Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION	
Predmet:	Mehanizmi
Subject Title:	Mechanisms

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Tehnika – področje izobraževanja		2	zimski/poletni
		ali	
		3	poletni
Education in Engineering		2	winter/summer
		or	
		3	summer

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
10	5				75	**3**

Nosilec predmeta / Lecturer: Karl Gotlih

Jeziki / Languages:
Predavanja / Lecture: Slovenščina / Slovene
Vaje / Tutorial:

Pogoji za opravljanje študijskih obveznosti:
Ni posebnih pogojev

Prerequisites:
No prerequisites

Vsebina:
Vsebina je razdeljena na poglavja: Uvod in klasifikacija mehanizmov; Prostostne stopnje mehanizmov; Vektorske in matrične metode za opis geometrije mehanizmov (opis s kompleksnimi števili in Denavit Hartenbergova notacija s homogenimi transformacijskimi matrikami); Posebnosti opisa odprtih in zaprtih kinematičnih verig; Kinematika (hitrosti in pospeški na mehanizmu); Direktna in inverzna kinematična naloga; Kinetična in dinamična analiza mehanizmov; Direktna in inverzna dinamična naloga; Metode sinteze mehanizmov; Delovni prostori in njihove lastnosti pri odprtih kinematičnih verigah.

Content (Syllabus outline):
The course comprises the following chapters: Introduction and classification of mechanisms; Degrees of freedom; Vector and matrix methods for geometrical description of mechanisms (description with complex numbers and the Denavit Hartenber notation with homogeneous transformation matrices); Open and closed kinematical chains; Kinematics (velocities and accelerations on the mechanism); Direct and inverse kinematic problem; Kinetic and dynamic analysis of mechanisms; Direct and inverse dynamic problem; Methods of mechanism synthesis; Workspace and its properties for open kinematic chain structures.

Temeljni literatura in viri / Textbooks:

- Erdman, G. Sandor: Machine design, Prentice Hall, 2001
- Erdman, G. Sandor: Mechanism design I, Prentice Hall, 1997
- J. Grosjean: Kinematics and Dynamics of mechanisms, McGraw-Hill, 1991
- H. Soni: Mechanism Synthesis and Analysis, McGraw-Hill, 1974
- S. Molian: Mechanism Design, Pergamon, 1997
- KEGL, Marko, GOTLIH, Karl. Ročični mehanizmi : učbenik. Maribor: Fakulteta za strojništvo, 2009.

Cilji:

Podati študentom znanja, ki jim omogočajo kvalitetno projektiranje, analizo in sintezo mehanizmov.

Objectives:

To provide knowledge, which enable high quality design, analysis and synthesis of mechanisms.

Predvideni študijski rezultati:

Znanje in razumevanje:

Prepoznavanje mehanizmov, poznavanje metod notacije in analiza in sinteza mehanizmov.

Prenesljive/ključne spretnosti in drugi atributi:

Spretnosti komuniciranja: javna predstavitev seminarskega dela, pisno izražanje pri pisnem izpitu.

Uporaba informacijske tehnologije: uporaba programskih orodij za modeliranje, sintezo in analizo mehanizmov.

Reševanje problemov: modeliranje mehanizmov.

Delo v skupini: skupinsko delo pri seminarju in laboratorijskih vajah.

Intended learning outcomes:

Knowledge and understanding:

Identification of mechanisms, provide knowledge of methods for notation, analysis and synthesis of mechanisms.

Transferable/Key Skills and other attributes:

Communication skills: public presentation of seminary work, manner of expression at written examination.

Use of information technology: use of programming tools for modelling, synthesis and analysis of mechanisms.

Problem solving: modelling of mechanisms.

Working in a group: group work at the seminar and lab work.

Metode poučevanja in učenja:

- Predavanja
- seminarsko delo v skupini
- praktično delo na vajah

Teaching and learning methods:

- lectures
- seminar team work

practical laboratory work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
• seminarska naloga,	**30 %**	• seminar work,
• pisni izpit,	**40 %**	• written examination,
• ustni izpit.	**30 %**	• oral examination.

Reference nosilca / Lecturer's references:

GOTLIH, Karl, KOVAČ, Denis, VUHERER, Tomaž, BREZOVNIK, Simon, BREZOČNIK, Miran, ZVER, Andrejka. Velocity anisotropy of an industrial robot. Robot. comput.-integr. manuf.. [Print ed.], Feb. 2011, vol. 27, iss. 1, str. 205-211, doi: 10.1016/j.rcim.2010.07.010.

RAJH, Matej, GLODEŽ, Srečko, FLAŠKER, Jože, GOTLIH, Karl, KOSTANJEVEC, Tomaž. Design and analysis of an fMRI compatible haptic robot. Robot. comput.-integr. manuf.. [Print ed.], Apr. 2011, vol. 27, iss. 2, str. 267-275, doi: 10.1016/j.rcim.2010.06.007.

GOTLIH, Karl, BREZOVNIK, Simon, BALIČ, Jože, BREZOČNIK, Miran. A reverse engineering technique and its possibilities in robotics. V: IFToMM 2011. The 13th World Congress in Mechanism and Machine Science, June 19 -23, Guanajuato, Mexico Universidad de Guanajuato (UCEA), Mexico. IFToMM, cop. 2011, 6 str. [COBISS.SI-ID 15145238]