

MWF 1:10-2pm  
1134 Bainer Hall

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Office Hours: MWF 2-3, by appointment, and if I'm in.

<u>Date</u>	<u>Topic</u>	<u>Reading/Assignment</u>
March 29	Overview of Operations Research Methods	notes
31	Systems Engineering: Formulating problems and using results	Wurbs draft paper
April 2	Simulation: Derived system operation rules	Lund&Guzman 1999; Draper & Lund 2004
5	Simulation packages	Hirsch 1978; <u>Comments on Wurbs</u>
7	Risk analysis simulation methods [Jay gone]	Hazen 1914
9	Simulation: Monte Carlo methods [Jay gone]	Jackson 1975
12	Simulation: Rippl method and Stretched thread	Klemes 1979; <u>Sim HW due</u>
14	Simulation with optimization engines	Randall et al. 1997; Draper et al 2004
16	Optimization	Labadie 2004
19	Deterministic Optimization: HEC-PRM and simulation	HEC report <u>Project topic due</u>
21	Optimization in spreadsheets and LP/NLP packages, Hydroplatform	
23	Application: Shared Vision Modeling	reading
26	Deterministic Optimization: Dynamic programming	Yakowitz 1982; <u>LP HW due</u>
28	Stochastic Optimization: Decision theory/ decision analysis	Davis, et al. 1972
30	Deterministic optimization application	Pulido et al. 2004; <u>Project outline due</u>
May 3	Stochastic Opt 2-stage LP and chance-constrained LP	Rosenberg 2007
5	Genetic/Evolutionary Algorithms	Wardlaw & Sharif 1999; <u>Decision Anal. HW due</u>
7	Applications: Surface water systems	Rogers&Fiering 1986; Walski 2001
10	Applications: Environmental Water Account	Hollinshead 2007
12	Stochastic Optimization: Stochastic dynamic programming	<u>2-stage LP HW due</u>
14	Stochastic Opt: Search and implicit stochastic opt.	Grismer & Wets; HEC report
17	Applications: Regional wastewater treatment plant design [Jay gone]	Revelle et al. 1968
19	Applications: Game Theory [Jay gone]	Madani (in press)
21	Applications: Ground water systems [Jay gone]	Gorelick 1983; <u>SDP HW due</u>
24	Applications: Environmental management	Williams & Revelle 1998 or 2005; <u>Draft project due</u>
26	Applications: Hydroeconomic Modeling	Harou et al, 2009
28	Panel Discussion on Systems Analysis in Water Resources	
31	<b>HOLIDAY</b>	
June 2	Class Project Presentations	
7	Monday, 6-8pm: more Class Project Presentations	<u>Final projects due</u>

Term project: Each student will develop, complete, and present a term project. Projects should be a little innovative, but not too ambitious, an excuse to look into the application of this approach to your interests.

Text: The required text is Loucks, *Water Resources Systems Planning and Management*, UNESCO, 2006. Paper [http://publishing.unesco.org/details.aspx?Code\\_Livre=4438](http://publishing.unesco.org/details.aspx?Code_Livre=4438) or electronic <http://wldelft.nl/other/wrsbook>

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Panel?: David Ford, Francis Chung, Randi Field, Andy Draper, Ken Kirby, Paul Hutton, Gary Bardini, Rob Tull, Chris Enright, Dan Sheer, Walter Bourez

Some suggestions include:

- Implementing the stretched thread method on a spreadsheet or subroutine
- A preliminary "general" 1-reservoir spreadsheet simulation model
- Risk analysis for flood operations
- Optimal valve maintenance for water systems
- Critical comparative review of common reservoir simulation models
- Extend an existing model from the literature
- A review of hydrologic data issues for system modeling and management purposes
- Data display and post-processing options for water resources modeling
- Review of distribution network system optimization
- etc. ...