



College: Engineering

Department: Civil

Course Title: Hydraulics

Course No: CE311

Credit Hours: 3Hours

Semester: First

About The Course

Course Title: Hydraulics

Class:

Course No: CE311

Credit Hours: 3

Lecture Room:

Obligatory/ Optional: Obligatory

Text Book: Les Hamill "Understanding Hydraulics", Second Edition ,
2001, Polgrave

Reberson, J.A., Cassidy, J.J. and Chaudhry, M.H., 1998, "Hydraulic Engineering",
Second Edition, Prentice Hall.

The Instructor

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Course Description

Basic principles, Fluids in motion, Open channel flow, Uniform flow, Non-uniform flow, Flow under varying head, Flow through pipelines, Water turbines, Water pumps and understanding of hydrological processes

Topics covered:

1. Hydrostatics
2. Fluids in Motion
3. Flow Through Pipelines and closed conduits
4. Flow under Varying Head
5. Flow in Open Channels
6. Turbines and pumps

المبادئ الأساسية ، السوائل المتحركة ، تدفق القناة المفتوحة ، التدفق المنتظم ، التدفق غير المنتظم ، التدفق تحت رأس متغير ، التدفق عبر خطوط الأنابيب ، التوربينات المائية ، مضخات المياه وفهم العمليات الهيدرولوجية

المواضيع التي تمت تغطيتها:

1. الهيدروستاتيك
2. السوائل في الحركة
3. التدفق عبر خطوط الأنابيب والقنوات المغلقة
4. تدفق تحت رأس متغير
5. التدفق في القنوات المفتوحة
6. التوربينات والمضخات

Course Objectives

This course is intended for junior or senior level students who have completed a course in basic fluid mechanics. The objectives of this course is to:

- 1- Apply energy and momentum principles in hydraulic systems,
- 2- Distinguish between flow through pipes and open channels,
- 3- Know the main equations governing flow in open channels,
- 4- Analyze flow types, hydraulic jump and Design cross section for open channels
- 5- Calculate backwater curves,
- 6- Analyze flow in pipelines and design of networks,
- 7- Understand the performance of water pumps and design of pumping stations,

Learning Outcome

Making students aware of how language works to convey meaning as its basic function

Course Outline and Time schedule

Week	Course Outline
First week	Introduction
2 nd week	1.2 Hydrostatic pressure and force
	1.3 Force on a plane (flat), vertical immersed surface
	1.4 Location of the resultant force on a vertical surface
	1.5 Force on a plane, inclined immersed surface
3 rd week	1.6 Force on a curved immersed surface
	1.7 Variation of pressure with direction and buoyancy
	1.8 The hydrostatic equation
	1.9 Stratified fluids
4 th week	4.1 Introduction to the fundamentals
	4.2 Classifying various types of fluid flow
	4.3 Visualising fluid flow
	4.4 The continuity equation
	4.5 Understanding the momentum equation
5 th week	4.6 Applying the momentum equation
	4.7 The energy (or Bernoulli) equation
	4.8 Applying the energy equation
	4.9 Drag and lift
	4.10 Free and forced vortices
6 th week	6.1 Introduction
	6.2 Understanding reservoir – pipeline flow

	6.3 Parallel pipelines
	6.4 Branching pipelines
	6.5 The development of the pipe friction equations
	6.6 Head losses at changes of section

7 th week	Review & Exam I
8 th week	7.1 Introduction
	7.2 Time to empty a reservoir of uniform cross-section
	7.3 Time to empty a reservoir of varying cross-section
	7.4 Flow between two tanks
9 th week	8.1 Fundamentals
	8.2 Discharge equations for uniform flow
	8.3 Channel proportions for maximum discharge or velocity
	8.4 Compound channels and the composite Manning's n
10 th week	8.5 Environmentally acceptable channels
	8.6 Specific energy and critical depth
	8.7 Calculation of the critical flow conditions in any channel
11 th week	8.8 Calculation of the critical flow in a trapezoidal channel
	8.9 Calculation of the critical flow in a rectangular channel
	8.10 Flow transitions
	8.11 Gradually varying non-uniform flow
12 th week	Review & EXAM II

13 th week	11.1 Introduction
	11.2 Impulse turbines
	11.3 Reaction turbines
	11.4 Performance equations and characteristics of turbines
14 th week	11.5 Rotodynamic pumps
	11.6 Pump performance equations, affinity laws and specific speed
	11.7 Pump selection for a particular duty
	11.8 Avoiding problems with cavitation and surge
	11.9 Introduction to the analysis of unsteady pipe flow
15 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.
- 2- Problem solving.
- 3- Cooperative learning.
- 4- Discussion.
- 5- Learning by activities.
- 6- Connecting students with different sources of information

Sources of information and Instructional Aids

For example: Computer ... power point ...etc.

- Transparencies
- Distance learning
- Library sources

Assessment Strategy and its tools

The assigned syllabus is assessed and evaluated
Through: feed back and the skills that are acquired by the students

The tools:

- 1- Diagnostic tests to identify the students level and areas of weakness
- 2- Formal (stage) evaluation
 - a) Class Participation
 - b) Ist Exam
 - c) 2nd Exam
 - d) Activity file

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
First Exam		20
2 nd Exam		20
Activities & Participation	Students should be notified about their marks	20
Final Exam		40

Activities and Instructional Assignment

- 1- Practical assignments to achieve the syllabus objectives.
- 2-

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 (%).

Internet websites

- 1.....
- 2.....
- 3.....

References :

- 1.....

2.....

3.....

Syllabus Classification

Objectives	<i>Learning outcome</i>	<i>Assessment tools</i>
1-		
2-		
3-		
4-		
5-		

