Department of Civil and Environmental Engineering
CE 320A – Hydraulics Laboratory

Fall 2023 – Wednesday – **Prof. Piotr Wiszowaty**
Section 101 6:00 – 9:00 p.m.

Introduction: Welcome to the CEE Hydraulics Laboratory. This is the place where you will "put to the test" the theory that you are learning in the classroom. The Hydraulics Laboratory course (CE 320A) is designed to complement the lecture portions of the three water-oriented courses: Fluid Mechanics (CE 320), Water Resources (CE 321), and Hydraulics Engineering (CE 322). The specific objectives of this course are to provide the student with an opportunity to:

1. Explore the fundamental principles of fluid mechanics through experimentation;
2. Demonstrate and analyze key hydraulic phenomena using hands-on physical devices and computer modeling;
3. Investigate engineering design principles for pipe networks, open channel systems, and ground water regimes;
4. Develop skills for analyzing experimental data and working in teams;
5. Learn to design a custom hydraulics experiment.

Fortunately, many real world hydraulic phenomena can be easily simulated at a reduced laboratory scale. This is due to the fact that fluids adhere quite closely to the principles of *engineering similitude*. Thus, the experiments in the CEE Hydraulics Laboratory provide an excellent opportunity for you to visualize and analyze the very same hydraulic phenomena that you are studying in class and will apply as practicing engineers.

Prerequisites: CE 320 is pre-requisite or co-requisite.

Lab Manual:

1. *Hydraulics Laboratory Manual*, by J.R. Schuring and W.P. Shu, 2010.

Reference Textbook (Same as the assigned text for CE320: Fluid Mechanics):

1. *Hibbeler, Fluid Mechanics, 2nd Edition*, Pearson. (print copy is not required)

Laboratory Assignments: Lab assignments will be given weekly and lab reports must be handed in or uploaded before the start time of the following class, unless otherwise announced. Late assignments will not be accepted. Some lab reports will be written and submitted individually by the student. In completing individual reports, students in the same group will share data, although all analyses and written text must be the student's own work.* Several group-written reports will be assigned during the semester. For some experiments, an abbreviated assignment in a "lab problem" format will be used.

***Honor Code:** Students are advised that the NJIT Honor Code will be upheld in this course, and any violations will be brought to the immediate attention of the Dean of Students.

Grading Basis: Lab Reports and Lab Problems = 95%; Attendance & Class Participation = 5%

Contact Information: Prof. Piotr Wiszowaty
Office: Colton Hall 311
Contact: pw38@njit.edu , 732-522-1062
Office Hours: Wednesday 5pm – 5:50pm by appointment

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Laboratory 6:00 – 9:00PM **101** Prof. Piotr Wiszowaty

COURSE OUTLINE

Week	Topics	Assignment	Report*
1	General Orientation and Lab Safety; Manometer Principles **(6)**	Safety Procedures	LP
2	Continuity and Flow Measurement **(3)**	Lab 4	LP
3	Viscosity of Liquids **(6)**	Lab 1	LR
4	Weir Flow **(6)**	Lab 9	LP
5	Hydrostatics: Archimedes Principle of Buoyancy **(4)**	Lab 3	LR
6	Bernoulli's Principle and Equation: ▪ Torricelli and Bernoulli Tank Exp. **(6)** ▪ Venturi Apparatus **(1)**	Lab 5	LP
7	Pipe Phenomena ▪ Friction Loss and Minor Losses (Class Exp.)	Lab 7	LR
8	Hydraulic Jump, Translatory Waves & Water Hammer ▪ Flow Visualization Chamber (Class demo) ▪ C4 Flume **(1)** ▪ F1-10 Bench (**1**)	Lab 8	LP
9	Manning's Equation **(1)**	Handout	GR
10	Centrifugal Pump Network **(1)** Student-Designed Hydraulics Experiment Introduction	Lab 10 Lab 13	LP GR
11	Stream Gaging – Field Exercise (6) (This will be held at Memorial Park in Nutley on a Saturday)	Lab 12	LP
12	Student-Designed Hydraulics Experiment (cont.)	Lab 13	GR
13	Student-Designed Hydraulics Experiment (cont.)	Lab 13	GR
14	Student-Designed Hydraulics Presentation	Lab 13	GR
15	**FINAL EXAM PERIOD** (no final in this course)		

*Legend of Report Type:
LR = Individual lab report
LP = Individual lab problem
GR = Group lab report

Note: Students will be consulted on any substantial changes to the course syllabus. Changes will be discussed and announced in advance.