

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Ciljno konstruiranje
Course title:	Design Methods

Študijski program Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Inženiring in avtomobilska industrija		drugi	
		second	

Vrsta predmeta / Course type Izbirni/optional

Univerzitetna koda predmeta / University course code: 21010

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45	-	30		-	135	7

Nosilec predmeta / Lecturer: prof. dr. Dorian Marjanović, prof.dr. Mario Štorga

Jeziki / Languages:	Predavanja / Lectures:	Angleščina/ english
	Vaje / Tutorial:	Angleščina / english

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

Prerequisites:

<ul style="list-style-type: none"> Pred izpitom mora študent(ka) uspešno opraviti in zagovarjati projektno nalogo in seminar. 	<ul style="list-style-type: none"> Successful completion of seminars and project assignments through individual and team presentations. Successful results on written partial exams during semester.
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Vsebina:

Content (Syllabus outline):

<p>Seznani študente z načini in orodji za oblikovanje s poudarkom na ciljnih DfX, predvsem: inženirsko načrtovanje izdelkov in njihova življenjska doba, varnost, tveganja, ergonomija in okolje.</p> <ul style="list-style-type: none"> • Uvod v inženirske metode načrtovanja in orodij. • Strukturiranje ciljev in reševanje problemov. • Življenjski cikel izdelka. • Arhitektura in kompleksnost izdelka. • Oblikovanje načrta. • Pisni delni izpit K1. Sinteza računalniškega oblikovanja. • Detajlna zasnova • Hitro oblikovanje prototipov. • Načrtovanje izdelave in montaža. • Vpliv oblikovanja izdelka na okolje. • Dizajn za robustnost, varnost in ergonomijo. • ECO dizajn. • Teorija tehničnih sistemov in teorija oblikovanja. • Informacijsko modeliranje izdelka in procesa oblikovanja. <p>Laboratorijske Vaje:</p> <p>Uporaba načinov načrtovanja pri nalogah DfX. Prednostna naloga ciljev oblikovanja. Oblikovanje načrta. Sinteza računalniškega oblikovanja. Vpliv oblikovanje za okolje</p> <p>Študenti bodo uporabljali razpoložljiva orodja CAD / CAE in CES EduPack –Eco Audit Tool.</p>	<p>The course aims at the understanding of the design methods and tools with the focus on DfX goals, particularly: product life oriented engineering design and product life systems - manufacturing, safety, risks, ergonomics and environment.</p> <ul style="list-style-type: none"> • Introduction to engineering design methods and tools. • Design goals structuring and problem solving. • Product life cycle issues. • Product architecture and complexity. • Embodiment design. • Written partial exam K1. Computational design synthesis. • Detail design • Rapid prototyping • Design for manufacturing and assembling. • Design for impact on environment.. • Design for robustness, safety and ergonomics. • ECO Design • Theory of Technical Systems and design theory. • Information modelling of product and design process. <p>Exercises</p> <p>Applications of design methods on DfX project assignments. Individual tasks and teamwork on tasks: Prioritization of design goals Embodiment design Computational design synthesis. Design for Environment Students will use available CAD/CAE tools and CES EduPack – Eco Audit Tool.</p>
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Temeljni literatura in viri / Readings:

- Ulrich, K.T., Eppinger, S.D.: Product Design and Development; McGraw Hill; 2004
- K Ehrlenspiel, A Kiewert, U Lindemann, MS Hundal: Cost-efficient Design, Springer, 2007.
- Eggert, R.J.: Engineering Design; Prentice Hall; 2005
- C. Q. Hauang: Design for X – concurrent engineering imperative, Chapman & Hall, 1996.
- Cross, N.: Engineering Design Methods: Strategies for Product Design; Wiley; 2008

Priporočljiva literatura / Recommended Textbooks

- Pahl, G., Beitz, W., Feldhusen, J., Grote, K.H.: Engineering Design: A Systematic Approach; Springer; 2007
- Hubka, V., Eder, W.E.: Theory of Technical Systems; Springer 1988.
- Matthews, C. : Case Studies in Engineering Design, Arnold, 1998.

Cilji in kompetence:

Cilji

- spoznavanje osnovnih pojmov, metod in postopkov pri ciljnem konstruiranju,
- spoznavanje uporabe sodobne računalniške opreme za ciljno konstruiranje.

Kompetence

- razumevanje hkratnega pristopa k zagotavljanju konstrukcijskih ciljev,
- poznavanje smernic in priporočil za ciljno konstruiranje,
- poznavanje pomena trajnostnega razvoja oz. ekoloških pogojev/smernic pri konstruiranju.

