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HYDRAULICS

COURSE INFORMATION

by

Nadiatul Adilah Ahmad Abdul Ghani
Faculty of Civil Engineering and Earth Resources
nadiatul@ump.edu.my

HYDRAULICS

- SUBJECT CODE : BAA 2723
- CREDIT HOURS : **3**
- CONTACT HOURS : 3
- PRE-REQUISITE : BAA 2713

Synopsis

This course introduces :

1. The **concept and use of equations** for open drainage and flow analyses (uniform & non-uniform flow) **in open channel**.

2. It also covers the various phenomena such as **hydraulic jump and backwater, specific energy concept application,** analyses of **hydraulics machinery** principles and **dimensional analysis & hydraulic similarity** concepts.

3. The **application software package** (HEC-RAS) will be introduced in this course.

Course Outcome

By the end of this course, students should be able to:

CO1: Describe the hydraulic principles and apply the fundamental concept in analyzing flow in open channels.

CO2: Differentiate and analyze the Rapidly Varied Flow (RVF) & Gradually Varied Flow (GVF) phenomena, then design the open channel for steady & unsteady flow cases using HEC-RAS Hydraulics Software.

CO3: Establish the dimensional analysis formulation and apply hydraulic similarity concepts in scaling analysis.

CO4: Discuss hydraulics machinery principles and apply the fundamental concepts in analyzing the performance of hydraulic pump.

Course Contents

- Topic 1: Flow in Open Channel
- Topic 2: Uniform Flow in Open Channel
- Topic 3: Non-Uniform Flow in Open Channel
- Topic 4: Software (Introduction and Application)
- Topic 5: Dimensional Analysis and Hydraulic Similarity
- Topic 6: Hydraulic Machinery

Planning Schedule

Week	Topic	Course Contents	Remarks
2 (Sept17 – 23)	**1. Flow in Open Channels**	1.1 Types of Channel 1.2 Types of Flow	
3 (Sept 24 –30)		1.3 Geometric Characteristics of Channels	
4 (Oct 1 – 7)	**2. Uniform Flow in Open Channels**	2.1 Resistance of Flow Formula 2.2 Determination of Normal depths by Various Methods	
5 (Oct 8 – 14)		2.3 Design of Open Channels 2.4 Effectives Cross-Sections (Circular, Rectangular, Trapezoidal)	
6 (Oct 15 - 21)	**3. Non-Uniform Flow in Open Channels**	3.1 Use of Specific Energy 3.2 Determination of critical Depths by Various Methods	**Quiz 1 (5%)**
7 (Oct 22 – 28)		3.3 Control Sections	
8 (Oct 29 – Nov 4)		3.4 Rapidly Varied Flow (RVF) - Hydraulic Jump: Types and Uses - Momentum Principle (specific force), Conjugate Depths, Energy Dissipated and Power - Length and Location of hydraulic jump	**MID TERM (20%) 1 Nov 2018 6-7:30pm**
9 (Nov 5-11)	**MID TERM BREAK**		

10 (Nov 12– 18)		3.5 Gradually varied flow (GVF) - Types of GVF profiles - Classes of profiles – backwater, drawdown - Computations of depths in a GVF using direct step method	
11 (Nov 19 – 25)	**4. Software: Introduction and Application**	4.1 Introduction to HECRAS 4.2 HECRAS application for steady flow analysis 4.3 HECRAS application for unsteady flow analysis	**WORK-BASED PROJECT (20%)**
12 (Nov 26 – Dec 2)	**5. Dimensional Analysis and Hydraulic Similarity**	5.1 Fundamental Dimensions, Systems of Units and Hydraulic Variables 5.2 Methods of Dimensional Analysis	
13 (Dec 3 – 9)		5.3 Hydraulics Scale Models 5.4 Types of Similarity	**Assignment (10%)**
14 (Dec 10 – 16)	**6. Hydraulic Machinery**	6.1 Introduction to Hydraulics Machines 6.2 Classification of Hydraulic Machines: Positive Displacement and Rotordynamic	
15 (Dec 17 – 23)		6.3 Pump: Description of a Centrifugal & Reciprocating Pump 5.4 Pump Characteristics: Single, In Series and In Parallel 6.5 Characteristic Curves	**Quiz 2 (5%)**
16	**REVISION WEEK**		

Evaluation

	Type	Name	Marks Allocation (%)
Assessments	Formative	Quizzes	10%
		Assignments	10%
		Work-Based Project	20%
	Summative	Mid Term Exam	20%
		Final Exam	40%
Total			**100%**

References

1. Chow, V.T, “Open Channel Hydraulics”, McGraw Hill, Tokyo, 1959 (Web)
2. Mott, R. L., and Untener, J. A., "Applied Fluid Mechanics", 7th Ed., Prentice Hall, 2014
3. Gribbin, John E., “Hydraulics and Hydrology for Stormwater Management”, Delmar Publishers’, 1997
4. Larock, Bruce E., “Hydraulics of Pipelines System”, CRC Press,2000
5. Kay, M., “Practical Hydraulics”, Taylor & Francis, 2008
6. Sturm T.W, “Open Channel Hydraulics”, McGraw-Hill, 2000
7. Subramanya K., “Flow in open Channels”, McGraw-Hill, 2008

Universiti Malaysia PAHANG

Lecturer Information (Authors)

Pn. Nadiatul Adilah bt Ahmad Abdul Ghani
Dr Nor Azlina bt. Alias
Pn. Wafty bt. Abd Rahman
Dr. Jacqueline Isabella

Communitising Technology

Course Information by N Adilah A A Ghani