Spring 2022 Course

CVEN 5444 Special Topics: Analytical Methods, Experimental Design and Applied Data Analysis

Tuesdays and Thursdays 4:00 pm-5:15 pm
SEEC N129

Course Description

- Are you curious about how to efficiently design experiments for complex systems with lots of variables?
- Do you want to learn statistical methods for analyzing data from engineering studies?
- Do you plan to conduct lab- or field-based research where sample collection and analysis is important?
- Do you wish you could be more confident about measurements from analytical instruments and want to learn about developing a QA/QC program?

If you've answered 'yes' to any of these questions, then this course might be for you.

This course focuses on experimental design and applied statistical methods for data analysis. Students will learn how to design and interpret experiments considering multiple variables, avoiding confounding effects, and identifying interactions between variables. The skills learned in this course are not specific to academic research. Practicing engineers use applied research techniques to troubleshoot and optimize systems, and the course topics are directly transferrable to those scenarios. These statistical tools are applied to analytical methods to validate environmental samples. Students will learn how to decipher analytical methods to ensure that environmental samples are collected and analyzed following robust QA/QC procedures. We will develop and apply these concepts using analytical methods commonly encountered in environmental engineering (e.g., organic carbon and spectroscopy).

Recommended Prerequisites: An undergraduate statistics course. While the statistical concepts transcend fields, the context for course examples and analytical methods will be relevant to environmental engineering. It is recommended that students have prior exposure to the fundamentals of environmental engineering and environmental chemistry. Please contact Professor Korak if you are interested but are concerned about prerequisites.

Instructor: Professor Julie Korak, Assistant Professor, Department of Civil, Environmental, and Architectural Engineering, Julie.Korak@colorado.edu

Topics

- Comparative statistics
- ANOVA analysis
- Experimental blocking
- Factorial designs
- Multilinear regression models
- Response surface methodology
- Analytical methods