IOWA STATE UNIVERSITY Civil, Construction, & Environmental Engineering

CE 5730: Groundwater Hydrology

Course Description:

Principles of groundwater flow, hydraulics of wells, superposition, slug and pumping tests, and regional groundwater flow. Mechanisms of contaminant transport. Design of measurements, saturated riparian buffers, capture zones, dewatering systems, and well fields

Course objectives (course designed to provide students with):

- Fundamental principles governing movement of water and contaminants in groundwater systems
- Effective engineering thinking skills such as evaluating solutions and making approximations

Course Outcomes (students should be able to):

- Analyze the movement of water and contaminants in groundwater systems
- Design groundwater tests and systems—e.g., to measure aquifer properties, remove nutrients from runoff, supply water, and remediate contamination

Course Topics

- 1. Basics of groundwater
 - a. Physical properties of aquifers: porous media, Darcy's law, aquifer types
 - b. Framework for groundwater flow: Conservation of mass, equations of groundwater flow
- 2. Groundwater flow
 - a. Elementary solutions for confined and unconfined flow
 - b. Wells, pump tests, and slug tests
 - c. Superposition
 - d. Groundwater modeling
- 3. Groundwater contamination
 - a. Sources of contamination
 - b. Physical, chemical, and biological processes
 - c. Behavior of non-reactive and reactive contaminants
 - d. Groundwater remediation
- 4. Design problems
 - a. Permeameter
 - b. Saturated buffer
 - c. Well field
 - d. Remediation system