

## CE 638 Design of Hydraulic Structures

**College:** Engineering

**Department:** Civil

### **First: Course Definition**

**1- Course Code:** CE 638

**2- Units:** 3

**3- Semester:**

**4- Prerequisite:**

**5- Co-requisite:**

**6- Location** (if not on main Campus):

### **Second: Course Objectives**

- Integrate the hydraulics and water resources background by involving the students in water structures design applications.
- Introduce the students to professional practice and design codes.
- Encourage class discussions for formulating and solving multi-variable hydraulic design problems in an open-ended solution space.
- To develop understanding of the basic principles and concepts of analysis and design of hydraulic structures.

### **Third: Course Specifications**

#### **1- Topics to be covered**

<b>Subject</b>	<b>No of Weeks</b>	<b>Units</b>
Design of canals and drains.	2	6
Design of culverts, head works and outlet works.	2	6

Design of dams and falls.	2	6
Design of canal transitions.	2	6
Design of cross drainage works.	2	6
Design of energy dissipation structures.	2	6
Design of flood control structures.	2	6

## 2- Course components (Total hrs in the Semester): 42

Lecture	Exercise	Other
42	-	0

## 3- Intended Learning Outcomes of the Course (ILO's)

### **a. Knowledge**

#### ***i) Description of the knowledge to be acquired:***

- Collect different methods of canals and drain's design.
- Principles of flow in culverts, head works and outlet works.
- Types of dams and its design.
- Usefulness of cross drainage works and its design.
- Methods and structures of dissipation flow energy.
- Flood control structures.

#### ***ii) Teaching strategies to be used to develop that knowledge***

- Class lectures.
- Term projects.
- Students' presentations.
- Group discussion.
- 

#### ***iii) Methods of assessment of knowledge acquired***

- Exams.
- Quizzes.
- Homework assignments.
- Term projects.

## ***b- Cognitive (Intellectual) Skills***

### ***i) Cognitive skills to be developed***

- Advanced concepts of hydraulic structures analysis and design.
- Flow problem modeling.
- Numerical and computational models in hydraulic engineering.

### ***ii) Teaching strategies to be used to develop these cognitive skills***

- Class lectures.
- Case studies analysis.
- Term projects.

### ***iii) Methods of assessment of students' cognitive skills***

- Students' seminars and presentations.
- Term projects.
- Written reports.

## ***c. Interpersonal Skills and Responsibility***

### ***i) Description of the interpersonal skills and capacity to carry responsibility to be developed***

- Decision making based on engineering analysis.
- Communication skills.
- Team work.

### ***ii) Teaching strategies to be used to develop these skills***

- Class lectures.
- Term projects.
- Case studies analysis.
- Field trips.

### ***iii) Methods of assessment of students' interpersonal skills and capacity to carry responsibility***

- Term project.
- Written reports.
- Students' seminars and presentations.

## ***d. Communication, Information Technology and Numerical Skills***

***i) Description of the skills to be developed in this domain***

- Literature research.
- Problems modeling.
- Utilization of computer applications in analysis and design.

***ii) Teaching strategies to be used to develop these skills***

- Class lectures.
- Case studies analysis.
- Computer lab sessions.
- Term projects.

***iii) Methods of assessment of students numerical and communication skills***

- Term projects.
- Written reports.
- Students' seminars and presentations.

***e. Psychomotor (if applicable) & Other Non-cognitive Skills***

***i) Description of the psychomotor or other skills to be developed and the level of performance required***

- NA
- 

***ii) Teaching strategies to be used to develop these skills-***

- NA
- 

***iii) Methods of assessment of student's psychomotor skills***

- NA
- 

**4- Student Assessment Schedule**

<b>Serial</b>	<b>Assessment tool (test, group project, examination etc.)</b>	<b>Week due</b>	<b>Weight</b>
1	Term Project – 1	3 <sup>rd</sup>	15 %
2	Mid Term Exam -1	7 <sup>th</sup>	15 %
3	Reports	10 <sup>th</sup>	15 %
4	Term Project – 3	13 <sup>th</sup>	15 %
5	Final Exam	16 <sup>th</sup>	40 %

**5- Student Support**

- Providing electronic library of textbooks and scientific periodicals.

- Providing the necessary computer applications for the course.

## **6- Learning Resources**

### ***i) Essential Books (References)***

- Vischer, D.L. and Hager, W. H. " Dam Hydraulics," John Wiley & Sons, New York, 1992.
- "Design of Small Dams," US Dept. of Interior, Bureau of Reclamation, 1977.
- Yanmaz A. M. " Applied Water Resources Engineering," METU press, 2001.
- Roberson, J.A., Cassidy, J.J. and Chaudhry, M.N. " Hydraulic Engineering," John Wiley & Sons, New York, 1995.
- Mays, L.W. "Hydraulic Design Handbook," McGraw-Hill Professional; 1<sup>st</sup> edition, 1999.

### ***ii) Course Notes***

- NA
- 

### ***iii) Recommended Books***

- Hydraulic structures, 4<sup>th</sup> Edition: P. Novak, A.I.B. Moffat, C. Nalluri and R. Narayanan, Taylor and Francis Group, ISBN:9780415386265
- Theory and Design of Irrigation Structures Vol. II , Latest Ed, R. S. Varshney et al

### ***iv) Electronic Books & Web Sites:***

- Scientific journals and forums.
- Instructor's instruction.

### ***v) Periodicals***

- ASCE scientific journals.

## **7- Course Evaluation and Improvement Processes**

### ***i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching***

- Students' questioners.
- Students' evaluation of course and instructor.

### ***ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department***

- Public faculty seminars.

- Assessment by external evaluators of students achievements.
- Instructor (Course) Report

***iii) Processes for Improvement of Teaching***

- Assessment of students' work by external examiners.
- Analysis of students' evaluation of course and instructor.
- Seminars by industry professionals.

***iv) Processes for verifying standards of student achievement***

- Check marking by an independent faculty member of a sample of student work.
- Periodic exchange and remarking of a sample of assignments/exams with a external evaluator.

***v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.***

- Assessment and evaluation of the level of achieving the course outcomes through a continuous improvement process (part of a quality assurance system established by the university),
- Consequently, actions are to be taken to improve the course delivery when necessary.
- Review of the course objectives, outcomes and curriculum every 2 years.