DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT306	3			Spring
Title	**T**	**A**	**L**	**ECTS**
Heat Transfer	3	2	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face-to-face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The main aim of the course is to teach the basic concepts of thermodynamics and the first and second laws of thermodynamics. demonstrate the fundamentals of thermal design of engineering systems. To improve students' analysis, application and communication skills in this field.					
Content	Thermodynamic systems and their properties. Thermodynamic processes; work and heat interactions. Pure substances and thermodynamic properties. First Law; closed and open systems, flow processes. The Second Law; Heat machines, heat pumps and coolers. Entropy					
Prerequisites	None					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	1) Incropera F.P., Bergman T.L., Lavine A.S., & Dewitt D.P., 1981, Isı ve Kütle Geçişini Temelleri, Literatür Yayıncılık. 2) Çengel, Y.A., & Ghajar, A.J., 2014, Isı ve Kütle Transferi (4. baskı)
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	10	%
Engineering	30	%
Engineering Design	0	%

Social Sciences	0	%
Educational Sciences	0	%
Natural Sciences	20	%
Health Sciences	0	%
Expert Knowledge	40	%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz	0	0
Assignments	1	10
Attendance	0	0
Recitations	0	0
Projects	1	20
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	13	3	39
Self-Study	14	6	84
Assignments	1	6	6
Presentation / Seminar Preparation	0	0	0
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory	0	0	0
Projects	1	12	12
Final Exam	1	2	2
		Total Work Load	**173**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	To be able to explain the basic physical laws of heat transfer, to determine the heat transfer modes for the given situations and to make appropriate approximations.
2	To be able to calculate the heat transfer and temperature distribution of one-dimensional heat conduction problems in steady state.
3	For non-planar geometries, in one-dimensional heat conduction; be able to describe the effect of time dependency of production on the temperature distribution
4	To be able to calculate the amount of heat transfer for finned surfaces and various geometries and semi-infinite bodies
5	To be able to explain convection equations and terms in heat transfer

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6	Finding heat transfer coefficients for forced convection from co-relationships
7	To be able to make estimations for basic geometries in a moving fluid by means of fluid/heat transfer analogy.
8	In heat transfer with radiation; To be able to explain basic concepts with wavelength, source and direction effects
9	To be able to calculate radiative heat transfer rates for black bodies or gray bodies
Weekly Content	
1	Basic mechanisms of heat transfer, definitions
2	Heat conduction equation and Initial and Boundary conditions
3	Heat transfer with one-dimensional conduction in steady state
4	Heat transfer with two-dimensional conduction in steady state
5	Numerical methods in heat conduction
6	Time dependent heat conduction
7	Fundamentals of transport, velocity and thermal boundary layers, dimensionless numbers
8	Midterm
9	Internal and external flow in forced transportation
10	Heat pipes and heat exchangers
11	Fundamentals of heat transfer by radiation
12	Blackbody radiation, Stefan-Boltzmann law
13	Radiation heat transfer between black and gray surfaces and its applications
14	Applications in heat transfer by radiation
15	Final exam

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1	5	5	4	5	5	3	1
2	5	5	4	5	5	3	1
3	5	5	4	5	5	3	1
4	5	5	4	5	5	3	1
5	5	5	4	5	5	3	1
6	5	5	4	5	5	3	1
7	5	5	4	5	5	3	1
8	5	5	4	5	5	3	1
9	5	5	4	5	5	3	1
Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High						

P1 Working with modern scientific sources.
P2 Having modern scientific knowledge and scientific analysis abilities and being able to apply them to scientific problems.
P3 Having theoretical and practical skills in the area of Energy Science and Technology.

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P4 Having foreign language skills to follow the worldwide advancements in the field of Energy Science and Technology and to be able to discuss them with foreign colleagues.
P5 Having computational skills for research data analysis purposes.
P6 Having appropriate skills for academic and industrial jobs, being ready to take responsibility in working life.
P7 Having knowledge about work occupational work and safety.

Compiled by:	Res Asst. Elvan Burcu Kosma
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