TED UNIVERSITY

CE 332
WATER RESOURCES ENGINEERING

SYLLABUS/SPRING 2021

Course Information

Required or Elective	☑Required ☐Elective	**Date Prepared**	February 2021
Semester	Spring 2021	**Class Hours, Lab. Hours and Classrooms**	Mon. 10:00-11:50 @ online platform Thu. 12:00-13:50 @ online platform
Course Credit Hours/ ECTS credits	(3+0+0) 3 / 6	**Pre-requisite/ Co-requisite**	CE 331
Level of Course	Junior	**Language of Instruction**	☑ English ☐ Turkish
Instructor(s) and office hours	Prof. Dr. Mehmet Ali Kökpınar (mehmet.kokpinar@tedu.edu.tr) (Office hours: by appointment)		
Teaching Assistant(s)	Neslihan Pınar Gödek (npinar.godek@tedu.edu.tr)		
Textbook(s)	1. Usul, N. (2013). *Engineering Hydrology*. 3rd Edition, METU Press, Ankara. 2. Yanmaz, A.M. (2013). *Applied Water Resources Engineering*. 4th Edition, METU Press, Ankara.		
Recommended Readings	1. Chow, V.T., Maidment, D.R. and Mays, L.W., (1988). *Applied Hydrology*. McGraw Hill. 2. Bedient, P.B., Huber, W.C. and Baxter E.V. (2013). *Hydrology and Floodplain Analysis.* Prentice Hall. 3. Linsley, R.K., Kohler, M. A. and Paulhus, J.Lh. (1988). *Hydrology for Engineers*, McGraw Hill. 4. Shaw, E.M. (1991). *Hydrology in Practice,* Chapman and Hall. 5. *Mays, L. W. (2010). Water resources engineering. John Wiley & Sons.* 6. Wurbs, R. A., & James, W. P. (2001). *Water resources engineering*. Prentice Hall. 7. Linsley, R.K., Franzini, J., Freyberg, D. and Tchobanoglous, G. (1992). *Water Resources Engineering*. McGraw Hill. 8. Jansen, R.B. (1988). *Advanced Dam Engineering*. New York. 9. Robertson, J. A., Cassidy, J. J. and Chaudry, M. H. (1988). *Hydraulic Engineering*, Houghton Miffling Comp. 10. Tworth, A.J., Law, F.M., Crowley, F.W. and Ratnayaka; D.D. (1994). Water Supply, Edward Arnold. 11. USBR, (1987). Design of Small Dams, Water Resources Publications. 12. Mc Ghee, T. J. (1991). Water Supply and Sewerage, Singapore, McGraw Hill. 13. Hansen, V.E., Israelsen, O.W. and Stringham, G.E., (1980). *Irrigation Principles and Practices*. John New York, Wiley and Sons.		
Course Web Pages	Please register to Moodle page http://moodle.tedu.edu.tr and regularly follow this link to have access to course materials.		

Course Description

Introduction to hydrology and water resources engineering. Basin and hydrologic processes: precipitation, stream flow, infiltration. Hydrograph analysis. Hydrologic flood routing. Groundwater hydrology. Dams and spillways. Municipal water supply systems. Wastewater and storm water collection and discharge. Irrigation and drainage.

Course Objective

The aim of this course is to serve an introduction to field of engineering hydrology by covering fundamentals such as hydrological cycle, catchment, losses, hydrographs and hyetographs; give basic concepts of water resources engineering; enable students to use basic information in design applications of hydraulic engineering.

Course Learning Outcomes

Upon successful completion of this course, a student specifically will be able to:

1. Recognize the elements of the hydrological cycle and able to define the movement of water on earth **[B01]**.
2. Explain the measurement of precipitation and analyze the precipitation data **[B03]**.
3. Examine rainfall intensities and hyetographs **[B04]**.
4. Understand the components of runoff and analyze hydrographs **[B04]**.
5. Determine the storage capacity of dams and variations in a reservoir during a flood **[B04].**
6. Explain the types of dams and their construction principles **[B02]**.
7. Design and analyze the stability of concrete gravity and arch dams **[B05]**.
8. Investigate the hydraulics of overflow spillways **[B04]**.
9. Conceptualize processes in simple groundwater systems and determine groundwater flow through use of Darcy's law **[B04]**.
10. Design gravity pipelines used for water supply purposes **[B05]**.
11. Design wastewater and storm water systems **[B05]**.
12. Determine the dimensions of irrigation canals **[B05].**

Course Assignments

Tentatively, course grading will be based on the following manner. The dates of exams will be announced within the semester. Type of exam executions may be online or face-to face that will be announce whenever the university will reach a decision on this concept.

