College of Engineering

Department of Civil Engineering

CE 427 Hydraulics of Pressurized Flow

Credit and Contact hours	3 / 3 (Lectures), 1 (Tutorials), 0 (Laboratory)
Required, or Elective	Elective for a BSCE degree
Course Description	Dimensional analysis (Buckingham's Pi-Theorem) and similarity, review of the hydrodynamics conservation laws (mass, energy and momentum), types of pumps and turbines, hydraulic system curves, pump characteristic curves (head, power, efficiency), pumps connected in parallel and in series, applications of pumps and turbines in common pipe flow setups (e.g. pump stations in pipe networks and pipelines, turbines in hydropower generation).
Prerequisites or Co-requisites	CE324 (Hydraulics)
Course Learning Outcomes	Students completing this course successfully will be able to

Course Learning Outcomes	***Related Student Outcomes (SO)***
CLO1: Apply principles of conservation of mass, energy and momentum to different connected types of pumps and turbines in pipeline and networks systems.	**SO2**
CLO2: Analyze and evaluate the performance of different types of pumps and turbines in common pressurized flow setups.	**SO4**

Student Outcomes related to this Course	**SO 2.** an ability to apply **engineering design** to produce solutions that meet specified needs with consideration of **public health**, **safety**, and **welfare**, as well as **global, cultural, social, environmental, and economic factors**. [ABET 2] **SO 4**. an ability to recognize **ethical** and **professional responsibilities** in engineering situations and make **informed judgments**, which must consider the **impact of engineering solutions in global, economic, environmental, and societal contexts.[**ABET 4]

<table>
<tr><td rowspan="4">Topics Covered</td><td>List of Topics</td><td>Related CLOs</td></tr>
<tr><td>1. Introduction to different types of pumps and turbines.</td><td>CLO1</td></tr>
<tr><td>2. System and characteristic curves of pumps; pumps in parallel and series</td><td>CLO2</td></tr>
<tr><td>3. Applications in common pipe flow setups.</td><td>CLO1 and CLO2</td></tr>
<tr><td>Textbook(s) and Other Required Material</td><td colspan="2">1. Gupta, R. S. (2016). Hydrology and hydraulic systems. Waveland Press.
2. Potter, M. C., Wiggert, D. C., & Ramadan, B. H. (2016). Mechanics of fluids. Nelson Education.
3. Mays, L. W. (2019). Water resources engineering. John Wiley & Sons.</td></tr>
<tr><td>Grading System</td><td colspan="2">Home works and quizzes 10%
Two Midterm Exams 40%
Final Examination 40%</td></tr>
<tr><td>Instructors</td><td colspan="2">Dr.Faisal M. Alfaisal (2A93), email; falfaisal@ksu.edu.sa</td></tr>
<tr><td>Date of Review</td><td colspan="2">September 2020</td></tr>
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