

Department: Civil & Environmental Engineering

Division: Civil engineering

Level and Major: Graduate - Hydraulic structures and Water Engineering

Course Title: Advanced Hydraulic

Number of Credits: 3

Prerequisite (Corequisite): Structural analysis (I), Concrete Technology **Lecturer: -**

Course Topic

- A review of hydraulic
- Permanent flows of variables
- Fast non-permanent flows (valve opening and closing)
- Non-permanent flow in the dam(flood routing in the reservoir ,flood dam failure)
- Non-permanent flow in the river(flood routing in the river, specification method)
- Non-permanent flow in the in the pipe(water hammer ,flow in the out let pipe and impact tank)
- Cross-sectional velocity changes (shear velocity ,shear stress, vertical velocity profile)
- Effects of geometric change on flow(flow in the channel conversion, flow in the river bending and secondary rotation, opening and narrowing vortices ,flow at the site of retaliation of the branches(
- Silting and erosion(washed and suspended load and bedrock, silting in the dams and water structures ,scouring basics ,critical shear stress ,general erosion in the river
- Flow and erosion around the groyne and abutment bridge (flow regime changes ,local phenomena ,vortices ,narrowing erosion ,silting around the abutment
- Flow and erosion around the piers(local phenomena ,vortices, local rinsing)

Course Description:

Reading Sources:

Course Goals and objectives:

Evaluation:

Course topics:

The course aims to: