

ERE465/665: Environmental Systems Engineering

Fall 2018

Professor: Chuck Kroll 424 Baker Lab cnkroll@esf.edu (315) 470-6699

Teaching Assistant: To be determined

Office Hours: Days before homework is due and by appointment

Mailbox: The course mailbox is located in the hallway outside of Baker 402.

Lectures: Mon/Wed: 3:45 am – 5:05 am Baker 437

Course Description: Mathematical models of environmental systems are presented and combined with optimization procedures, decision theory, uncertainty analysis, and engineering economics to develop integrated approaches to the planning, design, and sustainable management of complex environmental systems. Students will be exposed to a variety of optimization algorithms for a wide range of environmental applications.

Prerequisites:

APM206 (at least 1 calculus course)

APM395 (at least 1 probability and statistics course; can be concurrent)

Working knowledge of Excel

[Knowing computer programming may be helpful, it is not essential for this course.]

Required Texts and Supplies:

Course reader (available for purchase in Bray Hall)

Recommended Texts and Supplies:

Civil and Environmental Systems Engineering, Revelle, Whitlatch, and Wright. Any edition is fine with me.

Water Resources Systems Planning and Management: An introduction to methods, models and applications by D.P. Loucks and E. Van Beek, available for **free** in pdf form from <http://unesdoc.unesco.org/images/0014/001434/143430e.pdf>

Course Software:

In this course we will primarily use two software packages: Excel and R. In Excel, we will use the SOLVER, an optimization package built into EXCEL. R is a language and environment for statistical computing and graphics. We will use multiple computing packages with the R environment. Both packages are available in the ESF computer clusters.

Grading:	Exam 1:	Tentative Date => October 17	25%
	Exam 2:	Tentative Date => During Finals Time Slot	25%
	Homework Assignments		25%
	Course Projects and Presentations		25%

Note: Exam and project formats will be discussed later in the semester

Attendance Policy:

Attendance is highly recommended, but will not impact your grade. Students will be required to make presentations in class and work collectively on in-class problems throughout the semester.

Course Objectives:

This course will introduce students to mathematical models and methods to aid in management and decision making. These techniques can be applied to many different engineering and non-engineering situations, and class applications will involve a variety of environmental resources (water, forest, etc.), as well as issues with model calibration. The course will focus primarily on three subject areas:

- Engineering economic methods to compare competing alternatives with varying benefits and costs over time,
- Optimization techniques for developing improved planning and management strategies, as well as model calibration, and
- Decision theory and techniques given risk and uncertainty in the decision making process.

Program Learning Objectives: By the end of the semester students should be able to:

- a) Apply knowledge of mathematics, science and engineering (ABET outcome a)
- b) Identify, formulate, and solve engineering problems (ABET outcome e)
- c) Use the techniques, skills, and modern engineering tools necessary for engineering practice (ABET outcome k)

College Learning Outcomes: This course will contribute to students achieving the following College-wide learning outcomes:

- a) Quantitative Reasoning: Students will be able to effectively describe, interpret, apply, and evaluate quantitative information.
- b) Technological and Information Literacy: Students will be able to: use critical thinking skills to determine the information needed to solve a problem, access information using appropriate technologies, and effectively and appropriately use information to accomplish a specific purpose.
- c) Critical Thinking: Students will be able to: identify, analyze, evaluate, and develop well-reasoned arguments.

Academic Dishonesty:

Academic dishonesty is a breach of trust between a student, one's fellow students, or the instructor(s). By registering for courses at ESF you acknowledge your awareness of the ESF Code of Student Conduct (<http://www.esf.edu/students/handbook/StudentHB.05.pdf>), in particular academic dishonesty includes but is not limited to plagiarism and cheating, and other forms of academic misconduct. The Academic Integrity Handbook contains further information and guidance (<http://www.esf.edu/students/integrity/>). Infractions of the academic integrity code may lead to academic penalties as per the ESF Grading Policy (<http://www.esf.edu/provost/policies/documents/GradingPolicy.11.12.2013.pdf>).

Sources of Support and Class Absence:

If you experience academic or personal difficulties that affect your studies or life, there are people and resources that will help you. There is a website that serves to answer many student questions: <http://www.esf.edu/students/success>. In addition, the ESF Office of Student Life, 110 Bray Hall (470-6660) will provide academic support, career guidance, personal counseling, or direct you to the proper source of help. If you encounter a situation beyond your control in which you will be missing 3 or more days of classes, you should contact the Office of Student Life and they will get in touch with all your instructors for you. Supportive documentation may be required.

Accommodations for Students with Learning and Physical Disabilities:

SUNY-ESF works with the Office of Disability Services (ODS) at Syracuse University, who is responsible for coordinating disability-related accommodations. Students can contact ODS at 804 University Avenue- Room 309, 315-443-4498 to schedule an appointment and discuss their needs and the process for requesting accommodations. Students may also contact the ESF Office of Student Affairs, 110 Bray Hall, 315-470-6660 for assistance with the process. To learn more about ODS, visit <http://disabilityservices.syr.edu>. Authorized accommodation forms must be in the instructor's possession one week prior to any anticipated accommodation. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

Inclusive Excellence Statement:

As an institution, we embrace inclusive excellence and the strengths of a diverse and inclusive community. During classroom discussions, we may be challenged by different ideas. Understanding individual differences and broader social differences will deepen our understanding of each other and the world around us. In this course, all people are strongly encouraged to respectfully share their unique perspectives and experiences. This statement is intended to help cultivate a respectful environment, and it should not be used in a way that limits expression or restricts academic freedom at ESF.

Religious Observance:

ESF protects the rights of students to observe religious holy days according to their tradition. Students will be provided an opportunity to make up any exam or work requirements that may be missed due to a religious observance provided they give the instructor reasonable advance notification.