SYLLABUS

1. Course title:

Theory of sintering and heat treatment

2. Code:

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

Mandatory

6. Prerequisites:

7. Class restrictions:

8. Duration / semester(s):

1 | 6

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
	1			
9.1. Lectures	3		Classes:	45
9.2. Seminars	1		Individual work:	107,7
9.3. Laboratory/Practice classes	0		In total:	152,7

10. Faculty:

Faculty of Mechanical Engineering Tuzla

11. Department/study program:

Production Mechanical Engineering

12. Lecturer:

Dr.sc. Samir Butković,professor

13. Course aims:

Acquiring fundamental theoretical knowledge in the field of sintering, heat treatment, diffusion phenomena, phase transformation, as well as formation of thermal cycles and selection of parameters for sintering and heat treatment of some material. Also, very important aim is to present specificities of furnaces and atmospheres used for sinterenig and

heat treatment.

14. Learning outcomes:

After completing this course students are able to estimate sinterability of the material and its ability to be heat treated. Also, they are able to determine technological procedures for heat treatment and sintering, select appropriate furnace and atmosphere in order to achieve required properties of products.

15. Course content:

1. Crystal structure and defects in metals,
2. Principles and applications of phase diagrams,
3. Diffusion and phase transformation,
4. Heat treatment processes,
5. Annealing (Full Annealing, Recrystallization Annealing, Stress Relief Annealing, Spheroidization , Normalizing),
6. Hardening and Tempering,
7. Thermo-mechanical processes,
8. Test I,
9. Thermo-chemical processes,
10. Solid-state sintering mechanisms,
11. Liquid state sintering mechanisms,
12. Testing of parts produced by sintering,
13. Principles for formation of thermal cycles for sintering and heat treatment of: carbon steel, low-alloy steel and stainless steels,
14. Furnaces and atmospheres,
15. Test II

16. Learning methods:

Lectures with active participation of students,
Exercises,
Consultations,
Preparation and presentation of seminar papers.

17. Assessment methods:

Activity during lectures,
2 tests (solving of tasks),
2 test (understanding of theory)
Seminar/homework papers,
Final exam,

Knowledge tests results are recognized as cumulative result if achieved results are positive after each individual exam and gives at least 50% of the planned and/or the necessary knowledge and skills. In order to pass the subject the student must achieve a minimum of 54 cumulative points.

The condition for signing is the student's attendance at a minimum of 70% of lectures and exercises.
Grading Scale:

Grade	Descriptive	Letter	Points
5 (five)	Does not meet minimum criteria	F, FX	<54
6 (six)	Meets minimum criteria	E	54÷64
7 (seven)	Generally good, but with significant shortcomings	D	65÷74
8 (eight)	Average, with noticeable errors	C	75÷84
9 (nine)	Above average, with occasional errors	B	85÷94
10 (ten)	Exceptional success with no errors or with minor errors	A	95÷100.

18. Assessment components:

Attendance and activity during lectures, 6 points
2 tests (solving of tasks), 2 tests x 10 points=20 points
2 test (understanding of theory), 2 tests x 12 points=24 points
Seminar/homework papers, 10 points
Final exam, 40 points

19. Mandatory reading list:

1. B. Samir, E. Šarić, M. Mehmedović: Tehnologije presanja i sinterovanja metalnih prahova, Tuzla 2021.
2. Đorđević, Vitomir: Mašinski materijali – prvo dio, Mašinski fakultet Univerziteta u Beogradu, 2003.

3. George E. Totten: Steel heat treatment, metallurgy and technologies, Taylor and Francis Group, 2007.

20. Additional reading list:

1. Callister, William D.: Fundamentals of Materials Science and Engineering: An Integrated Approach, 2nd ed. Wiley and Sons, 2004.

21. Web sources:

22. Applicable from the academic year:

23. Adopted in the Faculty/Academy session: