

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	PLANIRANJE IN VODENJE LOGISTIČNEGA SISTEMA
Course title:	PLANNING AND MANAGEMENT OF LOGISTICS SYSTEMS

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
LOGISTIKA SISTEMOV 1. stopnja		3.	5.
SYSTEM LOGISTICS 1 st degree		3.	5.

Vrsta predmeta / Course type: IZBIRNI

Univerzitetna koda predmeta / University course code: UN

Predavanja Lectures	Seminar Seminar	vaje Tutorial	Laboratory work	Druge oblike študija Field work	Samost. delo Individ. work	ECTS
e-P 15 a-P 30		e-V 24 a-V 21			90	6

Nosilec predmeta / Lecturer: IZTOK POTRČ

Jeziki / Predavanja / Lectures: SLOVENSKI / SLOVENE
 Languages: Vaje / Tutorial: SLOVENSKI / SLOVENE

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

Prerequisites:
No special conditions.

Vsebina:
Predavanja:
 Povezava med načrtovanjem izdelkov in sistemom montaže (oblikovanje za montažo, tolerance, primeri oblikovanja).
 Postopki in sistematika načrtovanja montažnega sistema (postavitve problema, grobo načrtovanje, fino načrtovanje, realizacija, preskusni zagon).
 Osnovni principi sistema montaže in vpliv transportnega sistema (oblike postavitve montažnega sistema brez avtomatiziranega toka izdelkov, delno in popolno avtomatizirani sistemi sestave s transportnim in skladiščnim sistemom).
 Primeri montažnih linij in nivo delovnih postaj (ročna montaža, delno avtomatizirana in popolno avtomatizirana montažna mesta).
 Načrtovanje sistema sestave (določitev časa takta, določitev števila delovnih mest, določitev vmesnih skladišč, določitev materialnega toka, določitev informacijskih tokov).
 Elementi transportnega sistema (gnani in negnani transporterji, elementi za prevzem in preusmeritev).

Content (Syllabus outline):
Lectures:
 Linking between design and assembly (design for assembly, tolerances, design cases).
 Procedures and systematics on design of assembly systems (determination of problem, rough planning, fine planning, realisation, start-up procedures).
 Basic principles of assembly systems and influence of manner of transportation and material handling system (Assembly and montage systems without automatically material flow, partly- and completely automatic assembly systems with transportation and warehouse systems).
 Montage and assembly lines and level of technological points (manual assembly, partly and full automatic assembly points).
 Design of assembly systems (determination of assembly rhythm, determination of number of working places, determination of buffers, determination of material and information flow).
 Elements of transportation and material handling system (powered and free conveyors, switch points, manipulation machines).



Informacijski tokovi in nosilci informacij (Črna koda, RFID, Pick by light/voice/vision...).

Vmesna skladišča (linijsko vm. skladišče, obtočno vm. skladišče, posebni primeri skladiščenja).

Varnostne zahteve in primeri montažnih celic.

Seminar:

Seminar aplikativno dopolnjuje vsebino predavanj s praktičnim reševanjem problemov določanja montažnih sistemov.

Information flow and information carriers (bar-code, RFID, Pick by light,/voice/vision...).

Buffers (on transportation line buffers, circulation-type buffers, special cases of warehousing).

Safety demands and cases of assembly cells.

Seminar:

Seminar (project) work supplement lectures with practical solutions design problems by assembly systems.

Temeljna literatura in viri / Readings:

- E-gradivo predmeta.
- Redford, A., Chal, J. (1994). Design for Assembly. London: Mcgraw-Hill Book Company.
- Baudin, M. (2002). Lean Assembly: The Nuts and Bolts of Making Assembly Operations Flow. Productivity Press.
- Konold, P., Reger, H. (1997). Angewandte Montagetechnik. Vieweg Verlag.
- Kopač, J., Noe, D. (1989). Strega in montaža. Ljubljana: Fakulteta za strojništvo, Univerza v Ljubljani.
- Pfohl, H.C. (2009). Logistiksysteme. Springer Verlag.
- Potrč, I. (1999). Transportni sistemi (zbrano gradivo). Fakulteta za strojništvo, Univerza v Mariboru.
- Scheer A.W. (1996). Business Process Engineering – Reference models for industrial enterprises. Berlin: Springer-Verlag.
- Davis, R. (2001). Business Process Modeling with Aris. London: Springer.
- Gajšek, B. (2015). Vitka notranja logistika in osnove planiranja v proizvodnem podjetju: e-gradivo. Celje: Fakulteta za logistiko, Univerza v Mariboru.

Cilji in kompetence:

- Osvojitev osnovnih metod planiranja in vodenja logističnega sistema.
- Projektna zasnova in modifikacija izdelka (naprave ali konstrukcije) v povezavi z montažnimi, funkcijskimi, proizvodnimi, tržnimi in ekološkimi zahtevami.
- Osvojitev osnovne metodike pri planiranju in načrtovanju sistema montaže.
- Spoznavanje načinov montaže in ekonomska upravičenost avtomatizacije sistema montaže.

Objectives and competences:

- Gaining knowledge of basic methods for planning and management of logistics systems.
- Design plan and modification of product (device or construction) due to assembly, functional, technological, market and ecological requirements.
- To get aware of basic methods for planning and design of the assembly systems.
- Insight into design manners and economic authorization of automation by assembly systems.

Predvideni študijski rezultati:

Znanje in razumevanje:

- poznavanje specialnega področja planiranja in vodenja logističnega sistema,
- poznavanje specialnega področja sistemov montaže,
- znati izbrati ustrezno podporo materialnega toka v sistemih montaže glede zahtev po zmogljivosti,
- povezovanje konceptov logističnega transportnega sistema v smislu integralnega transporta.

