

**CIEN E3004 – Urban Infrastructure Systems**

Department of Civil Engineering & Engineering Mechanics  
Columbia University

**Preliminaries**

Instructor: Markus Schläpfer

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Office hours: Wednesdays, 4:00 pm – 5:00 pm

TA: TBA

Lectures: Wednesdays, 1:10 pm – 3:40 pm

Location: 233 Mudd

**Course Description**

Overview: Introduction, from a Civil Engineering perspective, to (a) the infrastructure systems that support urban socioeconomic activities and (b) fundamental system design and analysis methods. Coverage of water resources, vertical and transportation infrastructure. Emphasis upon the purposes these systems serve, the factors that influence their performance, the basic mechanics that govern their design and operation, and the regional and global impacts they have.

Objectives: - Explain the role that infrastructure systems and civil engineers play in society  
- Characterize the infrastructure systems covered in the course and describe their key design & management parameters and performance measures  
- Apply basic design & analysis methods to infrastructure components & systems  
- Develop, compare and recommend conceptual system designs that are technically smart, environmentally sensitive, and socially aware

**Prerequisites**

Knowledge of spreadsheet programs, basic calculus, and probability concepts.

**Textbook**

No required textbook. Relevant reading material will be assigned during the course.

**Grading**

10% Class Participation, 20% Homework, 35% Mid-term, 35% Final.

Homework submitted late will receive a penalty. Submissions must be individual.

**Attendance policy**

Attendance at lectures is mandatory. If a student is to be absent, they should discuss it prior with the instructor.

**Class schedule (may be modified)**

Date	No.	Topics
Sept. 7	1	Course overview & introduction
Sept. 14	2	Urban sustainability; socio-economic basics of cities
Sept. 21	3	Mobility & transportation
Sept. 28	4	Mobility & transportation
Oct. 5	5	Buildings
Oct. 12	6	Energy supply
Oct. 19	7	Mid-term Exam
Oct. 26	8	Review Mid-term Exam
Nov. 2	9	Water supply
Nov. 9	10	Infrastructure interdependencies
Nov. 16	11	Smart cities, urban analytics, and urban science
Nov. 23	–	No class, Academic holiday
Nov. 30	12	Integrated infrastructure systems planning
Dec. 7	13	Integrated infrastructure systems planning
Dec. 21	14	Final Exam