DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details

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

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technology					
Forms of Teaching and Learning	Face-to-face					
Course Type	**Compulsory**		**Elective**	**X**		
Objectives	In this course, students will understand the mechanisms of heat conduction, convection, and radiation in solids and fluids and will be able to calculate the resulting temperature distribution. Using this knowledge, they are expected to gain insights into the modeling, calculation, and sizing of heat exchangers.					
Content	Introduction and definitions, types of heat transfer, definitions, problem-solving techniques, heat conduction, steady and unsteady heat conduction, heat convection: forced convection, natural convection, boundary layer theory, energy and Navier-Stokes equations, fundamental laws of thermal radiation, as well as heat exchangers and their calculation.					
Prerequisites	None					
Coordinator	Assist. Prof. Dr. Osman Sinan Süslü					
Lecturer(s)	Assist. Prof. Dr. Osman Sinan Süslü					
Assistant(s)						
Work Placement	None					

Recommended or Required Reading

Books / Lecture Notes	Lecture Notes
Other Sources	Waermeübertragung: Peter von Böckh, Thomas Wetzel, Springer Vieweg, ISBN 978-3-662-55479-1 https://link.springer.com/book/10.1007/978-3-662-55480-7 Çengel, Waerme- und Stoffübertragung: Hans Dieter Baehr, Karl Stephan, Springer Vieweg, ISBN 978-3-662-49676-3 Isı ve Kütle Transferi (Çengel): Esaslar ve Uygulamalar. Yunus A. Çengel. ISBN-10 ? : ? 6053552879

Additional Course Material

Documents	
Assignments	
Exams	

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Course Composition		
Mathematics and Basic Sciences	50	%
Engineering	30	%
Engineering Design	5	%
Social Sciences		%
Educational Sciences		%
Natural Sciences	15	%
Health Sciences		%
Expert Knowledge		%

Assessment		
Activity	**Count**	**Percentage (%)**
Midterm Exam	1	30
Quiz		
Assignments		
Presentation	2	15
Recitations		
Projects	2	15
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load			
Activity	**Count**	**Duration**	**Work Load (Hours)**
Lectures	14	3	42
Self-Study	14	5	70
Assignments			
Presentation / Seminar Preparation	2	5	10
Midterm Exam	1	3	3
Recitations	14	2	28
Laboratory			
Projects	2	6	12
Final Exam	1	3	3
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes	
1	Students can calculate heat transfer and temperature distribution in one-dimensional heat conduction problems under steady-state conditions..
2	Students can describe the effect of heat generation and time dependence on temperature distribution in one-dimensional heat conduction for non-planar geometries.

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3	Students can calculate the amount of heat transfer for finned surfaces, various geometries, and semi-infinite bodies.
4	Students will learn convection equations and terms in heat transfer.
5	Students can determine heat transfer coefficients for forced convection using empirical correlations.
6	Students can perform approximate calculations for fundamental geometries using fluid/heat transfer analogy in moving fluids.
7	Students can explain fundamental concepts of radiative heat transfer, including wavelength, source, and directional effects.
8	Students can calculate radiative heat transfer rates for black bodies or gray bodies.
Weekly Content	
1	Fundamental mechanisms of heat transfer, definitions
2	Heat conduction equation and initial and boundary conditions
3	One-dimensional heat transfer by conduction in steady state
4	Two-dimensional heat transfer by conduction in steady state
5	Numerical methods in heat conduction
6	Transient heat conduction
7	Fundamentals of convection, velocity and thermal boundary layers, dimensionless numbers
8	Midterm Exam
9	Internal and external flow in forced convection
10	Internal and external flow in forced convection
11	Heat pipes and heat exchangers
12	Fundamentals of heat transfer by radiation
13	Blackbody radiation, Stefan-Boltzmann law
14	Radiative heat transfer between black and gray surfaces and its applications
15	Applications of heat transfer by radiation
16	Final Exam

Contribution of Learning Outcomes to Program Objectives (1-5)									
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**
1	5	5	4	2	2	3	1	2	2
2	5	5	4	3	3	3	1	2	2
3	5	5	4	3	2	3	1	2	2
4	5	5	4	2	4	3	1	2	2
5	5	5	4	4	3	3	1	2	2
6	5	5	4	2	4	3	1	2	2
7	5	5	4	5	3	3	1	2	2
8	5	5	4	3	2	3	1	2	2

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Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High	
Compiled by:	
Date of Compilation:	