Objectives and competences:

Objectives

- This course aims to present useful methods for mechanical designers, and to illustrate the practical application of Design for X methods.

Competences

On completion of the course students should:

- be able to formulate a design problem, allowing the widest range of valid solutions;
- be able to evaluate competing design concepts systematically;
- be able to use techniques such as division of tasks and self-help in embodiment design;
- know how to search for ways in which a design can fail, and assess the likelihood of failure;

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent/študentka:

- Usposobljenost za metodično ciljno konstruiranje
- Usposobljenost za hkratno upoštevanje konstrukcijskih ciljev in trajnostnega razvoja
- Usposobljenost za hkratno uporabo dosedanjih in najnovejših virtualnih tehnologij
- Ovrednotenje in izbira ustreznih konstrukcijskih priporočil.

Intended learning outcomes:

Knowledge and understanding:

Student:

- To design innovative principles for fulfilling required functionality of the technical system.
- To create the architecture of the technical system.
- To create the embodiment and detailed design of components of the technical system.
- To analyse the influence of criteria from different life cycle phases of the technical system.

Metode poučevanja in učenja:

- Frontalna predavanja s testi
- Vaje z uporabo virtualnih tehnologij
- Projekt in seminarska naloga z predstavitvijo.

Learning and teaching methods:

- Lectures with continuous knowledge assessments
- Exercises with individual and team design problem assignments. Written report and public oral presentation of the achievements.

Načini ocenjevanja:

- Ustni izpit: 20 %
- Vaje: 10 %
- Pisni del izpita: 20 %
- Seminarska oz. projektna naloga: 50 %

Delež (v %)

Weight (in%)

Assessment:

Oral Examination: 20%
Course excersises: 10%
Written partial exams: 20%
Coursework: 50%

Reference nosilca / Lecturer's references:

Ključne reference nosilca:

Prof.dr. Dorian Marjanović

1. Milan Stevanović, Dorian Marjanović, Mario Štorga. IDEA Management in Product Innovation – The Empirical Research Results, Tehnički vjesnik/Technical Gazette Vol. 23/No. 5, October 2016.
2. Editorial board of IJDCI (2013) Perspectives on design creativity and innovation research , International Journal of Design Creativity and Innovation, 1:1, 1-42, DOI: 10.1080/21650349.2013.754657
3. Rohde, Danijel; Storga, Mario; Marjanović Dorian Design rationale capturing model for use during the embodiment phase of the product design TRANSACTIONS OF FAMENA Volume: 39 Issue: 1 Pages: 27-42 Published: 2015
4. Stanković Tino, Štorga Mario, Shea Kristina, Marjanović Dorian: "Formal Modelling of Technical Processes and Technical Process Synthesis", Taylor & Francis UK: Journal of Engineering Design, First published on: 24 September 2012 (iFirst), DOI: 10.1080/09544828.2012.722193
5. Pavković Neven, Štorga Mario, Bojčetić Nenad, Marjanović Dorian: "Facilitating design communication through engineering information traceability", Cambridge University Press: Artificial Intelligence for Engineering Design, Analysis and Manufacturing, 27, 2013, p. 91–105, DOI: 10.1017/S0890060413000012
6. Škec, Stanko; Storga, Mario; Marjanović Dorian Mapping risks on various product development process types TRANSACTIONS OF FAMENA Volume: 37 Issue: 3 Pages: 1-16 Published: 2013
7. Stanković Tino, Štorga Mario, Marjanović Dorian: "Synthesis of Truss Structure Designs by NSGA-II and NodeSort Method", Strojniški vestnik - Journal of Mechanical Engineering 58(2012)3, 203-212, DOI: 10.5545/sv-jme.2011.042 2012
8. Štorga, Mario; Andreasen, Mogens Myrup; Marjanović, Dorian: "The Design Ontology: Foundation for the Design Knowledge Exchange and Management", Taylor & Francis UK: Journal of Engineering Design, 21: 4, 2010, p. 427 — 454
9. Stankovic, Tino; Marjanovic, Dorian; Bojčetić, Nenad; Enhancing evolution of truss structures by using genetic algorithms TRANSACTIONS OF FAMENA Volume: 33 Issue: 1 Pages: 1-10 Published: 2009
10. Pavkovic, N; Marjanovic, D; Storga, M Object-oriented framework for design process modeling and planning STROJARSTVO Volume: 47 Issue: 3-4 Pages: 87-100 Published: MAY-AUG 2005
11. Pavkovic, N; Marjanovic, D Considering an object-oriented approach to design process planning INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT Volume: 21 Issue: 3-4 Pages: 373-392 Published: 2001
12. Mahalec, I; Lulic, Z; Marjanovic, D Motor vehicle approval in Croatia: costs and benefits INTERNATIONAL JOURNAL OF ENVIRONMENT AND POLLUTION Volume: 14 Issue: 1-6 Pages: 425-430 Published: 2000
13. Marjanović, D.: Design process representation for the development of an ICAD system. AUTOMATIKA, Volume: 37 , Issue: 3-4; 127-132 Published 1996
14. Kostelić, A, Marjkanović, D, Tasevski D, Solman, N, Milosevic, V, Computer-Aided Shell and Tube Heat- Exchangers Design-System KOCIT, Strojarstvo, V25, No. 3-4, pp.177-183, 1983