A. ***Midterm-1 (30%)***
B. ***Midterm-2 (30%)***
C. ***Final (40%)***

Course Assessments & Learning Outcomes Matrix

Assessment Methods	Course Learning Outcomes
Midterm-1	#1, #2, #3, #4
Midterm-2	#5, #6, #7, #8, #9
Final	#1, #2, #3, #4,#5, #6, #7, #8, #9,#10, #11, #12

Relationship to Program Outcomes

This course contributes to fulfillment of the following program outcomes:

Comprehend science and advanced mathematics subjects fundamental to Engineering **[PO1].**

Apply knowledge of mathematics, science, and engineering to design and implement original, innovative and sustainable civil engineering systems or processes to meet desired needs within a greater societal context **[PO2].**

Identify, formulate, and solve engineering problems **[PO6].**

Employ state-of-the-art engineering techniques and computing tools necessary for creative engineering solutions **[PO11].**

Course Outline

Week	Topic
1	**1. INTRODUCTION (3 hrs.)** 1.1. Scope of the course 1.2. Hydrologic cycle 1.3. System concept
2-3	**2. HYDROLOGIC PROCESSES (6 hrs.)** 2.1. Basin 2.2. Precipitation 2.3. Stream flow 2.4. Infiltration
4-5	**3. HYDROGRAPH ANALYSIS (6 hrs.)** 3.1. Components of runoff 3.2. Hydrograph 3.3. Unit hydrograph theory 3.4. Synthetic unit hydrograph
6	**4. RESERVOIR ROUTING (2 hrs.)** 4.1. Introductory remarks 4.2. Routing in reservoirs ***MIDTERM EXAM I***

6-7-8-9-10	**5. DAMS AND SPILLWAYS (12 hrs.)** 5.1. Classification and parts of dams 5.2. Reservoir capacity determination 5.3. Dam construction principles 5.4. Concrete gravity dams 5.5. Arch dams 5.6. Spillway design flow 5.7. Hydraulics of overflow spillways 5.8. Crest gates 5.9. Spillway crest profile 5.10. Energy dissipation facilities
10-11	**6. GROUNDWATER HYDROLOGY (4 hrs.)** 6.1. Fundamentals of groundwater flow 6.2. Groundwater flow equations 6.3. Well hydraulics ***MIDTERM EXAM II***
12	**7. WATER SUPPLY (3 hrs.)** 7.1. Municipal water requirements and population estimation 7.2. Characteristics of municipal water supply systems 7.3. Hydraulics and operation of gravity pipelines 7.4. Design of gravity transmission lines
13	**8. WASTE WATER COLLECTION AND REMOVAL (3 hrs.)** 8.1. Flow in sewers 8.2. Design of storm sewer systems 8.3. Design of sanitary sewer systems
14	**9. IRRIGATION AND DRAINAGE (3 hrs.)** 9.1. Introduction and land classification 9.2. Characteristics of irrigation systems 9.3. Design of classical irrigation systems by Demand Method 9.4. Land drainage facilities

Course Policies and Some Remarks

General

1. The course schedule is tentative and it will be adapted to the pace of the class.
2. There will be three term homework. The homework dates are given in the tentative schedule and they are subject to change.
3. All students must submit three assigned term homework to get a grade. Only one missing term homework will be allowed to enter make-up term homework. If anyone having more than one missing term homework, the grade will be FX.

Attendance

In order to be admitted to the homework, a student **must have attended at least 70% of the lectures**. Students not fulfilling these conditions will not be permitted to pass this course and receive automatically the grade **FX** at the end of the semester.

Make Up Exams

Make-ups for homework will NOT be offered generally. If you have a legitimate reason for missing one of the term homework, then you must submit make-up term homework. The only exceptions are illness or emergency (e.g., death in family, a traffic accident, etc.). In case of an illness or emergency you need to supply a documentation that supports your claim. Also please read the document given in the link: http://www.tedu.edu.tr/tr/main/yonetmelikler-ve-yonergeler

Calculator Policy

You may use a scientific calculator during the homework.

Plagiarism

All of the following are considered plagiarism:

- "Turning in someone else's work as your own
- Copying words or ideas from someone else without giving credit
- Failing to put a quotation in quotation marks
- Giving incorrect information about the source of a quotation
- Changing words but copying the sentence structure of a source without giving credit
- Copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not" (www.plagiarism.org)

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources. Collaboration on non-collected homework and in studying is strongly encouraged; however, the work you hand in must be solely your own. For more information on TEDU policy on intellectual integrity see the link: http://student.tedu.edu.tr/sites/default/files/content_files/2015-2016ogrencielkitabi.pdf

Cheating

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following: copying answers on exams, homework and lab works, using prohibited material on exams, lying to gain any type of advantage in class, providing false, modified or forged data in a report, plagiarizing, modifying graded material to be re-graded, causing harm to colleagues by distributing false information about an exam, homework or lab. Cheating is a very serious offense and will be penalized accordingly by the university disciplinary committee. For more information on TEDU policy on intellectual integrity, please see the following link: http://student.tedu.edu.tr/sites/default/files/content_files/2015-2016ogrencielkitabi.pdf

Disability Support

If you have a disabling condition which may interfere with your ability to successfully complete this module, please contact Dr. Onur Özmen (email: onur.ozmen@tedu.edu.tr). For more information please see Handbook for Registered Students.