

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Modeliranje in simulacija diskretnih procesov
Course title:	Modeling and simulation of discrete processes

Študijski program <i>Study programme and level</i>	Študijska smer <i>Study field</i>	Letnik <i>Academic year</i>	Semester <i>Semester</i>
Inženiring in avtomobilska industrija Podiplomski (tretja)	Program nima smeri	prvi	drugi
Engineering and Automotive Industry Graduate – Master (third)	The program has no study fields	First	Second

Vrsta predmeta / Course type	izbirni	Optional
-------------------------------------	---------	----------

Univerzitetna koda predmeta / University course code:	31018
--	-------

Predavanja <i>Lectures</i>	Seminar <i>Seminar</i>	Sem. vaje <i>Tutorial</i>	Lab. vaje <i>Laboratory work</i>	Teren. vaje <i>Fieldwork</i>	Samost. delo <i>Individ. work</i>	ECTS
60	-	30	-	-	180	10

Nosilec predmeta / Lecturer:	izr. prof. dr. Blaž Rodič	assoc. prof. Blaž Rodič, PhD
-------------------------------------	---------------------------	------------------------------

Jeziki / Languages:	Predavanja / Lectures:	Vaje / Tutorial:
	angleški	English
	angleški	English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Znanje angleškega jezika.	Command of the English language
---------------------------	---------------------------------

Vsebina:

Content (Syllabusoutline):

<ul style="list-style-type: none"> - Uvod: Jeziki za modeliranje dinamičnih sistemov. Dinamika matematičnega modela. Semantični splet za modeliranje in simulacijo. Sistemski inženiring. Osnovni elementi matematičnega modeliranja. Modeliranje sistemov z diskretnimi dogodki. - Metodologije modeliranja: Modeliranje s pomočjo agentov. Distribuirani modeli. Izvajanje modela. Simulacija diskretnih dogodkov in zveznih sistemov. - Tipi modelov: Diferencialne enote kot diskretni dinamični sistemi. Algebra procesa. Logika v času. Modeliranje z diagrami z diskretnimi dogodki. Petri mreže za modelirane sisteme spodbujene z dinamičnimi dogodki. Modeli sistemov s čakalnimi vrstami. Modeliranje človeške interakcije v organizacijskih sistemih. Dinamični modeli v organizacijskih znanostih. Modeliranje in analiza proizvodnih sistemov. - Stohastični diskretni sistemi: Stohastični časovni avtomati. Simulacija sistemov. Optimizacija sistemov. Direktno upravljanje s pomočjo modelov. Optimizacija performans oskrbovalnih verig. Projektiranje in upravljanje proizvodnih celic s pomočjo modelov. 	<ul style="list-style-type: none"> - Introduction: Languages for dynamic systems modelling. Dynamics of mathematical models. Semantic Web for modelling and simulation. Systems engineering. The basic elements of mathematical modelling. Modelling of systems with discrete events. - Modelling methodologies: Agent based modelling. Distributed models. Model implementation. Discrete event simulation and continuous system simulation. - Model types: Differential units as discrete dynamical systems. Process algebra. Logic and time. Modelling diagrams for discrete event systems. Petri nets for modelling of systems driven by dynamic events. Models of queueing systems. Modelling of human interaction in organizational systems. Dynamic models in organizational sciences. Modelling and analysis of production systems. - Stochastic discrete systems: Stochastic timed automata. Simulation of systems. Optimization of systems. Direct process control through models. Optimisation of manufacturing systems. Design and performance evaluation of supply chains. Design and management of manufacturing cells with models.
---	---

Temeljni literatura in viri / Readings:

<ul style="list-style-type: none"> - Fishwick, P.A. (2007). <i>Handbook of Dynamic System Modeling</i>. (Cpaman & Hall/Crc Computer and Information Science). Chapman & Hall/CRC; 1 edition. ISBN-10: 1584885653 - Wainer, g.a. (2009). <i>Discrete-Event Modeling and Simulation: A Practitioner's Approach (Computational Analysis, Synthesis, and Design of Dynamic Models)</i>. CRC; 1 edition. ISBN-10: 1420053361 - Fishman, G.S. (2001). <i>Discrete-Event Simulation</i>. 1 edition. Springer. - Zimmermann, A. (2007). <i>Stochastic Discrete Event Systems: Modeling, Evaluation, Applications</i>. 1 edition. Springer.
--

Priporočljiva literatura / Recommended Textbooks

--

Cilji in kompetence:

Objectives and competences:

