**CE 441 – Surface Hydrology**

**Code and Name:** CE 441 – Surface Hydrology
**Credit Hours:** 3 (Lecture: 3, Tutorial: 1)

**Textbook:**
- Water Resources Engineering: Chin, D.A., 3rd Edition, Pearson, 2013
**Other References:**
*- Hydrology and Hydraulic Systems, by RAM Gupta, 2016, Fourth Edition*
*- Course handouts: distributed on a regular basis to provide more information on the topic.*
**Course Description:**
Hydrological analysis of surface water systems such as rivers, streams and lakes. Main elements of the hydrological cycle including precipitation, evapotranspiration, infiltration and runoff. Rainfall data analysis and how to identify the design storm corresponding to a given return period and how to generate IDF curves from historical rainfall data. Rainfall-runoff model for an ungagged catchment. River and reservoir routing using hydrological methods. Introduction to urban hydrology.

**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 studying the urbanization effect on runoff and flood protection measures (4).
2.  Carry out water budget or mass balance analysis for a catchment or a lake or aquifer (1);
3.  Calculate areal precipitation, conduct rainfall data analysis, outlier's analysis, data gap covering, frequency analysis and generation of IDF curves (1);
4.  Carry out watershed delineation digitally using QGIS or WMS (1);
5.  Carry out hydrological analysis of a basin using Excel and HecHms package (1);
6.  Design a crossing drainage structure using HY8 package (1,2);
7.  Design an urban storm drainage network and calculate peak discharge using rational or CN method (2);

**Topics to be covered:**
-   Hydrological cycle and climatological parameters and climate change.
-   Water scarcity in the globe and discussion of available sources of water resources in Saudi Arabia.
-   Water Mass Balance (Water Budget) Analysis for lakes and basins.
-   Precipitation and rainfall analysis
-   Evaporation, Transpiration and Evapotranspiration.
-   Infiltration and Water Losses.
-   Introduction to Catchment Hydrology (Delineation, DEM and TIN) Slope, Tc
-   Rainfall - Runoff Models: Rational, SCS Unit Hydrograph and Convolution
-   Hydrological Flow Routing
-   Introduction to Urban Hydrology
-   Introduction to common software packages: EasyFit, HEC-HMS, HY8, Google Earth and WMS for hydrological analysis

**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.