Intended learning outcomes:

Knowledge and understanding:

- special knowledge of planning and management of logistics systems,
- special knowledge of all kinds of the assembly systems,
- knowledge of proper determination of proper support for material flow due to demanded capacity,
- connection of transport-logistics systems concepts, into the integral transport.

Prenesljive/ključne spretnosti in drugi atributi:

- povezovati uporabo različnih inženirskih znanj za reševanje problemov planiranja materialnih tokov v sistemih montaže,
- študenta izobraziti do nivoja, da se je sposoben soočiti s problemom reševanja novih idej načrtovanja, oblikovanja in optimiranja sistemov montaže.

Transferable/Key skills and other attributes:

- combined use of different engineering skills for solution of material flow planning problems in assembly systems,
- to give students skills, that they can be involved in project work – solving new concepts of planning, design and optimization of the assembly systems.

Metode poučevanja in učenja:

Predavanja: pri predavanjih študent spozna teoretične vsebine predmeta. Del predavanj se izvaja na klasični način v predavalnici, del pa v obliki e-predavanj (e-predavanja se lahko izvajajo na videokonferenčni način ali s pomočjo posebej v ta namen didaktično pripravljenih e-gradiv v virtualnem elektronskem učnem okolju).

Vaje: pri vajah študent utrdi teoretično znanje in spozna aplikativne možnosti. Del vaj se izvaja na klasični način v predavalnici, del pa v obliki e-vaj (e-vaje se lahko izvajajo na videokonferenčni način ali s pomočjo posebej v ta namen didaktično pripravljenih e-gradiv v virtualnem elektronskem učnem okolju).

Learning and teaching methods:

Lectures: students understand the theoretical frameworks of the course. Part of the lecture course is in a classroom while the rest is in the form of e-learning (e-lectures may be given via video-conferencing or with the help of specially designed e-material in a virtual electronic learning environment).

Tutorials: Students enhance their theoretical knowledge and are able to apply it. Part of the seminar is in a classroom while the rest is in the form of e-learning (e-tutorials may be given via video-conferencing or with the help of specially designed e-material in a virtual electronic learning environment).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
<u>Način (pisni izpit, ustno izpraševanje, naloge, projekt):</u>		<u>Type (examination, oral, coursework, project):</u>
<ul style="list-style-type: none">• Opravljene obveznosti e-predavanj in e-vaj so pogoj za pristop k izpitu.		<ul style="list-style-type: none">• Successful completion of e-lectures and e-tutorials is a prerequisite for entering the exam.
<ul style="list-style-type: none">• Pisni izpit.	50%	<ul style="list-style-type: none">• Written exam.
<ul style="list-style-type: none">• Seminarska naloga.	40%	<ul style="list-style-type: none">• Seminar work.
<ul style="list-style-type: none">• Predstavitve seminarske naloge.	10%	<ul style="list-style-type: none">• Oral presentation of seminar work.

Reference nosilca / Lecturer's references:

1. REIBENSCHUH, Marko, ODER, Grega, ČUŠ, Franc, POTRČ, Iztok. Modelling and analysis of thermal and stress loads in train disc brakes - braking from 250 km/h to standstill. Stroj. vestn., 2009, vol. 55, no. 7/8, str. 494-502, ilustr. http://www.sv-jme.eu/scripts/download.php?file=/data/upload/2009/SV-7-8-09/8_Odar_zl_p494_502.pdf.
2. HREN, Gorazd, POTRČ, Iztok, AVSEC, Jurij. Integrated web-based framework for product mechanism simulation. Advanced engineering, 2010, year 4, no. 1, str. 25-36, ilustr.
3. LERHER, Tone, POTRČ, Iztok, ŠRAML, Matjaž, TOLLAZZI, Tomaž. Travel time models for automated warehouses with aisle transferring storage and retrieval machine. Eur. J. oper. res.. [Print ed.], Sep. 2010, vol. 205, iss. 3, str. 571-583, doi: 10.1016/j.ejor.2010.01.025.
4. LERHER, Tone, ŠRAML, Matjaž, POTRČ, Iztok, TOLLAZZI, Tomaž. Travel time models for double-deep automated storage and retrieval systems. Int. J. Prod. Res., June 2010, vol. 48, no. 11, str. 3151-3172, doi: 10.1080/00207540902796008.
5. LERHER, Tone, ŠRAML, Matjaž, POTRČ, Iztok. Simulation analysis of mini-load multi-shuttle automated storage and retrieval systems. Int. j. adv. manuf. technol., Published online: 14 September 2010, doi: 10.1007/s00170-010-2916-8.
6. ŠAMEC, Blaž, POTRČ, Iztok, ŠRAML, Matjaž. Low cycle fatigue of nodular cast iron used for railway brake discs. Eng fail. anal.. [Print ed.], Available online 18 April 2011., doi: 10.1016/j.engfailanal.2011.04.002.
7. KOSTANJŠEK, Grega, GAJŠEK, Brigita. The impact of workplace supply on productivity in functionally organized layouts. Tehnički glasnik, ISSN 1848-5588, 2017, vol. 11, no. 1/2, str. 35-44.

8. GAJŠEK, Brigita, ŠIMENC, Mitja, LERHER, Tone, POTRČ, Iztok. On the technology roadmapping based development of the new order-picking technology RF kinetic. Advanced engineering, ISSN 1846-5900, 2009, year 3, no. 2, str. 167-173.