



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

**Predmet:** Računalniško podprta proizvodnja v šoli  
**Course title:** Computer aided production in school

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program Predmetni učitelj 2. stopnje	Izobraževalna tehnika	2, 3	Poletni/ Summer
Five-year master's degree program Subject Teacher	Technical education		

**Vrsta predmeta / Course type**

Izbirni / Elective

**Univerzitetna koda predmeta / University course code:**

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
20	10		15		45	3

**Nosilec predmeta / Lecturer:**

Boris Aberšek

**Jeziki / Predavanja / Lectures:** slovenski / slovene

**Languages: Vaje / Tutorial:** slovenski / slovene

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

Ni posebnih pogojev.

**Prerequisites:**

No special prerequisites.

**Vsebina:**

Predavanja:

- Osnovni principi in razvoj avtomatizacije obdelovalnih strojev in sistemov v integrirane obdelovalne sisteme s poudarkom na izobraževanje;
- CNC tehnologija, DNC - direktno numerično programiranje NC strojev in naprav. Lokalne CAD/CAM povezave v šoli;
- računalniško integrirani obdelovalni sistemi na šolskih primerih;

**Content (Syllabus outline):**

Lectures:

- Basic principles and automation development of machine tools and manufacturing systems towards integrated systems in education;
- CNC technology, DNC – direct numerical control/programming of NC machine tools and equipments. Local CAD/CAM integration in the school;
- computer integrated manufacturing systems – school examples;

- fleksibilna avtomatizacija in industrijska robotika – prenos v šolsko prakso;
- inteligentni proizvodni sistemi;
- utelešeni kognitivni sistemi – humanoidni inteligentni robotski sistemi.

#### Vaje in seminar:

- V okviru vaj študentje spoznajo različne načine priprave in izdelave enostavnih fleksibilnih obdelovalnih sistemov in robotov;
- seminar aplikativno dopolnjuje vsebino predavanj z reševanjem praktičnih problemov in izdelavo različnih konkretnih sistemov.

- flexible automatization and industrial robotics – transformation in the school practice;
- intelligent manufacturing systems;
- embedded embodied systems – humanoid intelligent robots systems.

#### Tutorials and seminar:

- At tutorials students learn more about method and procedures of producing models of flexible production systems and robots;
- seminar work supplements the lectures with the solutions of the practical problems and producing different concrete systems.

#### **Temeljna literatura in viri / Readings:**

- Aberšek, B.: Proizvodni sistemi, (Zbrano gradivo), PeF, Maribor, 2003
- Burke, R. Project Management, 3. izdaja. Wiley, Chichester, 2001
- Balič, Jože. Računalniška integracija proizvodnje. Maribor: Fakulteta za strojništvo, 2001
- Balič Jože. Prilagodljivi obdelovalni sistemi. Maribor: Fakulteta za strojništvo, 2000.

#### **Cilji in kompetence:**

- Podati znanja in informacij o sodobnih tehnologijah, ki se danes vse pogosteje uporabljajo;
- podati potrebna znanja s področja vrednotenja in izbire sodobnih obdelovalnih tehnologij;
- prikazati praktično uporabo predhodno pridobljenih teoretičnih znanj s področja industrije in njihovo poenostavitev na praktičnih primerih;
- spodbujanje študentov k kreativnemu in samostojnemu razmišljanju in razvijanju sposobnosti za kreativno reševanje inženirskih problemov in načrtovanja proizvodnje in poenostavljanju kompleksnih problemov.

#### **Objectives and competences:**

- To present knowledge and information about contemporary technologies, mostly connected with production;
- to provide necessary knowledge from area of assessment and selection of contemporary production technologies;
- to demonstrate practical use of previously accumulated theoretical knowledge on the practical examples;
- to encourage the students to creative and independent thinking for developing and solving different engineering problems and planning of production and to simplification of the complex systems.

#### **Predvideni študijski rezultati:**

#### **Intended learning outcomes:**

**Znanje in razumevanje:**

- Pomen nazornega prikazovanja kompleksnih sistemov na poenostavljenih primerih;
- razumevanje sovisnosti različnih znanj in postopkov ter pomena uporabe strokovne literature in računalniških sistemov za učinkovito reševanje praktičnih problemov.

**Prenesljive/ključne spretnosti in drugi atributi:**

- Kombinirana uporaba različnih znanj za reševanje praktičnih problemov;
- načrtovanje enostavnih računalniško podprtih tehnoloških sistemov;
- razumevanje delovanja kompleksnih sistemov.

**Knowledge and understanding:**

- The importance of clearly display of complex systems on the simplified cases;
- understanding of relationships between different skills and procedures and importance of professional literature and computer systems for efficient solutions of practical problems.

**Transferable/Key Skills and other attributes:**

- Combined use of different skills for solution of practical problems;
- design of simply computer supported technological systems;
- understanding how complex systems work.

**Metode poučevanja in učenja:**

- frontalna predavanja,
- skupinsko delo;
- izdelava seminarske naloge,
- diskusije v elektronskem forumu,
- e-učenje.

**Learning and teaching methods:**

- frontal lectures,
- work in small groups;
- seminar work,
- discussion in electronic forums,
- e-learning.

**Načini ocenjevanja:**

- diskusije v elektronskem forumu,
- seminarske naloga,
- pisni/ustni izpit.

Delež (v %) /

Weight (in %)

**Assessment:**

- discussion in electronic forums,
- seminar works,
- written/oral examination.

**Reference nosilca / Lecturer's references:**

- Aberšek, B., Flašker, J. Review of experimental models for confirmation of mathematical models of gears. *Key eng. mater.*, 2008, vol. 385-387, 345-348.
- Aberšek, B., Mikluš, S. Models for optimization of gantry crane main girder. *Key eng. mater.*, 2007, vols. 348-349, str. 657-660
- Aberšek, B. Modern learning environments in combination with inteligent expert system. *Journal of science education*, 2005, vol. 6,
- Aberšek, B., Popov, V. Intelligent tutoring system for training in design and manufacturing. *Adv. eng. softw. (1992)*. [Print ed.], 2004, 35, str. 461-471
- Aberšek, B., Flašker, J. *How gears break*, (Advances in damage mechanics, vol. 7). Southampton; Billerica (MA): WIT Press, cop. 2004

