



College: Engineering

Department: Civil

Course Title: Hydraulic Laboratory

Course No: 0901311

Credit Hours: 1Hours

Semester: First

About The Course

Course Title: Hydraulic Lab

Class: HYD. Lab

Course No: CE311

Credit Hours: 1

Lecture Room: HYD. Lab

Obligatory/ Optional: Obligatory

Text Book: Fluid Mechanics and Hydraulics Laboratory Manual

The Instructor

Name: Dr. Essam Ali Mahmood

Title: Full time lecturer

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Course Description

This laboratory course is designed to provide insight and experience into the fundamental principles taught in fluid mechanics and hydraulics courses. These principles include: Fluid properties: density, specific gravity, viscosity; fluid characteristics; continuity; conservation of energy; fluid behavior; center of pressure; pipe flow; open channel flow; and pump performance.

Course Objectives

- Students are able to apply knowledge of engineering
- Students are able to design and conduct experiments
- Students are able to analyze and interpret data
- Students are able to work cooperatively and Students are able to apply knowledge of engineering

Learning Outcome

After successfully completing this course, the students should be able to understand Hydraulic Laboratory.

Course Outline and Time schedule

Week	Course Outline
First week	Measurements of fluid properties
2 nd week	Osborne Reynolds Apparatus
3 rd week	Bernoulli's Theorem Demonstration Apparatus
4 th week	Venturi Meter
5 th week	Hydrostatic forces and center of pressure

6 th week	Pumps (single, Series and parallel)
7 th week	Midterm Exam
8 th week	Pelton Wheel Turbine
9 th week	Weirs
10 th week	Hydraulic jump in open channel flow
11 th week	FINAL EXAM

Presentation methods and techniques

Methods of teaching varied according to the type of text, student and situation. The following techniques are usually used:

- 1- Lecturing with active participations.
Involve the civil engineering students in asking some questions related to the target topic of the course.
- 2- Problem solving.
Encourage the students to solve the given assignments and submit them at the definite time,
- 3- Cooperative learning.
By enhancing the students studying in groups .
- 4- Discussion.
To discuss the results and the answers of the target problems.
- 5- Learning by activities.
To encourage the students to some group activity.
- 6- Connecting students with different sources of information.

Sources of information and Instructional Aids

- Computer softwear ... power point
- Using weight board.

Assessment Strategy and its tools

The assigned syllabus is assessed and evaluated.

Through: feedback and the skills that are acquired by the students

The tools:

- Assignments: 10%
- Attendance: 10%
- Term Tests And report: 20 +20%
- Final Examination: 40 %

Tool & Evaluation

Tests are permanent tools & assessment, in addition to the activity file which contains curricular and the co-curricular activities, research, report papers and the active participation of the student in the lecture.

The following table clarifies the organization of the assessment schedule:

Test	Date	Grade
Midterm		20
Activities & Participation	Students should be notified about their marks	40
Final Exam		40

Activities and Instructional Assignment

- 1- Practical assignments to achieve the syllabus objectives.
- 2- Group Activity and demonstrations.

Regulations to maintain the teaching-Learning Process in the Lecture:

- 1- Regular attendance.
- 2- Respect of commencement and ending of the lecture time.

- 3- Positive relationship between student and teacher.
- 4- Commitment to present assignments on time.
- 5- High commitment during the lecture to avoid any kind of disturbance and distortion.
- 6- High sense of trust and sincerity when referring to any piece of information and to mention the source.
- 7- The student who absents himself should submit an accepted excuse.
- 8- University relevant regulations should be applied in case the students behavior is not accepted.
- 9- Allowed Absence percentages is (%).

References:

1. A textbook of Fluid Mechanics by "Dr. R.K. Bansal", Laxmi publications ,2004.
2. Fluid Mechanics (SI Units), Yunus A . Cengel John M Oimbala, 2nd Ed., Tata McGraw Hill, 2006.
3. Fluid Mechanics and Fluid power Engineering , Kumar D.S, kataria and Sons .,2004.
4. <https://en.wikipedia.org/wiki/Viscometer>.
5. <https://www.scribd.com/doc/315983949/Hydraulic-Jump-Experiment-Complete-Report>.
6. <https://www.scribd.com/doc/246653261/Bernoulli-s-Principle-Demonstration-Lab-Report>.
7. <https://www.scribd.com/doc/67807920/Lab-Report-for-Venturi-Meter>.

8. <https://blog.craneengineering.net/operating-centrifugal-pumps-in-series-or-parallel>.
9. <https://www.mathalino.com/reviewer/fluid-mechanics-and-hydraulics/total-hydrostatic-force-plane-and-curved-surfaces>.
10. https://en.wikipedia.org/wiki/Open-channel_flow.
11. <http://www.pumpfundamentals.com/micro-hydro.htm>
- 12 https://en.wikipedia.org/wiki/Specific_gravity.
13. <https://www.scribd.com/doc/106767949/Reynolds-Number>.
14. Chadwick, A. and J. Morfett, 1986, Hydraulics in Civil Engineering, Allen & Unwin, Ltd., London.
15. Chevalier, L.R. and Craddock, J.N., 2002, NSF Lab Project: Civil and Environmental Engineering Laboratories, Available Online: < <http://civil.engr.siu.edu/nsflab/> >.
16. Chow, V.T., 1959, Open-Channel Hydraulics, McGraw-Hill, New York, NY.
17. Hwang, N.H.C, 1981, Fundamentals of Hydraulic Engineering Systems, PrenticeHall, Inc., Englewood Cliffs, NJ. Mott, R.L., 1990, Applied Fluid Mechanics, 3rd Ed., Merrill Publishing Co., Columbus, OH.
18. <http://www.engineeringcivil.com/weirs.html>.

Syllabus Classification

Objectives	<i>Learning outcome</i>	<i>Assessment tools</i>
Introduction	<i>Report Writing</i>	<i>.By using solved problems Power point and weight board.</i>
Measurements of fluid properties	Students are able to apply knowledge of engineering	<i>.By using solved problems Power point and weight board.</i>
RE and Bernoulli's Theorem, Venturi	Students are able to design and conduct experiments	<i>.By using solved problems Power point and weight board.</i>
Pumps and Turbine	Students are able to analyze and interpret data	<i>.By using solved problems Power point and weight board.</i>
Hydrostatic forces and Weirs Hydraulic jump in open channel flow	Students are able to work cooperatively and Students are able to apply knowledge of engineering	<i>.By using solved problems Power point and weight board.</i>