Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION	
Predmet:	Sodobna gradiva in obdelovalne tehnologije
Subject Title:	Advanced material and production technologies

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Tehnika – področje izobraževanja		1	poletni
Education in Engineering		1	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
15	10				155	**6**

Nosilec predmeta / Lecturer: Boris Aberšek

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

Pogoji za opravljanje študijskih obveznosti:

Osnovno znanja o gradivih, obdelovalnih tehnologijah in načrtovanju proizvodnje

Prerequisites:

Basic knowledge of material, productional technologies and planning of the production.

Vsebina:

Predavanja:

Sodobna gradiva.
- kompozitna gradiva;
- super legure;
- nano gradiva;
- pametna gradiva.

Sodobne tehnologije.
- obdelava z abrazivnim tokom (plazma, laser,...);
- obdelava z vodnim curkom (VC);
- obdelava z abrazivnim VC (AVC);
- obdelava polne oblike;
- hidrodinamična obdelava;
- NC/CNC/DNC tehnologije;
- CAD - CAM sistemi.

Računalniško podprte tehnologije načrtovanja in vodenja proizvodnje.

Seminar:

Seminar aplikativno dopolnjuje vsebino predavanj z reševanjem praktičnih problemov.

Content (Syllabus outline):

Lectures:

Contemporary material.
- composites;
- super alloys;
- nano materials;
- smart materials.

Contemporary technologies.
- machining with abrasive flow (plasma, laser, ...);
- machining with water yet;
- machining with abrasive water yet;
- total form machining
- Hydro dynamical machining
- NC/CNC/DNC technologies;
- CAD - CAM systems.

Computer aided technologies for planning and managing production.

Seminar:

Seminar work supplements the lectures with the solutions of the practical problems.

Temeljni literatura in viri / Textbooks:

Aberšek, B., *Tehnologija in obdelava gradiv,* Didakta, Radovlica, 1995

Aberšek, B., Flašker, J. *Vzdrževanje : sistemi, strategije, procesi in optimiranje*. 1. izd. Maribor: Fakulteta za strojništvo, 2005
Balič, J., *Flexsible manufacturing systems*, DAAAM Publishing, Vienna, 2001
MacInnes, R.L. and Pearce, S.L., *Strategic MRO powered by DSC,* Net Results Inc., Kentucky, 2002
Zhong, L.W., Ze, Z., Liu, Y., *Handbook of Nanophase and Nanostructured Materials,* Kluwer Academic/Plenum Publisher, 2003

Cilji:

podati znanja in informacij o sodobnih gradivih v tehnični praksi ter sodobnih tehnologijah, ki se danes vse pogosteje uporabljajo;
podati poglobljeno teoretično znanje s področja vrednotenja in izbire posameznih gradiv;
podati poglobljeno teoretično znanje s področja vrednotenja in izbire sodobnih obdelovalnih tehnologij;
podati poglobljena znanja o načrtovanju in vodenju proizvodnje;
prikazati praktično uporabo predhodno pridobljenih teoretičnih znanj na praktičnih primerih;
spodbujanje študentov k kreativnemu in samostojnemu razmišljanju in razvijanju sposobnosti za kreativno reševanje inženirskih problemov.

Objectives:

To present knowledge and information about contemporary materials used in technical praxes as modern technologies, mostly connected with production;
to provide detailed theoretical knowledge from area of assessment and selection of contemporary materials;
to provide detailed theoretical knowledge from area of assessment and selection of contemporary production technologies;
to provide detailed theoretical knowledge about planning and management of the production;
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.

Predvideni študijski rezultati:

Znanje in razumevanje:
poznavanje splošnih napotkov in pravil za izbiro gradiv in ustreznih obdelovalnih tehnologij;
poznavanje načinov za učinkovito načrtovanje proizvodnega procesa;
poznavanje splošnih kriterijev za izbiro gradiv in ustreznih tehnologij;
poznavanje metod in smernic za tehnološki razvoj izdelka;
poznavanje sodobnih računalniških metod za tehnološko načrtovanje proizvodnje;
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:
Uporaba informacijske tehnologije: uporaba orodij za izdelavo in oblikovanje .
Reševanje problemov: ocenjevanje obstoječih in lastnih tehnoloških rešitev.
kombinirana uporaba različnih znanj za reševanje praktičnih problemov;
načrtovanje tehnologije za izdelavo izdelka z uporabo sodobnih metod.

Intended learning outcomes:

Knowledge and understanding:
knowledge of general instructions and rules for selecting materials and suitable production technologies;
knowledges for effective planning of productional technologies;
knowledge of general criteria for selecting materials and adequate production technologies;
knowledge of methods and guidelines for technological product development;
knowledge of advanced computer aided methods for technological planning of the productin;
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:
use of information technology: use of tools for creating and designing technological process;
problem solving: evaluation of existing and proper program solutions;
combined use of different skills for solution of practical problems;
design of technological process using advanced approaches.

Metode poučevanja in učenja:

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

Teaching and learning methods:

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

Načini ocenjevanja: Delež (v %) / Weight (in %) **Assessment methods:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
diskusije v elektronskem forumu,	**20 %**	discussion in electronic forums,
seminarske naloga,	**40 %**	seminar works,
pisni izpit,	**20 %**	written examination,
ustni izpit.	**20 %**	oral examination.

Reference nosilca / Lecturer's references:

Aberšek, B., Flašker, J. *How gears break*, (Advances in damage mechanics, vol. 7). Southampton; Billerica (MA): WIT Press, cop. 2004

Aberšek, B., Flašker, J. *Vzdrževanje : sistemi, strategije, procesi in optimiranje*. 1. izd. Maribor: Fakulteta za strojništvo, 2005

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., Popov, V. Intelligent tutoring system for training in design and manufacturing. *Adv. eng. softw. (1992)*. [Print ed.], 2004, 35, str. 461-471