

## DISTRICT HEATING SYSTEMS

1	Course Title:	DISTRICT HEATING SYSTEMS
2	Course Code:	MAK4210
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	8
7	ECTS Credits Allocated:	4.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	-
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. ATAKAN AVCI
15	Course Lecturers:	Prof. Dr. Atakan AVCI
16	Contact information of the Course Coordinator:	atakan@uludag.edu.tr / 2242941954/ U.Ü. Müh. Mim. Fak. Mak. Müh. Bölümü BURSA
17	Website:	
18	Objective of the Course:	<p>To provide knowledge the mechanical engineering students , this course is to supply the necessary background about district heating systems. The aim of the course are:</p> <p>To supply the necessary information about creation of thermal energy.</p> <p>To train the students in understanding of the thermal energy distribution.</p> <p>To provide knowledge on system equipment and control systems.</p> <p>To gain students in understanding of design systems.</p> <p>To provide having engineering candidates capable of designing heating systems</p>
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Determine necessary creations of thermal energy and feasibility studies.
	2	Identify and select appropriate parameters for thermal energy distribution.
	3	Identify the necessary auxiliary equipments and control units
	4	Determine and evaluate various alternative systems for design
	5	Determine and solve the problems associated with installations of different heating systems.
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21	Course Content:	

	Course Content:			
Week	Theoretical	Practice		
1	general remarks, past experiences, energy resources and properties			
2	planning considerations, Cogeneration, trigeneration systems and applications, power/heat plants.			
3	heat generators, boilers, types, their characteristics, system equipment and their functions.			
4	Heat generators, heat storage, fuel preparation systems, equipments and selections. Heat carrier medium and properties.			
5	Chimney systems, emission control, pressurized air systems, and water preparation systems			
6	The pressurized systems, pressurisation of sealed systems, the expansion tanks, calculation and selection.			
7	Pipe distribution systems, ducts, expansion units and equipment.			
8	Secondary heat centre, isolation, units. The design and calculations of distribution pipe systems (hot water)			
9	The design and calculations of distribution			
Activites		Number	Duration (hour)	Total Work Load (hour)
Theoretical	distribution pipe systems (steam) and equipments	14	3.00	42.00
Practicals/Labs		0	0.00	0.00
Self study and preparation	pipe systems (steam).	14	4.00	56.00
Homeworks		0	0.00	0.00
Projects	The project applications of district heating	0	0.00	0.00
Field Studies		0	0.00	0.00
Midterm exams	Textbooks, References and/or Other	1	4.00	4.00
Others		12	3.00	36.00
Final Exams		2	8.00	16.00
Total Work Load				146.00
Total work load/ 30 hr		10	4.87	4.87
ECTS Credit of the Course				4.00
		İstina), Technical publications of TMMB (TMMB Teknik Yayınları) 1, İstanbul, 1996.		
23	Assesment			
TERM LEARNING ACTIVITIES		NUMBE R	WEIGHT	
Midterm Exam		1	50.00	
Quiz		0	0.00	
Home work-project		0	0.00	
Final Exam		1	50.00	
Total		100	100.00	
Contribution of Term (Year) Learning Activities to Success Grade		50.00		

Contribution of Final Exam to Success Grade									50.00									
Total									100.00									
Measurement and Evaluation Techniques Used in the Course																		
24	ECTS / WORK LOAD TABLE																	
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	5	0	4	0	0	4	0	0	0	3	0	4	0	4	0	0		
ÖK2	5	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0		
ÖK3	5	0	4	0	0	0	0	0	0	0	3	0	0	0	0	0		
ÖK4	5	4	0	0	0	3	0	0	0	4	0	0	0	3	0	0		
ÖK5	5	3	3	0	4	0	4	0	0	0	3	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					