

**CEE 434**  
**Environmental Systems I – Fall 2023**

**Instructor:**

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**Class & office hours and rooms:**

Lectures, Tu & Th 9:30-10:50  
Classroom: Newmark 3310

Office hours: Mon & Wed: 1:30-3:00

F2F: Hydrosystems Lab, 2030 or via Zoom:

<https://illinois.zoom.us/j/3381494255?pwd=OmFiM0kyUkhFTG1ZOEJ0RHVlSSsyZz09>

All lectures will be recorded and published in Mediaspace (<https://mediaspace.illinois.edu>). The recordings will be available in the channel created for CEE434 recordings. [CEE 434 2023 Fall - Illinois Media Space](#)

**TAs:**

A couple of graduate students of Prof X. Cai's group will work as TA for the various parts of this course. Their contact information will be provided later.

**Prerequisites**

CEE 201, CEE 330, and CEE 350 or equivalents

**Texts**

- *Water Resources Systems Planning and Management-An Introduction to Methods, Models and Applications* by Loucks and van Beek, available from the Canvas course website; or online: <http://ecommons.cornell.edu/handle/1813/2804>
- *Environmental System Analysis* by Eheart (A free PDF is available to the class from course website at Canvas)

**Supplemental References**

- *Civil and Environmental Systems Engineering*, ReVelle et al., 1997 and some lectures on optimization (*for those who have not taken CEE 201*).

**Class Web Site**

Login to <https://canvas.illinois.edu> and choose CEE 434.

**Grades**

In-class quizzes	10.0% (inform the instructor ahead the class time with a good reason if you cannot attend the class; separate quizzes will be given to online students who cannot join the lectures synchronously)
Homework	40.0%
First exam	25%
Second exam	25%

95% +	A +	90%-95%	A	88%-90%	A-	85%-88%	B +	80%-85%	B	78%-80%
B-	75%-78%	C +	70%-75%	C	68%-70%	C-	55%-68%	D		
0 - 55%	F									

(Taking the lower bound in each category but not the upper bound, e.g., 90% means A)

**Homework and Exam Policies**

There are assignments for both individual students and groups. Group assignments can be conducted by groups of up to **four** students. Homework copied from others will result in 100% penalty. Late homework without a valid excuse given in advance will be penalized by 30%.

All exams are open-note, open-book. Note that team effort on exams is strictly prohibited. The University guideline on make-up examination will be strictly followed.

### Proposed Syllabus

Topics	No. Lectures	Reading list
1. Introduction 1.1. Environ. and Water Resources Systems 1.2. General Procedures for Systems Analysis	1	L Ch. 1, Liu et al. (2007)
2. Principles and Methods of Optimization 2.1. Linear Programming (LP) 2.2. Nonlinear Programming (NLP) 2.3. Multiple Objective Programming (MOP) 2.4. Stochastic Optimization (SO) 2.5. Dynamic Programming (DP, overview) 2.6. Genetic Algorithms (GA)  <b>First exam</b>	10	L Ch. 2 L Ch. 4(5) L Ch. 4(3), handout L Ch. 10 (skip 5.5.4-5.5.6) L Ch. 8 (1-4, 6), Ch 9 (1-3) L Ch.4(4) handout for GA
3. Water Resources Systems 3.1. Reservoirs 3.2. Aquifers 3.3. Basins (overview)	10	Ch.11 (skip 2.3, 2.4)
4. Water Quality Systems 4.1. Introduction to watershed modelling 4.2. Water quality regulation policies 4.3. Optimization in water quality management  <b>Second exam</b>	9	E Ch.3, Ch.4 L Ch 12 (1 - 4, 6, 7)

Notations: **L** - text of Loucks et al.; **E**-text of Eheart; Liu et al. (2007), a paper published by *Ambio* Vol. 36, No. 8. **For each of the lectures, you are encouraged to review the discussion problems and a record of the discussion available from the weekly modules in Canvas.**