COMBINED HEAT-POWER SYSTEMS

1	Course Title:	COMBINED HEAT-POWER SYSTEMS
2	Course Code:	MAK6212
3	Type of Course:	Optional
4	Level of Course:	Third Cycle
5	Year of Study:	1
6	Semester:	2
7	ECTS Credits Allocated:	5.00
8	Theoretical (hour/week):	3.00
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:	Prof. Dr. MUHSIN KILIÇ
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	Prof.Dr. Muhsin Kılıç mkilic@uludag.edu.tr Adres: Uludağ Üniversitesi Mühendislik-Mimarlık Fakültesi Ali Durmaz Makine Mühendisliği Binası DM:220 16059 Görükle/BURSA Tel: 0224 294 1953
17	Website:	
18	Objective of the Course:	The objectives of this course are to reinforce the students grasp of classical thermodynamics, to teach the combined heat-power cycles and their applications.
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	

	1	Understanding of the basic thermodynamic definitions and concepts.
	2	Evaluation of the thermodynamic state and properties for pure substances and ideal gases.
	3	Evaluation of the work and heat transfer of processes.
	4	Application of the principles of conservation of mass and the 1st Law of Thermodynamics to closed and open systems.
	5	Understanding of the termodynamics cycles and their applications.
	6	Evaulation of the combined heat-power cycles and their applications.
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21	Course Content:	
	Course Content:	
Week	Theoretical	Practice

1	Review of basic thermodynamic definitions and concepts.	
2	Open systems, first law applications.	
3	Application of first law to ideal gases. Variable specific heats of ideal gases.	
4	Second law and Carnot cycle. Heat engine, refrigeration machine and heat pumps.	
5	Entropy. Internal and external irreversibilities. TdS relations. Reversible work, actual work, usefull work and lost work.	
6	Availability (Exergy) analysis. Second law efficiency.	
7	Gas cycles: Ericson, Stirling, Brayton cycles	
8	Repeating courses and midterm exam	
9	Gas cycles: Otto and diesel cycles	
10	Pure substances cycles and applications	
11	Pure substances cycles and applications	
12	Basics of the combined heat-power cycles	
13	Combined heat-power cycles applications	
14	Evaulation of the combined heat-power cycles applications	

22	Textbooks, References and/or Other Materials:	1. K. Wark. Advanced Thermodynamics for Engineers. McGraw-Hill Inc., 1994. 4. Y. A. Çengel and M. Boles. Thermodynamics: An Engineering Approach, 5th Ed., Güven Yayınevi 5. A.T. Sayers. Hyraulic and Compressible Flow

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	3.00	42.00
Homeworks	6	12.00	72.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	18.00	18.00
Others	0	0.00	0.00
Final Exams	1	22.00	22.00
Total Work Load			196.00
Total work load/ 30 hr			6.53
ECTS Credit of the Course			5.00

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Quiz	0	0.00
Final Exam	1	50.00

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	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	5	5	4	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	4	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	4	4	3	0	0	0	0	0	0	0	0	0	0	0	0	3
ÖK5	4	5	4	0	0	0	0	0	0	0	0	0	0	0	0	3
ÖK6	5	5	5	0	0	0	0	0	0	0	0	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**			