ESOGÜ Mechanical Engineering Department
COURSE INFORMATION FORM

SEMESTER	SPRING

COURSE CODE	151817431 - 151817431	COURSE NAME	GAS TURBINES

SEMESTER	WEEKLY COURSE PERIOD			COURSE OF			
	Theory	Practice	Laboratory	Credit	ECTS	TYPE	LANGUAGE
8	3	0	0	3	5	COMPULSORY ( ) ELECTIVE (X)	ENGLISH

COURSE CATAGORY			
Basic Science	Basic Engineering	Mechanical Engineering [if it contains considerable design, mark with (√)]	Social Science
	X	( )	

ASSESSMENT CRITERIA			
	Evaluation Type	Quantity	%
MID-TERM	1st Mid-Term	1	40
	2nd Mid-Term		
	Quiz		
	Homework		
	Project		
	Report		
	Others (……)		
FINAL EXAM		1	60

PREREQUIEITE(S)	
COURSE DESCRIPTION	Introduction to gas turbines; shaft-power and aircraft propulsion gas turbine engine cycles. Compressors; compressor performance, energy transfer, velocity diagram for an axial-flow compressor, flow coefficient, work coefficient, Mach number, hub-to-tip ratio, De Haller number, hub and tip effects, degree of reaction, multistage axial-flow compressors, actual axial-flow compressor stage, off-design performance of multistage axial-flow compressors, centrifugal-flow compressors, axial-centrifugal compressors, problems. Turbines; turbine performance, blade notation for ideal axial-flow turbines, stage velocity diagram for an axial-flow turbine, energy transfer, degree of reaction, impulse turbine, velocity diagram types for axial-flow turbines, hub and tip effects, actual axial-flow turbine stages, turbine cooling, turbine cooling techniques using air as coolant, liquid-cooled turbine blades, problems.
COURSE OBJECTIVES	To give students detailed knowledge about axial-flow compressors, centrifugal-flow compressors, axial-flow turbines , energy transfer, and gas turbine science and technology.
ADDITIVE OF COURSE TO APPLY PROFESSIONAL EDUATION	After taking up the course, the students will be capable to analyse, understand compressor performance, turbine performance, energy transfer, and gas turbine systems; and also follow and understand the new developments in the gas turbine science and technology area, and put their skills in practice in the field of gas turbine technology in industry.
COURSE OUTCOMES	1. Analyses the compressor and turbine performance. 2. Knows the energy transfer. 3. Recognizes the axial-flow compressors, centrifugal-flow compressors. 4. Comprehends the axial-flow turbines. 5. Determines the degree of reaction. 6. Distinguishes and analyses compressors and turbines. 7. Understands the turbine cooling techniques. 8. Identifies gas turbine systems and thermal power plant systems.
TEXTBOOK	William W. Bathie, **" FUNDAMENTALS OF GAS TURBINES "**, Second Edition, John Wiley & Sons, Inc., New York, 1996.
OTHER REFERENCES	H. Cohen, G. F. C. Rogers and H. I. H. Saravanamuttoo, **" GAS TURBINE THEORY "** , Second Edition, Longman, 1996.
TOOLS AND EQUIPMENTS REQUIRED	

COURSE SYLLABUS	
WEEK	**TOPICS**
1	Compressors; compressor performance, energy transfer, velocity diagram for an axial-flow compressor,
2	Flow coefficient, work coefficient, Mach number, hub-to-tip ratio, De Haller number, hub and tip effects, degree of reaction,
3	Multistage axial-flow compressors, actual axial-flow compressor stage, off-design performance of
4	multistage axial-flow compressors, centrifugal-flow compressors,
5	axial-centrifugal compressors, problems.
6	Turbines; turbine performance, blade notation for ideal axial-flow turbines, stage velocity diagram for an axial-flow turbine
7	,energy transfer, degree of reaction, impulse turbine, velocity diagram types for axial-flow turbines
8	Mid-Term Examination
9	Mid-Term Examination
10	turbine cooling,
11	Mid-Term Examination 2
12	turbine cooling techniques using air as coolant,
13	liquid-cooled turbine blades,
14	Problems.
15,16	Final Exam

NO	PROGRAM OUTCOMES	3	2	1
1	Sufficient knowledge of engineering subjects related with mathematics, science and Mechanical Engineering; an ability to apply theoretical and practical knowledge on solving and modeling of Mechanical Engineering problems.	X		
2	Ability to determine, define, formulate and solve complex Mechanical Engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods.	X		
3	Ability to design a complex system, a component and/or an engineering process under real life constrains or conditions, defined by environmental, economical and political problems; for that purpose an ability to apply modern design methods.			X
4	Ability to develop, select and use modern methods and tools required for Mechanical Engineering applications; ability to effective use of information technologies.			X
5	In order to investigate Mechanical Engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results.		X	
6	Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence.		X	
7	Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language.		X	
8	Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement.	X		
9	Understanding of professional and ethical issues and taking responsibility	X		
10	Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development.			X
11	Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions.			X
1:None. **2**:Partially contribution. **3**: Completely contribution.				

Prepared by: **Prof. Dr. Tahir KARASU, D.I.C** **Date:** 15.04.2013

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