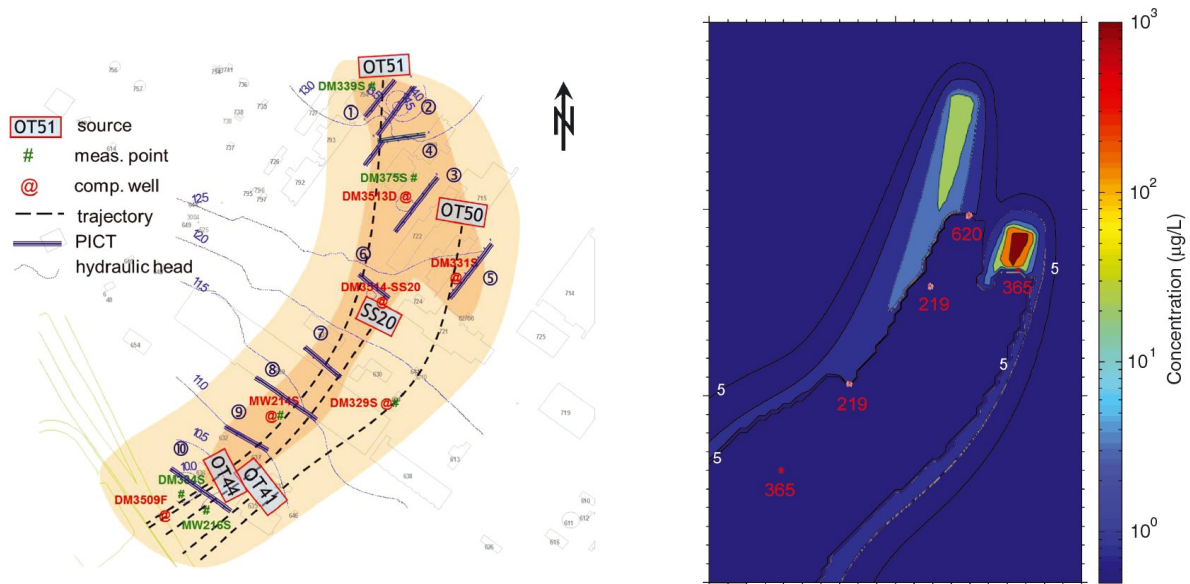


CEE 696 – Optimization and Estimation in Groundwater Engineering



Dover Air Force Base Site with groundwater contamination (left) and design with enhanced bioremediation (right)

Course Description: Optimization involves finding the “best” solution according to specific criteria. In fact, any engineering problem requires the optimization to make optimal use of resources with the least cost while minimizing failure and risk. Examples in groundwater engineering are maximizing of groundwater supply, minimizing remediation cost, and minimizing the risk of aquifer depletion or saltwater intrusion. Model parameter estimation/calibration can be also viewed as an optimization problem. In this course, we will learn various computational tools that solve optimization problems and mathematical theory behind them. We will apply these methods in a class project, with USGS MODFLOW and related programs. At the end of this course, you will have armed yourself with relevant techniques so that you can apply it to your own research or future consulting projects.

Instructor: Dr. Jonghyun “Harry” Lee (jonghyun.harry.lee@hawaii.edu)

Website: <https://www2.hawaii.edu/~jonghyun/classes/S18/CEE696/>

Textbook: No textbook required. Class notes, slides, and reference materials posted in [the class website](#).

Prerequisites: 1) undergraduate/graduate level class in linear algebra, 2) experience in script languages (e.g., MATLAB, R, PYTHON, Julia). We will use Python script for MODFLOW simulations and optimization routines.

Assignments: Homework, midterm, and project report submission through online Latex

Grading: 20% homework, 20% midterm, 60% project

Tentative outline of lecture topics:

1. General optimization theory
2. Numerical linear algebra
3. USGS MODFLOW and related programs
4. Python programming and optimization tools
5. Parameter estimation and inverse problem in the context of optimization

For more information, contact Jonghyun Harry Lee (jonghyun.harry.lee@hawaii.edu)