THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Data Analysis in Environmental Engineering

ENVENG 6220

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture
Lab

Course Description:
Application of programming and statistical methods for engineering data analysis. Will explore distribution, variance, and multivariate methods. Will provide a deeper understanding of analysis theories in the space, time, and spectral domain. Students will develop computer programming toolboxes and theoretical skills for analyzing and modeling data in their own research.

Prerequisites and Co-requisites:
Prereq: Stat 3450, 3460, 3470, or CivilEn 2050, or equiv; and Grad standing in the Civil Engineering or Environmental Science Graduate programs.

Course Goals / Objectives:
- Understand the theoretical background underlying statistical and data analysis techniques
- Understand the assumptions and validity conditions for statistical tests and data analysis techniques
- Employ software for statistics and data analysis
- Understand methods and techniques to work with spatial data and time series
- Understand methods and techniques for dealing with large data sets

Course Topics:

- Introductory Data Analysis (Linear Algebra; Statistical Measures; Multivariable Probability Densities; Correlation & Covariance; Random Variables; Data Exploration & Distributions; Normality and Outliers; Transformations; Regression)
- Univariate/Multivariate Analysis (ANOVA/MANOVA; Non-Parametric Statistics; Factor Analysis and PCA; Discriminant Analysis; Point Estimation & Uncertainty)
- Time Series Analysis (Time & Frequency Domain Models; Stationarity; Auto-Regression Models; Spectral Analysis and Coherence; Trend Analysis and Significance; Estimating errors in time series reconstruction)
- Forecasting and Extrapolation (Statistically Optimal Linear Estimators; Regression models; Space and time models; Multivariate regression models; Covariance models)

Designation:
Elective