HEAT TREATMENTS

1	Course Title:	HEAT TREATMENTS	
2	Course Code:	MAK5269	
3	Type of Course:	Optional	
4	Level of Course:	Second Cycle	
5	Year of Study:	1	
6	Semester:	1	
7	ECTS Credits Allocated:	6.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç. Dr. MUSTAFA SAFA YILMAZ	
15	Course Lecturers:	Yok	
16	Contact information of the Course Coordinator:	msafayilmaz@uludag.edu.tr 0224 2942637 U.U. Müh. Fak. Makine Müh. Böl. BURSA	
17	Website:		
18	Objective of the Course:	Understanding the basic metallurgical phenomena that cause material properties in heat treatments.	
19	Contribution of the Course to Professional Development:	It will be possible to determine the effects of heat treatments on the material and make updates in the designs accordingly.	
20	Learning Outcomes:		
		1	Knows the metallurgical formations that occur in different heat treatments and can create new heat treatment routes based on these.
		2	Makes microstructure-property optimization and material selection.
		3	Performs risk analysis in heat treatment.
		4	Can create new original applications by generalizing the information in the course.
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21	Course Content:		

Course Content:

Week	Theoretical	Practice
1	Heat treatment and material manufacturing technologies	
2	TTT diagrams and continuous cooling diagrams, heat treatment environments	
3	Hardness and hardenability	

4	Hardening and martensitic transformation, quenching media	
5	Hardness and hardenability	
6	Hardening and martensitic transformation, quenching media	
7	Risk analysis in tempering, subzero processes and heat treatment	
8	Intercritical temperature operation	
9	Surface hardening processes	
10	Heat treatment of tool steels and tool damage,	
11	Heat treatment errors	
12	Precipitation hardening (aging), heat treatment of Al and Cu alloys	
13	Recrystallization annealing, brazing processes	
14	Heat treatment cycles of industrial alloys	

22	Textbooks, References and/or Other Materials:	ASM Handbook Vol.5 Heat Treatment
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	20.00
Total	3	100.00

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self Study and preperation	14	9.00	126.00
Homeworks	1	6.00	6.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	1.00	1.00
Others	0	0.00	0.00
Final Exams	1	3.00	3.00
Total Work Load			178.00
Total work load/ 30 hr			5.80
ECTS Credit of the Course			6.00

Success Grade

Total 100.00

Course is **1** midterm and 1 final exam.

25	**CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS**															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	3	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	3	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

Contribution Level:	1 very low	2 low	3 Medium	4 High	5 Very High