Department: Civil & Environmental Engineering   Division: Civil engineering
Level and Major: Graduate - Water Resources Management and Engineering

Course Title: Advanced hydrology   **Number of Credits: 3**
Prerequisite (Corequisite): Structural analysis (I), Concrete Technology   Lecturer: -

Course Topic
- Basic generalities and concepts(hydrological cycle ,concept of hydrological system, basins ,the balance of basin
- Hydrological processes(continuity and momentume equations ,Reynolds transfer theory ,flow in the open channels, flow in the porous media, energy balance and transfer processes)
- Estimation of rainfall and casualties(atmospheric rotations and aqueous water ,rainfall, evaporation, guttation ,unsaturated flow, penetration(Green-Ampt,Philip, Horton equations)and westage of rain(SCS and NRCS),rainfall excess,(methods of measuring and monitoring rainfall phenomena
- Rainfall-run off analysis (direct runoff ,surface flow, flow hydrograph ,drainage and Horton's rules ,linea rsystems ,response functions and convolution integral)
- Flow hydrograph (unit hydrograph ,observational and fictitious (SCS ,Snyder ,Clark)basic flow ,calculation of flood hydrograph by using unit hydrograph)
- Flood routing (flood routing in the reservoir ,pulse and Runge-kutta method, flood routing in the river ,Muskingum, and working method ,the introduction of computer models)
- Fundamentals of statistical hydrology (fundamentals of statistic and probability in hydrology, completion of data defects :regression and statistical tests –probabilistic distribution functions-estimation of distribution parameters and goodness of fit tests)
- Frequency analysis (frequency analysis by using probabilistic distribution functions :frequency factor method and probability drawings ,introduction of soft ware applications frequency analysis such as: HEC-SSP,HYFA,HYFRAN ,regional flood frequency analysis(
- Estimating snowfall and casualties (features of water and ice and snow, recognizing the stages of occurrence and storage of snow ,determine the amount of water equivalent to snow ,snow gravity modeling, measuring snow during the time of falling ,snow survey instruments ,measuring snow depth ,snow measurement on the ground and snow pack
- Snow hydrology analysis)snow-stack blue balance ,snow-stack storage and time delay ,snow melt flow paths, snow melt hydrograph ,floods caused by snow melt and rain on the snow
- Hydrological design, Design storms ,method of calculating heatographic features ,design storm, probable maximum precipitation(PMP),probable maximum storm(PDM)methods of calculating features of probable maximum storm(depth ,temporal and spatial distribution),probable maximum flood) PMF,(desig nflood, sreliability analysi) suncertainty analysi,sdetermination of confidence limits)

  Course Description:
  Reading Sources:
  Course Goals and objectives:
  Evaluation:
  Course topics:
  The course aims to: