

MM 567 Heat Treatment				MECHANICAL ENGINEERING DEPARTMENT					
Semester	Methods of Education							Credits	
	Lecture	Recit.	Lab.	Project/Field Study	Homework	Other	Total	Credit	ECTS credit
1,2	36	6				146	188	3	7.5
Language	Turkish								
Compulsory / Elective	Optional								
Prerequisites	-								
Course Contents	Fundamental concepts: Iron-carbon phase diagram, time-temperature-transformation (TTT) diagram, formations of pearlite, bainite and martensite, diffusion. Alloying elements in steel: Austenite, ferrite, carbide, nitride forming elements, effects on eutectoid point, effects on TTT diagrams. Hardenability: Grossmann and Jominy tests, practical applications. General heat treatments: Annealing, normalizing, hardening, tempering, transformation of retained austenite. Special heat treatments: Tool steels, surface hardening methods. Dimensional changes during heat treatment.								
Course Objectives	To introduce steel which is the most commonly used industrial alloy, alloying elements for steel, TTT diagram which is very important for phase transformation, hardenability concept and heat treatments for various steels.								
Learning Outcomes and Competences	To know the importance of heat treatment for steels and heat treatment techniques. To design, perform and evaluate experiments To apply the knowledge of mathematics, science and engineering								
Textbook and /or Reference	1. Thelning, K-E., (1984) Steel and Its Heat Treatment (2nd Ed.), Butterworths, London, UK. 2. Thelning, K-E., (1987) Çelik ve Isıl İşlemi, Çev: Adnan Tekin, Flaş Matbaacılık, İst. 3. Krauss, G., (1990) Steels: Heat Treatment and Processing Principles, Tempering of Steel, ASM Intl. 4. Topbaş, M. Ali, (1992) Çeliğin Isıl İşlemi, Yıldız Teknik Üniversitesi Yayın no:250, İst.								
Assessment Criteria					If any, mark as (X)		Percentage (%)		
	Midterm Exams				X		40		
	Quizzes								
	Homeworks								
	Projects								
	Term Paper								
	Laboratory Work								
	Other								
Final Exam				X		60			
Instructors	Prof. Ibrahim USLAN								
Week	Subject								
1	Fundamentals concepts: Fe-C phase diagram.								
2	Fundamentals concepts: Time-Temperature-Transformation (TTT) diagrams.								
3	Formation of Pearlite, Bainite and Martensite Diffusion.								
4	Alloying elements in Steel: Austenite, ferrite, carbide forming elements								
5	Alloying elements in Steel: Nitride forming elements, effects on eutectoid point, effect on TTT diagrams.								
6	Hardenability: Grossmann and Jominy Tests.								
7	Hardenability: Practical applications.								
8	General Heat Treatments:Annealing.								
9	General Heat Treatments:Normalizing, hardening.								
10	General Heat Treatments: Tempering, transformation of retained austenite.								
11	Special Heat Treatments: Tool steels.								
12	Special Heat Treatments: Surface hardening methods.								
13	Special Heat Treatments: Surface hardening methods.								
14	Dimensional changes during heat treatment.								