<p>Cilji</p> <ul style="list-style-type: none"> - Predmet zagotavlja znanja, ki omogočajo študentu, da na bazi postavljenega modela dinamičnega sistema predvidi njegovo obnašanje. <p>Kompetence</p> <ul style="list-style-type: none"> - Modeliranje dinamičnih sistemov - Simulacija dinamičnih sistemov pri diskretnem dogajanju. 	<p>Objectives</p> <ul style="list-style-type: none"> - The course provides knowledge that will enable the student to behaviour by using its model. <p>Competences</p> <ul style="list-style-type: none"> - Modelling of dynamic systems - Simulation of dynamic systems with discrete events - Modeling and analysis of manufacturing systems.
--	--

- Modeliranje in analiza proizvodnih sistemov	
---	--

Predvideni študijski rezultati:

Intended learning out comes:

<p>Znanje in razumevanje: Študent/študentka:</p> <ul style="list-style-type: none"> - Modeliranje in analiza dinamičnih sistemov - Simulacija dinamičnih sistemov 	<p>Knowledge and understanding: Student:</p> <ul style="list-style-type: none"> - Modelling and analysis of dynamic systems - Simulation of dynamic systems
---	---

Metode poučevanja in učenja:

Learning and teaching methods:

<ul style="list-style-type: none"> - Študent bo na predavanjih dobil tudi tekste z znanstvenih del z nalogo, da poda komentar na vsako tematsko celoto. - Študent mora izdelati projektno nalogo na dobljeno temo. 	<ul style="list-style-type: none"> - Students will receive scientific texts at lectures, and will be required to deliver a commentary on each the matic whole. - The studen tmust develop a project assignment on the topic assigned.
--	---

Načini ocenjevanja:

**Delež (v %) /
Weight (in%)**

Assessment:

<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt):</p> <ul style="list-style-type: none"> - Analiza dobljenih znanstvenih del – 20% ocene, tj. do 20 točk - Projektna naloga– 50% ocene, tj. do 50 točk - Pisni izpit – 30% ocene, tj. do 30 točk 		<p>Type (examination, oral, coursework, project):</p> <ul style="list-style-type: none"> - Analysis of the scientific texts - 20% ofthe grade, ie. 20 points - Project assignment - 50% ofthe grade, ie. 50 points - Written exam - 30% ofthe grade, ie. 30 points
--	--	---

Reference nosilca / Lecturer's references:

<ul style="list-style-type: none"> - RODIČ, Blaž. Distribuirani sistemi za podporo odločanju in programski agenti. (Distributed decision support systems and software agents), Nova Gorica: Fakulteta za uporabne družbene študije, 2008. 170 pgs. ISBN 978-961-6718-05-9. - KANDUČ, Tadej and RODIČ, Blaž. Optimisation of machine layout using a force generated graph algorithm and simulate dannealing, International Journal of Simulation Modelling, Vol. 15, No. 2, pp1726-4529, 2016. - KANDUČ, Tadej and RODIČ, Blaž. Optimization of a furniture factory layout, Croatian Operational Research Review, 2015. - RODIČ, Blaž, BAGGIA, Alenka. Dynamic airport ground crew scheduling using a heuristic scheduling algorithm. International journal of applied mathematics and informatics, ISSN 2074-1278, 2013, vol. 7. - RODIČ, Blaž, VUKOVIČ, Goran, ZAVRŠNIK, Bruno, MIGLIČ, Gozdana. Issues in introducing training needs analysis in Slovenia's public administration. Transylvanian review of administrative sciences, 2012, no. 37 E, pgs. 155-171. - RODIČ, Blaž. Mobile agents for distributed decision support systems. Int. Sci. J. Manag. Inf. Syst., 2011, vol. 6, no.
--

1, pgs. 20-27.

- VUKOVIČ, Goran, ZAVRŠNIK, Bruno, RODIČ, Blaž, MIGLIČ, Gozdana. The training of civil servants in the Slovene state administration: issues introducing training evaluation. *Int. rev. adm. sci.*, dec. 2008, vol. 74, no. 4, pgs. 653-676.
- RODIČ, Blaž, KLJAJIĆ, Miroljub. Accessing distributed data sources with mobile agents and XML. V: JAŠKOVÁ, Mária (ur.). *ECON '05 : [selected research papers]*, (Research works proceedings, Vol. 12, 2005). Ostrava: Technical University of Ostrava, Faculty of Economics, 2005, pgs. 280-287.
- KLJAJIĆ, Miroljub, BRESKVAR, Uroš, RODIČ, Blaž. Computer aided scheduling with use of genetic algorithms and a visual discrete event simulation model. *WSEAS Trans. Syst.*, 2004, vol. 3, no. 3, pgs. 1021-1026.