Prof.dr. Mario Štorga

1. Škec Stanko, Štorga Mario, Tečec Ribarić, Zlatka: "Work Sampling of Product Development Activities", Tehnički vjesnik, Tehnički fakulteti Sveučilišta Josip Juraj Perišić Marija Majda, Martinec Tomislav, Štorga Mario, Stanko Škec: "Development of Collaborative Design Agents Framework", 7th International Conference on Computing and Cognition DCC'16; Chicago, USA, 2016 Strossmayer u Osijeku, Vol. 23 No. 6, 2016
2. Midžić Ida, Štorga Mario, Marjanović Dorian: "Validation of the Eco-transformity Method", 14th International DESIGN conference DESIGN 2016; FSB, Zagreb, The Design Society, Glasgow; 2016,
3. Perišić Marija Majda, Martinec Tomislav, Štorga Mario, Kanduc Tadej: "An Agent-based Approach to Support Management of Teams Performing Development Activities", 14th International DESIGN conference DESIGN 2016; FSB, Zagreb, The Design Society, Glasgow

4. Cash Phil, Štorga Mario: "Multifaceted Assessment of Ideation: Using Networks to Link Ideation and Design Activity", Taylor & Francis UK: Journal of Engineering Design, Vol. 26 Issue 10-12,
5. Cash, Phillip; Stanković, Tino; Štorga, Mario: Using visual information analysis to explore complex patterns in the activity of designers. // Design studies. 35 (2014) ,
6. Štorga, Mario; Mostashari, Ali; Stanković, Tino: Visualisation of The Organisation Knowledge Structure Evolution. // Journal of Knowledge Management. 17 (2013) , 5;
7. Pavković, Neven; Štorga, Mario; Bojčetić, Nenad: Product development ontology in traceability implementation framework. // Strojarstvo : Časopis za teoriju i praksu u strojarstvu. 49 (2007) , 2;
8. Cash, Phillip; Štorga, Mario: Multifaceted assessment of ideation: using networks to link ideation and design activity. // Journal of engineering design. 26 (2015) , 10-12; 391-415
9. Cash P., Stanković T., Štorga M.: "An Analysis of Engineers Information Seeking Activity", Proceedings of the ASME 2013 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2013, Portland, Oregon, USA, 2013.
10. Štorga M., Stanković T., Pavković N., Bojčetić N.: "Application Framework for Traceability of Engineering Information", Proceedings of the 19th International Conference on Engineering Design – ICED 13, Seoul, Korea, 2013
11. Savšek T., Štorga M., Cerovšek M.: "Information traceability in PLM Environment", Proceedings of the 10th Conference Innovative Automotive Technology – IAT 2012, Fajdiga, M. & Klemenc, J. (editors), Novo mesto / Dolenjske Toplice, Slovenia, 2012
12. Ahmed, Saeema; Štorga, Mario. Merged ontology for engineering design: Contrasting empirical and theoretical approaches to develop engineering ontologies. // Artificial Intelligence for Engineering Design, Analysis and Manufacturing. 23 (2009) ,
13. Bojčetić, Nenad; Žeželj, Dragan; Štorga, Mario: A Tool for Supporting the Process of Property Management and the Creation of Technical Drawings. // Transactions of FAMENA. 33 (2009)
14. Štorga, Mario; Pavković, Neven; Bojčetić, Nenad: Reducing the complexity of Product Development Context by Ontology. // Transaction of FAMENA. 30 (2006) ,