Code and Name: CE 442 – Hydraulic Analysis and Design
Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:
- Water Resources Engineering: Chin, D.A., 3rd Edition, Pearson, 2013
Other References:
- *Mays, L.W., Water Resources Engineering, John Wiley & Sons. 2005*
- *Design of Water Supply Pipe Networks, Prabhata K. Swamee Ashok K. Sharma, John Wiley & Sons. 2008.*
- *Course handouts: distributed on a regular basis to provide more information on the topic.*
Course Description:
This course focuses on using design aids in terms of professional software and CAD programs in order to help in carrying out hydraulic analysis and design for a number of hydraulic systems including: transmission lines, water supply network, sewer network and surface flow network. The software that will be used include: Excel, WaterCad/EpaNet, EPASWMM, HEC-RAS and QGIS.

Pre-requisites: CE340 Water Resources Engineering
Co-requisites: None

Course Learning Outcomes:
With relation to ABET Student Outcomes (From Fall 2019-SOs: 1-7)
1. Realize economic and environmental issues while developing design alternatives of water transmission lines and while dealing with a Hydraulic Structures and Hydraulic jumps (4).
2. Identify the water demands for potable networks at present and at project horizon (1).
3. Use numerical tool such as Excel, WaterCad and EPA-SWMM to solve water distribution network/storm sewer network (1).
4. Apply numerical computational method such as trial and error or step by step method to carry out water surface profile and sewer design (1).
5. Use Excel and HecRas package to analyze flow in water streams and water crossings such as bridges and culverts and analyze unsteady flow and surge wave analysis (1).
6. Hydraulically design a number of hydraulic structures including bridges, gates and energy dissipaters (2).
7. Design a complete water transmission line system (Gravity or Pressurized) to convey a given water demand using Excel (2).

Topics to be covered:
- Hydraulic analysis of transmission lines and water network using spreadsheets.
- Basics of water distribution network and calculations of water demand.
- Steady state and extended period analysis of large pipe network via WaterCad/EpaNet.
- Hydraulics of sanitary sewer, Design of trunk main sewer lines via spreadsheet.
- Design of sewer network via EPA-SWMM.
- Calculations of water surface profiles using spreadsheet.
- Design of Hydraulic Structures: Gates, Stilling Basins and Weirs.
- Steady state analysis of open channel network using Hec-Ras package.
- Hydraulic analysis of surge waves.

Grading Policy:
The grading for the course is: 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes 2 to 3 quizzes for the remaining 20% that is modified by the course instructor.