Philadelphia University

Faculty of Engineering - Department of Mechanical Engineering

Course Information

Title:	Hydraulic Machines (0620528)
Prerequisite:	Fluid Mechanics (1)
Credit Hours:	3 credit hours (16 weeks per semester, approximately 44 contact hours)
Textbook:	Hydraulic Machines, K Subramanya, Tata McGraw Hill Education Private Limited, 2013.
References:	1. Hydraulic and Compressible Flow Turbo-machines, A. T. Sayers, McGraw-Hill, 1990. 2. A Text Book of Fluid Mechanics and Hydraulic Machines by R. K. Bansal. 3. Basic Fluid Mechanics and Hydraulic Machines by Zoeb Husain, Mohd. ZulkiflyAbdullah and Zainal Alimuddin
Catalog Description:	This course object to give the student knowledge about: the geometry and design of turbo machines, the approach of two dimensional cascades and velocity triangles in the analysis of turbo-machines, define the efficiency of turbine and compressor machines, the operation of axial and centrifugal turbo machines and the performance of hydraulic turbines such as: *Pelton, Francis* and *Kaplan* turbines
Websites:	http://www.philadelphia.edu.jo/academics/adaraje/ http://www.philadelphia.edu.jo/academics/laithb/
Instructors:	Prof. Assim Hammed Yousif Al-Daraje **Email**: adaraje@philadelphia.edu.jo **Office**: Engineering building, room E61306 , ext: 2206 **Office hours**: Sunday, Tuesday and Thursday 10:00 – 11:00

Course Topics

Week	Topic
1-2	**Chapter 1: Introduction hydraulic machines**
3-5	**Chapter 2: reaction turbines (Francis turbines)**
7 - 8	**Chapter 4: impact turbines (Pelton wheel)**
9 – 11	**Chapter 5: centrifugal pumps**
12- 13	**Chapter 3: reaction turbines (Kaplan turbines)**
14 – 15	**Chapter 7: miscellaneous hydraulic machinery and devices**
16	Review, and final exam

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should:

1.	Have the ability to differ between different types of hydraulic machines	[1]

2.	Use similarity analysis to select similar machines and test analysis	[2]
3.	Drawing velocity triangles for all types of hydraulic machines	[2]
4.	Design a Pelton wheel hydraulic system and test analysis	[2]
5.	Design a Francis turbine hydraulic system	[2]
6.	Design a Kaplan turbine hydraulic system	[2]
7	Understand the principle of work for a centrifugal pump and test analysis	[6]
8	Learning the selection criteria for centrifugal pumps and test analysis	[6]

Assessment Instruments:

Evaluation of students' performance (final grade) will be based on the following categories:

Exams: Two written exams will be given. Each will cover about 3-weeks of lectures

Quizzes: 10-minute quizzes will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s).

Participation: Questions will be asked during lecture and the student is assessed based on his/her response

Final Exam: The final exam will cover all the class material.

Grading policy:

First Exam	20%
Second Exam	20%
Quizzes and participation	15%
Homework	5%
Final Exam	40%
Total:	100%

Attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

February, 2017