Course Description: Hydroinformatics is the study, design, development, and deployment of hardware and software systems for hydrologic data collection, distribution, interpretation, and analysis to aid in the understanding and management of water in the natural and built environment. This class will introduce students to fundamental and advanced hydroinformatics concepts and procedures including:

- Environmental sensors and data collection
- Dataloggers and datalogger programming
- Relational databases and data management software
- Describing data with metadata
- Data storage file formats and standards
- Programming, data visualization, and automation of data transformation and manipulation tasks using Python and R
- Accessing and sharing data

The course has a problem-based learning format where students will work over the semester to complete a series of assignments designed to build the technical skillset needed for students to be more successful in data intensive research and professional working environments. Students will also work on a semester project aimed at data collection, management, organization, and analysis for a hydrology or water resources problem. Projects may include designing appropriate data models and automating data loading, manipulation, and transformations in support of data intensive analyses or modeling. Class time will include lectures focused on learning and developing data management, transformation, and task automation skills, class discussions, code writing exercises to solve data manipulation tasks, demonstration of software and data systems, and student presentations of their project work. The course will emphasize development of reproducible processes for managing and transforming data in ways that others can easily and completely reproduce on their own to support analyses and modeling. Additionally, this course will better prepare students to work across multiple software platforms and systems used in data management.

Prerequisites: Graduate student standing, proficiency in Microsoft Excel, familiarity with and ability to write simple programs in any programming language such as C, C++, C#, Fortran, Visual Basic, R, Matlab, Python, or Java.