

Tennessee Technological University  
Department of Civil & Environmental Engineering  
CEE 5440/4440 – Water Resources Engineering

- 2017 Catalog Data: CEE 4410/5410. Solid and Hazardous Waste Management. Lecture 3. Credit 3.
- Required Textbook: Chin, David A.: Water-Resources Engineering. Third Edition, Pearson Prentice Hall, Upper Saddle River, New Jersey (2013).
- Faculty Coordinator: Kevin S. Young, P.E., B.C.E.E.
- Prerequisites: CEE 3413 or consent of instructor. The collection and disposal of solid wastes. Treatment and disposal technologies of hazardous wastes.
- Goal: To introduce students to the use of the U.S. Army Corps of Engineers Hydraulic Engineering Center's River Analysis System (HEC-RAS) software; to introduce students to the engineering principles associated with floodplain management through land use controls and wetland creation; the evaluation of aquifers, streams/rivers and lakes/reservoirs as feasible sustainable sources of water supply; the management of streams/rivers and lakes/reservoirs as sources of water supply, recreation and flood control; and to introduce students to the techniques used to design water supply wells and surface water supply intakes.

Course learning objectives:

Students will be exposed to the following topics in a manner that will allow them to apply learned material in new, concrete situations to analyze problems related to floodplain management, ground water and surface water as these topics are associated with water resources engineering.

Major Topics Covered:

- |   |  |
|---|--|
| 1. Floodplain management                                      | 6. Management of streams/rivers  |
| 2. Use of HEC-RAS software                                    | 7. Evaluation of lakes/reservoirs as sustainable water supplies            |
| 3. Evaluation of aquifers as sustainable water supplies       | 8. Management of lakes/reservoirs  |
| 4. Design, construction and testing of water supply wells     | 9. Integrated management of water resources                                |
| 5. Evaluation of streams/rivers as sustainable water supplies | 10. Design of water supply intakes   |
|   | 11. Projected potential effects of climate modification on water resources |

Measurable outcomes:

Students will be expected to:

1. Use National Flood Insurance Program maps and studies;
2. Report the components of a successful wetland reclamation project;
3. Solve the equations utilized by the HEC-RAS software to calculate steady flow water surface profiles;
4. Relate the basic data requirements for use in HEC-RAS software and understand how to determine these basic data;
5. Calculate the expected drawdown and the expected geometry of the cone of depression at a well for a given withdrawal rate;
6. Demonstrate the methodology utilized to select appropriate components of a production well;
7. Use statistical stream flow rate probability distributions and water chemistry to evaluate the use of a stream/river as a sustainable water supply;
8. Use mass diagrams and water chemistry to evaluate a lake/reservoir as a sustainable water supply;
9. Relate how water quality regulations, hydropower demands, flood-control considerations and recreation considerations are balanced to manage lakes/reservoirs;
10. Relate the projected potential effects of climate modifications on water resources.