

Environmental Systems (EnSci 381)**Fall 2014**Instructor: W.G. Crumpton - 129 Bessey Hall, crumpton@iastate.edu (office:294-4752)(cell:451-6306)TAs: David Green - 125 Bessey Hall, email: dgreen1@iastate.edu (lab:294-3983)Casey Judge - 151 Bessey Hall, email: cjjudge@iastate.edu (lab:294-3983)Samuel McDeid - 151 Bessey Hall, email: smmcdeid@iastate.edu (lab:294-3983)

In this course, we will use a systems approach to characterize the structure of natural environmental systems, to analyze material and energy flows through these systems, and to develop an understanding of the major physical, chemical, and biological processes controlling system structure and function. At the end of the course, you should be capable of applying this approach to virtually any system with which you are sufficiently familiar.

(The class schedule below may be adjusted based on our rate of progress and other factors.)

Weeks 1-2	<i>Preliminaries, Dimensional Analysis and Applied Math Review</i> <u>Dimensional analysis and applied math</u> : units of measure, dimensions, algebraic problem solving <u>Word Problems</u> : solving word problems using dimensional analysis and algebraic principles
Weeks 3-4	<i>Systems Concepts and Principles</i> Characteristics of systems, introduction to stock and flow diagrams, conservation equations, defining boundary fluxes, diagraming and accounting for stocks and flows from word problems, coupled and nested systems, mass loading and mass balance concepts, mass balance analysis versus mass balance modeling
Weeks 5-8	<i>Systems Analysis</i> <u>Steady-state Analysis</u> : material loads and balances at steady state, analyses of water budgets and material loads and balances across multiple systems <u>Time-dependent Analysis</u> : material loads and balances of time-varying systems, temporal data, basic statistics, time-stepping, time-dependent analyses of water budgets and material loads and balances across multiple systems
Weeks 9-15	<i>Integrated Analysis and Modeling of Environmental Systems</i> <u>Student Projects</u> : Application of a systems framework to selected environmental problems.

Your course grade will be based on a series of assignments and projects as indicated in the table below. Additional details and guidance on specific assignments, projects and your assembled portfolio will be provided separately. Attendance is required. If you must miss a class, let me know as soon as possible. Excessive absences can result in the loss of one or more letter grades and a requirement for comprehensive exams.

Special Needs: Please address any special needs or special accommodations with me at the beginning of the semester or as soon as you become aware. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) from the Disability Resources (DR) office (515-294-6624). DR is located in Room 1076 of the Student Services Building.

Assignments and grading: (subject to revision)

(15%)	Dimensional Analysis and Problem Solving Exercises	
(25%)	System Concepts and Analyses	
	Systems Concepts and Principles	
	Steady-state Analyses	
	Time-dependent Analyses	
(50%)	Projects	Anticipated Due Date
	Project 1 (15%)	11/3
	Project 2 (15%)	11/17
	Project 3 (20%)	12/12
(10%)	Portfolio Write-up (Due at final exam time)	12/19
100%	Semester Total	