

Global Green MBA – Damia Class

Environmental Systems Analysis (209.8245)

Period 5 | Room 205, Jacobs Building

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Course Description

This course introduces mathematical programming and modeling approach for environmental systems analysis. Optimization methods will be applied for water resources and environmental systems management, resources conservation, and pollution control.

By the end of the course students will be able to model and optimize environmental systems for a set of constraints and objectives as well as performing sensitivity analysis of decisions. Moreover, the course will cover concepts of tradeoff, non-inferior sets, and multi-objective optimization with particular emphasis on problems with conflicting objectives such as economic and environmental concerns.

Course Outline

1. What is environmental system analysis?
2. Introduction to mathematical programming
 - Objective function
 - Constraints
 - Decision variables
 - Typical types of optimization models
3. Linear programming
 - Graphical solution
 - Simplex method
 - Sensitivity analysis: shadow price/ reduced costs
4. Excel Solver
 - Formulate optimization problems
 - Solve optimization problems
 - Analyze results
5. Case studies
 - Water resources systems
 - Environmental systems

6. Multi-objective optimization
7. Analysis of regulatory policy and programs
8. Case studies
 - Water resources systems
 - Environmental systems

Assignments

Four homework assignments will be given throughout the course. Unless otherwise indicated, homework may not be completed by groups. Late homework will not be accepted.

Grading

Assignments	30%
Final Exam	70%

Resources

Daniel P. Loucks, Jerry R. Stedinger, Douglas A. Haith , Water Resources Systems Planning and Analysis, Prentice Hall, 1981.

Loucks DP, van Beek E, with contributions from, Stedinger JR, Dijkman JPM, Villars MT (1981/2005) Water resources systems planning and management: an introduction to methods, models and applications. Princeton Hall, Englewood Cliffs. ISBN: 9231039989