
Interdisciplinary first cycle academic study programme Computer Science and Mathematics	none	3	first

Vrsta predmeta / Course type	izbirni / elective
Univerzitetna koda predmeta / University course code:	27223

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike študija**	**Samost. delo** **Individ. work**	**ECTS**
45		**45**			**90**	**6**

Nosilec predmeta / Lecturer:	prof. dr. Sergio Cabello Justo, prof. dr. Matjaž Konvalinka

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

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

• Strateške igre z funkcijami preferenc za več igralcev. Nashevo ravnovesje. Najboljši odgovor. Dominiranost. Modeli duopola. • Strateške igre s funkcijami koristnosti za več igralcev. Mešane strategije in loterije. Mešano Nashevo ravnovesje. Princip indiferentnosti. Dominiranost. Obstoj mešanega Nashevega ravnovesja. • Bimatrične igre. Princip indiferentnosti. Iskanje Nashevega ravnovesja. Posebne bimatrične igre. Varnostni nivo. • Matrične igre. Izrek o minimaksu. Reševanje preko linearnega programiranja in dualnosti. Posebne matrične igre. • Bayesove igre. Bayes-Nashevo ravnovesje. • Ekstenzivne igre. Vgnezdeno popolno Nashevo ravnovesje. Stackelbergov model duopola. • Ekstenzivne igre z nepopolno informacijo. Strategije obnašanja. Kuhnov izrek. • Kooperativne igre. Nasheva sodniška procedura. Kooperativne igre v koalicijski obliki. Imputacije. Jedro. Shapleyjeve vrednosti. • Kombinatorne igre. Igra nim.	• Strategic games with preference functions for several players. Nash equilibrium. Best response. Domination. Models of duopoly. • Strategic games with utility functions for several players. Mixed strategies and lotteries. Mixed Nash equilibrium. Principle of indifference. Domination. Existence of mixed Nash equilibrium. • Bimatrix games. Principle of indifference. Search of Nash equilibrium. Special bimatrix games. Safety level. • Matrix games. Minimax Theorem. Solution through linear programming and duality. Special matrix games. • Bayesian games. Bayesian Nash equilibrium. • Extensive games. Subgame perfect Nash equilibrium. Stackelberg model of duopoly. • Extensive games with imperfect information. Behavioral strategy. Kuhn's theorem. • Cooperative games. Nash bargaining solution. Cooperative games in coalitional form. Imputations. Core. Shapley values • Combinatorial games. Nim.

Temeljni literatura in viri / Readings:

T.S. Ferguson: Game Theory. Elektronska knjiga dostopna na http://www.math.ucla.edu/~tom/Game_Theory/Contents.html

M. J. Osborne: An Introduction to Game Theory, Oxford University Press, 2003.

M. J. Osborne, A. Rubinstein: A Course in Game Theory, 10. natis, MIT Press, 2004.

B. von Stengel: Game Theory Basics. Lecture Notes, 2011.

Cilji in kompetence: **Objectives and competences:**

Študent spozna osnove teorije iger ter njeno uporabo pri modeliranju različnih situacij s poudarkom na primerih s področja ekonomije in financ. Teoretična razlaga je ilustrirana z mnogimi primeri.	The student gets acquainted with basic game theory and its use for modeling different situations, especially in the fields of economics and finance. The theoretic concepts are explained through several examples.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Slušatelj pozna osnovne probleme, s katerimi se ukvarja teorija iger, in razume pomen posameznih predpostavk pri posameznih vrstah iger. Uporaba: Modeliranje vsaj potencialno konfliktnih situacij, do katerih prihaja pri interakciji osebkov. Refleksija: Uporabe in pomanjkljivosti opisovanja in raziskovanja pojavov iz vsakdanjega življenja s pomočjo formalnih modelov. Prenosljive spretnosti – niso vezane le na en predmet: Sposobnost natančnega matematičnega opisa, zavedanje njegovih pomanjkljivosti.	Knowledge and understanding: The student knows basic problems in Game Theory and understands the meaning of the assumptions in each type of game. Application: Modeling of conflicting situations arising from the interaction of subjects. Reflection: Use and weaknesses of the description and exploration of phenomena in everyday life with the help of formal models. Transferable skills: Ability of precise mathematical description and awareness of its weaknesses.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje, domače naloge, konzultacije	Lectures, exercises, homework, consultations

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt): 2 kolokvija namesto izpita iz vaj, izpit iz vaj, izpit iz teorije 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 exam of theory grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

CABELLO, Sergio, DÍAZ-BÁÑEZ, José Miguel, LANGERMAN, Stefan, SEARA, Carlos, VENTURA, Inma. Facility location problems in the plane based on reverse nearest neighbor queries. European journal of operational research, ISSN 0377-2217. [Print ed.], 2010, vol. 202, iss. 1, str. 99-106. [COBISS.SI-ID 15160921]

CABELLO, Sergio, JAKOVAC, Marko. On the b-chromatic number of regular graphs. Discrete applied mathematics, ISSN 0166-218X. [Print ed.], 2011, vol. 159, iss. 13, str. 1303-1310. [COBISS.SI-ID 15914329]

CABELLO, Sergio, MOHAR, Bojan. Crossing and weighted crossing number of near-planar graphs. V: TOLLIS, Ioannis G. (ur.), PATRIGNANI, Maurizio (ur.). Graph drawing : 16th international symposium, GD 2008, Heraklion, Crete, Greece, September 21-24, 2008 : revised papers, (Lecture notes in computer science, ISSN 0302-9743, 5417). Berlin, Heidelberg: Springer, cop. 2009, str. 38-49. [COBISS.SI-ID 15099225]

KONVALINKA, Matjaž. Skew quantum Murnaghan-Nakayama rule. Journal of algebraic combinatorics, ISSN 0925-9899, 2012, vol. 35, no. 4, str. 519-545. [COBISS.SI-ID 16250713]

KONVALINKA, Matjaž, PAK, Igor. Geometry and complexity of O'Hara's algorithm. Advances in applied mathematics, ISSN 0196-8858, 2009, vol. 42, iss. 2, str. 157-175. [COBISS.SI-ID 15545945]

KONVALINKA, Matjaž. On quantum immanants and the cycle basis of the quantum permutation space. Annals of combinatorics, ISSN 0218-0006, 2012, vol. 16, no. 2, str. 289-304. [COBISS.SI-ID 16310873]