Philadelphia University

Faculty of Engineering - Department of Mechanical Engineering
First Semester 2017/2018

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. Hydrolic and Compressible Flow Turbo-machines, A. T. Sayers, McGraw-Hill, 1990. 2. A TextBook 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 **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	a
2.	Use similarity analysis to select similar machines	c, k
3.	Drawing velocity triangles for all types of hydraulic machines	a, j
4.	Design a Pelton wheel hydraulic system	c, k
5.	Design a Francis turbine hydraulic system	c, k
6.	Design a Kaplan turbine hydraulic system	c, k
7	Understand the principle of work for a centrifugal pump	a, k
8	Learning the selection criteria for centrifugal pumps	a, k, c

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.

CRITERION 3. STUDENT OUTCOMES (SOS)

a. The program must have documented student outcomes that prepare graduates to attain the program educational objectives.

b. an ability to design and conduct experiments, as well as to analyze and interpret data.

c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability.

d. an ability to function on multidisciplinary teams.

e. an ability to identify, formulate, and solve engineering problems.

f. an understanding of professional and ethical responsibility.

g. an ability to communicate effectively.

h. an ability to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

i. an ability to engage in life-long learning.

j. a knowledge of modern issues.

k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.