THERMODYNAMICS

1	Course Title:	THERMODYNAMICS	
2	Course Code:	GMD2209	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	2	
6	Semester:	3	
7	ECTS Credits Allocated:	3.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Yrd.Doç.Dr. ERHAN PULAT	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	pulat@uludag.edu.tr , 0 224 2941982 Uludağ Üniversitesi, Makina Mühendisliği Bölümü, Oda No: 217, Görükle, 16059, Bursa.	
17	Website:		
18	Objective of the Course:	Teaching of fundamental concepts and laws of thermodynamics by engineering approach.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Explaining of thermodynamic concepts and laws by proper using of thermodynamic terminıology.
		2	Doing distinction between pure substance and ideal gas, finding or determination of properties of substances.
		3	Using of first and second law of thermodynamics in problem solving.
		4	Doing proper assumptions to solve thermodynamic problems and obtaining thermodynamic data.
		5	Knowing performance limits of heat engines. Having possible environmental effects of heat engines, refrigerators, and heat pumps.
		6	Doing distinction between closed and open systems.
		7	Constructing relations of thermodynamics with other engineering branches, social disciplines, and ecosystems.
		8	
		9	
		10	
21	Course Content:		

Course Content:

Week	Theoretical	Practice
1	Introduction to thermodynamics, definitions, closed and open systems, properties, processes and cycle.	

2	Pure substances, equilibrium diagrams, thermodynamic tables, equations of state, ideal gas equation of state..	
3	Work and Heat. Moving boundary work.	
4	Nature of work and heat, heat transfer rate and power.	
5	First law of thermodynamics, internal energy, enthalpy, and specific heats.	
6	First law analysis, internal energy, enthalpy and specific heats of ideal gases.	
7	Second law of thermodynamics. Heat sources. Carnot's principle. Heat engines. Thermal efficiency. Heat pumps and refrigerators. Coefficient of performance, Clausius's and Kelvinb Planck's statements.	
8	Review and mid-term exam.	
9	Reversible and irreversible processes. Carnot cycle. Thermodynamic temperature scale.	
10	Entropi. Clausius's inequalty. Property diagrams related to entropi. Increase of entropi principle.	
11	Entropi change of pure substance. Entropi change of ideal gases. Reversible and irreversible processes of pure substances and ideal gases.	
12	Control volume analysis. Continuity equation	
13	Calculation of work for SSSF processes. Analysis of various SSSF processes	
14	Uniform State Uniform Flow (USUF)	
15	Textbooks, References and/or Other	Textbook: Mühendislik Termodinamiğin Temelleri, Cilt 1, [illegible] References: [illegible] Yayıncılık 3. Basım, Ekim 2000, İstanbul. 3. Çözümlü Termodinamik Problemleri, A.N. Eğrican, H. Heldman, Academic Press An Imprint of Elsevier, 3rd Ed., 5. Fundamentals of Food Process Engineering, R. T. Toledo, Springer, 2007, N.Y., U.S.A. 6. Introduction to Food Process Engineering, P. G. Smith, Kluwer Academic/Plenum Publishers, 2003, U.S.A.
16	Self study and preparation	
17	Homeworks	
18	Projects	
19	Field Studies	
20	Midterm exams	
21	Others	
22	Final Exams	
23	Assesment	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	0	0.00	0.00
Self study and preparation	14	2.00	28.00
Homeworks	5	3.00	15.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	9.00	9.00
Others	0	0.00	0.00
Final Exams	1	10.00	10.00
Total Work Load			90.00
Total work load/ 30 hr			3.00
ECTS Credit of the Course			3.00

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	40.00
Quiz	0	0.00
Home work-project	5	10.00
Final Exam	1	50.00
Total	7	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	5	3	3	4	3	3	3	2	3	3	0	0	0	0	0
ÖK2	5	5	3	3	4	3	3	3	2	3	3	0	0	0	0	0
ÖK3	5	5	3	3	4	3	3	3	2	3	3	0	0	0	0	0
ÖK4	5	5	3	3	4	3	3	3	2	3	3	0	0	0	0	0
ÖK5	5	5	3	3	4	3	3	3	2	3	3	0	0	0	0	0
ÖK6	5	5	3	3	4	3	3	3	2	3	3	0	0	0	0	0
ÖK7	5	5	3	3	4	3	3	3	2	3	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**