15. Chip removal machining

GENERAL INFORMATION ABOUT THE COURSE		
Course coordinator	Antun Stoić, PhD, professor	
Course name	**Chip removal machining**	
Study program	**Mechanical engineering**	
Course status	Compulsory	
Year	1	
Semester	1	
Number of credits and teaching methods	ECTS student load coefficient	5
	Number of hours (lectures + seminars + exercises)	30+0+30

1. DESCRIPTION OF COURSE
1.5. Course objectives
Expand knowledge on the theory of machining by cutting. Acquire knowledge of criteria and methods for determining workability of a material and treatment parameters. Become familiar with the procedure for testing the effects of the parameters on the machining process. Become familiar with modern technologies in machining by chip removal.
1.6. *Course enrolment prerequisites (if applicable)*
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1.7. Expected course learning outcomes
1. Differentiate the methods of machining by cutting and when to apply them. 2. Apply knowledge on the workability of materials in selecting machining parameters. 3. Analyse specifics in machining particular materials (tool, regime, constructability). 4. Explain loading conditions and types of wear on cutting blades. 5. Define achievable quality of machining and effect on environment. 6. Define technological parameters in machining a particular product.

1.8. Course content

1. Introduction to machining by chip removal
2. Creating and forms of removed chips
3. Occurrence of built-up edge on cutting blades
4. Cutting tools in machining by chip removal
5. Force and resistance of removing chips. Total energy, thermal energy and power in machining by chip removal
6. Accuracy in chip removal machining
7. Workability
8. Workability of Mg alloys
9. Workability of Al alloys
10. Workability of Ni alloys
11. Workability of Cu alloys
12. Workability of FeC alloys
13. Workability of Cr-Ni alloys
14. Workability of casts
15. Workability of ceramics and polymer materials

1.9. Types of teaching	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ Distance learning ☒ Fieldwork	☐ Individual assignments ☐ Multimedia and network ☒ Laboratory ☐ Mentorship ☐ Other types
1.10. Comments		

1.11. Student obligations *(attendance at classes, lectures, tutorials, seminars)*

70%

1.12. Tracking student work (proportion of individual activities in terms of ECTS credits based on the total number of ECTS credits)

Class attendance	1	Class participation	2	Seminar paper		Experimental work	1
Written exam	0.5	Oral exam	0,5	Essay		Research	
Project		Continual assessment of knowledge		Written seminar paper		Practical work	
Online activity							

1.13. Grading and assessment of student work during the semester and for the final exam *(interim exam, written exam, oral exam)*
Assessment methods: 1. Attending classes – presence along with active participation (brief written assessment of knowledge) 2. Exercises - presence along with active participation (commenting obtained results) 3. Written exam – continual assessment of knowledge (>50% accuracy) 4. Oral exam – oral assessment of knowledge (>50% understanding)

1.14. **Mandatory literature** (relevant at the time of submitting the proposed study program)
- R. Cebalo: Obrada odvajanjem čestica, Vedograf, Zagreb 2000. - Š. Šavar: Obrada odvajanjem čestica svezak 1, Sveučilišna naklada liber, Zagreb 1991.
1.15. Supplementary literature (relevant at the time of submitting the proposed study program)
- Š. Šavar : Obrada odvajanjem čestica svezak 2, Sveučilišna naklada liber, Zagreb, 1991. - R. Cebalo : Duboko Brušenje, Školska knjiga Zagreb, 1990. - M.C. Shaw: Metal Cutting Principles, Oxford University Press, New York, 1984.
1.16. Manner of tracking quality to ensure the acquisition of exit knowledge, skills and competences
Lectures. Auditory and laboratory exercises. Familiarity with machining procedures by chip removal in facilities and demonstrating application of production procedures in the laboratory (workshop). During classes, knowledge is testing by given exams (theoretical foundations) and numerical exercises.

2. COMBINING THE LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT OF THE LEARNING OUTCOMES

2.1. Class participation	*2.2. Student participation*	*2.3. Learning outcome*	*2.4. Assessment method*
Class attendance	Presence along with active participation	1-6	Records along with brief written assessment of knowledge
Exercises	Presence	2	Written records
Laboratory exercises	Active participation	3-5	Commenting on obtained results
Continual assessment of knowledge	Written assessment of knowledge	1-6	2 control tasks or written and oral
Final exam	Oral assessment of knowledge	1-6	Oral exam