HYDRAULIC MACHINERY

1	Course Title:	HYDRAULIC MACHINERY	
2	Course Code:	MAK3006	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	3	
6	Semester:	6	
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:	No	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. İRFAN KARAGÖZ	
15	Course Lecturers:	Prof.Dr. İrfan Karagöz Prof.Dr. Atakan Avcı	
16	Contact information of the Course Coordinator:	karagoz@uludag.edu.tr 40018	
17	Website:		
18	Objective of the Course:	This course is designed to introduce engineering students to the application of governing fluid flow equations and dimensional analysis to the hydraulic machinery, to give the student working knowledge of the principles, design and operation of pumps and turbines.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Ability to apply the basic principles and equations governing the fluid flow to turbomachinery
		2	Ability to analyze the means by which the energy transfer is achieved in the chief types of hydraulic machines and efficiency
		3	Ability to explain the principles, design and operation characteristics of pumps and turbines
		4	Ability to use the dimensionless numbers for turbomachines
		5	Ability to analyze and design hydraulic machinery systems,
		6	Ability to select the right type of pump and turbine for given operating conditions
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21	Course Content:		

Course Content:

Week	Theoretical	Practice

1	Review of the governing equations of fluid mechanics and thermodynamics. Definition of turbomachines and classification	
2	Basic theory of turbomachinery. Euler equation. Definitions of velocities	
3	Hydraulic turbines. Definitions of power and efficiencies	
4	Action turbines. Basic theory, design and operation	
5	Reaction turbines. Basic theory, design and operation.	
6	Cavitation. Quiz 1	
7	Analysis and design of axial flow hydraulic turbines.	
8	Related dimensionless parameters and similarity.	
9	Repeating courses and midterm exam	
10	Pumps and fans. Definitions of power and efficiencies. Classification	
11	Centrifugal pumps and fans. Basic theory and design	
12	Cavitation in pumps. Characteristic curves	
13	Pump application and selections. Similarity in pumps.	
14	Positive displacement machinery, Quiz 2	

22	Textbooks, References and/or Other Materials:	1. Hidrolik Makinalar , İ. Karagöz, Bursa, 2009 2. Su Makinaları Problemleri, H.F. Yazıcı, İTÜ, 1983 3. Hydraulic and Compressible Flow Turbomachines T. Sayers , McGraw-Hill, 1993
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	30.00
Quiz	2	20.00
Home work-project	0	0.00
Final Exam	1	50.00
Total	4	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**

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	12	3.00	36.00
Homeworks	5	8.00	40.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	8.00	8.00
Others	3	4.00	12.00
Final Exams	1	12.00	12.00
Total Work Load			150.00
Total work load/ 30 hr			5.00
ECTS Credit of the Course			5.00

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	4	3	0	2	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	0	4	0	3	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	5	0	0	3	0	0	0	0	0	0	0	0	0	0	0
ÖK4	2	4	3	0	5	0	0	0	0	0	0	0	0	0	0	0
ÖK5	2	2	5	0	3	0	0	0	0	0	0	0	0	0	0	0
ÖK6	1	0	4	0	2	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**