Course Descriptor

CVEN451– HYDRAULICS ENGINEERING

Proposed Academic Year	2020-2021	**Last Reviewed Academic Year**	Fall 2020
Course Code	CVEN451	**Course Title**	Hydraulics Engineering
Credit hours	3	**Level of study**	3th Year
College / Centre	COE	**Department**	Civil and Environmental
Co-requisites	None	**Pre-requisites**	None

1. COURSE OUTLINE

Applications of fluid mechanics for design of engineering water works such as pipelines, pipe networks, open channels and turbomachinery. Design of hydraulic structures. Introduction to coastal and harbour engineering.

2. AIMS

[Learn fundamental concepts of applied fluid mechanics to solve problems encountered in municipal water and wastewater systems design while integrating codes, standards and appropriate country regulatory requirements into the design process

3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS

Learning Outcomes *(Definitive)* Upon successful completion of this course, students will be able to**:**	**Teaching and Learning methods *(Indicative)***	**Assessment *(Indicative)***
1. Understand the engineer's professional responsibility in the design process	Lectures	Assignments and in-class tests
2. Identify, formulate, and solve problems encountered in municipal water systems design	Lectures, Labs and Computer software	Assignments, lab reports, mini design project and in-class tests
3. Integrate codes, standards and appropriate Federal, State, and local regulatory requirements into the design process	Lectures	Assignments and in-class tests
4.		

4. ASSESSMENT WEIGHTING

Assessment	**Percentage of final mark (%)**
Assignments Lab reports	8% 7%
Quizzes	5%
etc	
etc	

First Mid-term	20%
Second Mid-term	20%
Final Examination	40%
TOTAL	**100%**

5. ACHIEVING A PASS

Students will achieve **3** credit hours for this course by passing **ALL** of the course assessments and achieving a **minimum overall score of 50%**

NB *Ensure that ALL learning outcomes are taken into account

6. COURSE CONTENT (Indicative)	
Review of fluid mechanics, hydrology, hydraulic laws for hydraulic systems design	
Water flow in pipes: Description of pipe flow	
Energy Losses, Frictions	
Empirical formulas for friction Head, minor losses	
Lab Experiment (1) Energy Losses	
Pipelines connection and pressure	
Branching pipe systems, water hammer	
Experiment (2): Water Hammer	
Surge Tanks	
Experiment (3): Pipe surge	
Water pumps: Types of pumps	
Pumps selection and connection (Series and Parallel)	
Cavitation in water pumps, Specific speed and pump similarity	
Water flow in open channels	
Experiment (4): Open channels	
Uniform flow and hydraulic efficiency	
Energy Principles in open channel flow	
Hydraulic Jumps	
Computer software: WATERCAD or other related software	
Course review	
TOTAL HOURS	**45**
Plus **RECOMMENDED INDEPENDENT STUDY HOURS**	**90**
TOTAL COURSE HOURS	**135**

7. RECOMMENDED READING

Core text/s:

Houghtalen, R. J., Hwang, N. H., & Akan, A. O. (2016). *Fundamentals of hydraulic engineering systems.* Prentice Hall.

Marriott, M. (2016). *Nalluri And Featherstone's Civil Engineering Hydraulics: Essential Theory with Worked Examples*. John Wiley & Sons.

Chadwick, A., Morfett, J., & Borthwick, M. (2013). *Hydraulics in civil and environmental engineering.* Crc Press.

Library + online resources:

Gautham, D. (2016). *Hydraulic Engineering: Fundamental Concepts*, Momentum Press. NY.
https://www.masader.om/eds/detail?db=e000xww&an=1135114&isbn=9781606504918

Jonathan, D. and Angela, G.R. (2012). *Hydraulics : Fluid Dynamics, Mechanical Applications and Role in Engineering.* Nova Science Publisher, NY.
https://www.masader.om/eds/detail?db=e000xww&an=587201&isbn=9781622572670