CIVE 546 - WATER RESOURCES SYSTEMS ANALYSIS
SPRING 2014

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Course Time and Location: Lecture MF 9:00–9:50am,
Lab W 8:00 - 9:40am, Room C205 (GIS Lab)

Course Textbook: Water Resources systems Planning and Management, by Loucks, D.P. and E. van Beek, 2005 (Provided on the website)

Course Description:
Applications of systems analysis, simulation and optimization techniques in water resources planning and management. Prerequisite: CIVE 322/ENVE 322 Basic Hydrology, ENGR 510/MATH 510 Linear Programming and Network Flows, or consent of the instructor.

Office Hours: MWF 1:00-2:00 pm

Course Format: Two lectures and one computer lab per week.

Course Objectives: The goal of this course is to introduce participants to general concepts of systems analysis and systems engineering as they apply to the planning, design and operation of water resources systems. The course builds upon the general concepts of systems analysis, economic evaluation, and project planning presented in CIVE 544, Water Resources Planning, and provides the necessary background for CIVE 645, Computer-Aided Water Management and Control.

Advances in computing and information technology are revolutionizing how we manage our water resources. The goal of this course is to introduce participants to the linkage of computing, information technology, and practical aspects of water resources management. The course will describe general concepts of systems analysis and modeling, within a Decision Support System framework, as these models apply to the planning, design and operation of water resources systems. The use of computer models allows the water resources engineer to efficiently and effectively evaluate many alternatives and to promote improved decision-making. Students will apply simulation, optimization, and multi-criteria decision analysis models to example problems in water resources. The course will also discuss how emerging technologies such as evolutionary optimization, collaborative community-based modeling approaches, and collaborative sharing of information might be used to improve water resources management. While not all students will become model developers, it is important that all students understand the model development process. All students will be expected to effectively use the models presented in the course.

There is too much material to be adequately covered in a single course on water resources systems analysis and therefore the material has been divided between this course and the follow-up CIVE 645 course. This course will concentrate on the traditional application of systems concepts to the planning design and operational planning of single reservoir systems using primarily deterministic hydrology. While reservoirs are only one many water resources management tools, they are an excellent "typical example" for applications of systems analysis concepts and are used in this course as a metaphor water resources systems in general. The CIVE 645 course will focus on real-time operations of multi-reservoir systems using stochastic hydrology and on emerging technologies as applied to decision support systems concepts. It is recommended that students take both the CIVE 546 and CIVE 645 courses.

By the end of the CIVE 546 course you are expected to be able to:

1. Understand and apply the systems approach for analyzing basic water resources problems.
2. Understand the process of designing and applying simulation and optimization models for water resources management.
3. Understand the application of multi-criterion decision analysis techniques to water resources problems.
4. Develop operational guidelines for single and multi-purpose reservoirs.
5. Understand emerging technologies that are being applied in systems analysis.

Prerequisite Knowledge and Skills: The student starting CIVE 546 is expected to have an understanding of basic concepts of simulation and optimization models, basic statistical concepts and measures, including multiple regression analysis, and the ability to use spreadsheet and equation solver software.

Exams and Grading: The course will include two exams during the course and a final project. Grading will be based on the following components (percentages are approximate):

Homework	15%
Project	35%
Two Exams	50%

Term grades for this course will use the +/- grading system as described in the CSU catalog.