YEDİTEPE UNIVERSITY
FACULTY OF ENGINEERING

COURSE DESCRIPTION FORM2019/2020-2

COURSE INFORMATON				
Course Code	**MSN 504**	**Course Title**	**Advanced Thermodynamics**	
Semester	*Credits*	*ECTS*	*C +P + L Hour*	Prerequisites
2	**3**	**10**	**3 + 0 + 0**	**MSN 213**

Language of Instruction	**Course Level**	**Course Type**
English	Graduate	Elective

Course Coordinator	Prof. Dr. Taner Akbay
Instructors	Prof. Dr. Taner Akbay
Assistants	Res. Assist. Burcu Üçok
Goals	This course will help guide graduate students learn how to apply and anlyse thermodynamic concepts and definitions applicable to advanced materials processing. First and second laws of thermodynamics; internal energy, heat and work, heat capacities, enthalpy and entropy (statistical interpretation) will be reviewed. Through the use of basic thermodynamic principles and relationship between thermodynamic properties, the concept of exergy will be introduced.
Content	Theory, principles, conceptual understanding and application of materials thermodynamics.
Contribution of the Course to the Professional Education	Ability to apply the laws of thermodynamics to determine the properties and efficiencies of materials and processes respectively.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
Ability to use theoretical and applied knowledge in these areas in complex engineering problems.	1b	1,2	C,D
Ability to write effective reports and comprehend written reports, prepare design and production reports,	7c	1,2	C,D
Ability to make effective presentations,	7d	1,2	C,D

Teaching Methods:	1: Lecture by instructor, 2: Lecture by instructor with class discussion, 3: Problem solving by instructor, 4: Use of simulations, 5: Problem solving assignment, 6: Reading assignment, 7: Laboratory work, 8: Term research paper, 9: Presentation by guest speaker, 10: Sample Project Review, 11: Interdisciplinary group working, 12: ...
Assessment Methods:	A: Written exam, B: Multiple-choice exam C: Take-home quiz, D: Experiment report, E: Homework, F: Project, G: Presentation by student, H: ...

COURSE CONTENT

Week	Topics	Study Materials
1	Introduction, thermodynamic variebles and zeroth law	Lecture notes
2	State variables and functions, heat, work and first law	Lecture notes
3	Heat capacity	Lecture notes
4	Types of work, entropy, enthalpy and second law	Lecture notes
5	Gibbs free energy	Lecture notes
6	Individual assignments	-
7	Pheases, phase stability, molar quantities, Gibbs phase rule	Lecture notes
8	Individual term assignments	-
9	Homogeneous mixtures	Lecture notes
10	Statistical interpretation of entropy	Lecture notes
11	Behaviour of solutions, ideal and regular solutions	Lecture notes
12	Concept of exergy	Lecture notes
13	Individual term assignment presentations	-
14	Individual term assignment presentations	-
15	Summary and wrap up	Lecture notes

RECOMMENDED SOURCES

Textbook	Introduction to Thermodynamics of Materials, D. R. Gaskell, D. E. Laughlin
Additional Resources	

MATERIAL SHARING

Documents	Textbook and lecture notes
Assignments	Individual projects

Exams	Peer instruction, presentations and discussions

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Class Participation	1	10
Individual Presentatiins	2	25
Final Report	1	40
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES		
No	Program Learning Outcomes	check ✓
1a	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline,	
1b	Ability to use theoretical and applied knowledge in these areas in complex engineering problems.	✓
2a	Ability to identify, formulate, and solve complex engineering problems,	
2b	Ability to select and apply proper analysis and modeling methods for this purpose.	
3a	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result,	
3b	Ability to apply modern design methods for this purpose.	
4a	Ability to devise, select and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice.	
4b	Ability to employ information technologies effectively.	
5a	Ability to design experiments for investigating complex engineering problems or discipline specific research questions,	
5b	Ability to conduct experiments, gather data, analyze and interpret results for investigating complex	

	engineering problems or discipline specific research questions.	
6a	Ability to work efficiently in intra-disciplinary teams,	
6b	Ability to work efficiently in multi-disciplinary teams,	
6c	Ability to work individually.	✓
7a	Ability to communicate effectively in Turkish, both orally and in writing,	
7b	Knowledge of a minimum of one foreign language,	
7c	Ability to write effective reports and comprehend written reports, prepare design and production reports,	✓
7d	Ability to make effective presentations,	✓
7e	Ability to give and receive clear and intelligible instructions.	✓
8a	Recognition of the need for lifelong learning, ability to access information, ability to follow developments in science and technology,	
8b	Ability to continue to educate him/herself.	
9a	Consciousness to behave according to ethical principles and professional and ethical responsibility.	
9b	Knowledge on standards used in engineering practice.	
10a	Knowledge about business life practices such as project management, risk management, change management.	
10b	Awareness in entrepreneurship and innovation.	
10c	Knowledge about sustainable development.	
11a	Knowledge about the global and social effects of engineering practices on health, environment, and safety,	
11b	Knowledge about contemporary issues of the century reflected into the field of engineering.	
11c	Awareness of the legal consequences of engineering solutions.	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course duration (lectures)	14	3	42
Off-the-classroom study (prep., and review)	14	6	85
Presentation	1	3	3
Off-the-classroom study for presentation	1	60	60
Off-the-classroom study for the final exam	1	60	60
Total Work Load			249
Total Work Load / 25 (h)			9,96
ECTS Credit of the Course			10

Prepared by: Prof. Dr. Taner Akbay	Preparation date: 01.06.2020