



Course Name:

Uncertainty Analysis in Hydrological Models
(Revised August 2024)

Course Number:	Credit: 3
Program: Graduate	Course Type:
Prerequisite:	Corequisite:

Course Description (Objectives):

The objective of this course is to familiarize students with the principles of uncertainty analysis in hydrological models and to enhance their skills in using computational tools. After introducing the concepts of uncertainty and reviewing statistics and probability, the course will cover numerical methods for uncertainty and sensitivity analysis, optimization techniques, and parameter estimation in detail. Challenges associated with uncertainty analysis in hydrological models will also be discussed. Students will engage in practical work with computer models and various software tools to improve their ability to analyze and manage uncertainty in models.

Course Content (outline):

- Chapter 1: Overview of modeling and types of hydrological models
- Chapter 2: Definitions and concepts of uncertainty in hydrology
- Chapter 3: Review of statistical and probabilistic concepts
- Chapter 4: Numerical methods for uncertainty analysis in models
- Chapter 5: Numerical methods for sensitivity analysis in models
- Chapter 6: Optimization techniques and parameter calibration
- Chapter 7: Challenges in uncertainty analysis of complex hydrological models

References:

- Beven, Keith K. J. **Rainfall-runoff modelling: the primer**. John Wiley & Sons, 2011.
- Loucks, Daniel P., and Eelco Van Beek. **Water resource systems planning and management: An introduction to methods, models, and applications**. Springer, 2017.
- Saltelli, Andrea, et al. **Global sensitivity analysis: the primer**. John Wiley & Sons, 2008