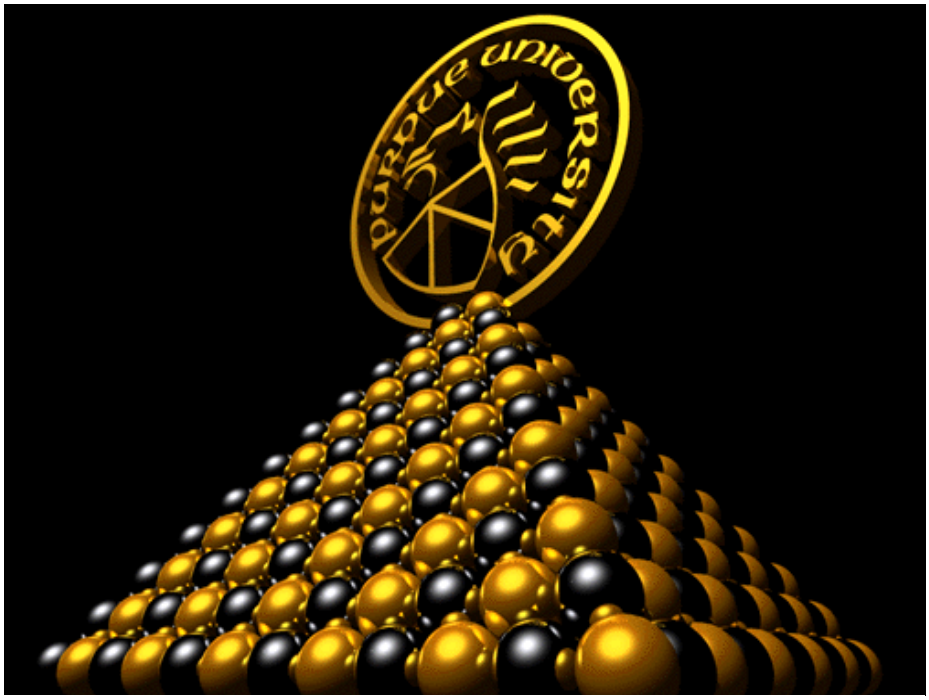
CE 398

Introduction to
Civil Engineering Systems Design



Well-rounded qualities glued together with determination and discipline

Course Syllabus

Sam Labi, Professor

Purdue University
Lyles School of Civil Engineering, G175A
Hampton Hall, 550 Stadium Mall Drive
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SYLLABUS for **CE 398** (Introduction to Civil Engineering Systems Design)

Class Time and Venue: Room:

Contact Information:

Instructor (Sam Labi) HAMP G175A labi@purdue.edu
Teaching Assistant (Sky Chen) HAMP 1268/2155 494-7381/2206, chen1670@purdue.edu

Office Hours: Instructor: Teaching Assistant:

This syllabus is a contract between the course instructor and the student. It addresses some questions that students typically have about the course and provides indication of the outcomes of their efforts (or lack thereof) in meeting the course expectations. It also includes a summary of topics to be covered in the course.

Course Type

CE 398, a core course for undergraduate studies in Civil Engineering (CE), is useful to all undergraduate students intending to pursue a career in civil engineering and related disciplines.

Course Objectives

1. Provide the student with an **overall picture of civil engineering systems development**, from needs assessment, to planning, design, construction, operations, maintenance, and end of life.

2. Expose the student to the various **systems-related analytical tasks** that civil engineers encounter at each phase of the CE system development process. A distinction is made between the tasks related to domain knowledge (learned in other CE courses) and systems-related knowledge (learned in this course, and include the tasks of description, evaluation, and decision-making).

3. Equip the student with the requisite **systems-related analytical tools** needed to carry out the tasks that Civil Engineers encounter at the various phases of the CE system development process. This includes a distinction between the tools related to domain knowledge (which is learned in other CE courses) and systems-related knowledge (which are learned in this course, and include the tools of engineering economics, life-cycle costing, financial analysis, modeling, simulation, optimization, risk & reliability analysis, network analysis, and so on).

4. Help the student to design a CE system, component, or process to meet needs within constraints associated with economic, social, political, ethical, health & safety, constructability and sustainability criteria. This is done through various HW assignments and a term project. The student is thus exposed to real-life instances and applications of key criteria for evaluation and decision making in various contexts that are associated with each phase of the CE systems development process.

5. Expose the student to **current and emerging issues** related to CE systems, such as smart cities, the internet of things, big data, vulnerability, and system resilience, and environmental sustainability.

6. Help the student to prepare for **professional licensure** by exposing them to various topics relevant to the practice including ethics and economic analysis.

7. Provide the student an opportunity to develop vital management-related skills of technical report writing, team work, and communication, and research project execution.

8. Serve as an **integrated part of Purdue's strategic curriculum** that prepares undergraduate students for effective careers in CE.

Course Description

This course introduces a fundamental systems approach to address various tasks at the various phases of civil systems development. In order to provide a solid context and foundation for the rest of course, the student is taught to:

- Understand and appreciate the evolution of civil engineering disciplines, systems thinking, and the typical goals and objectives of civil engineering systems.
- Recognize the various different phases of CE systems development and the tasks typically faced by civil engineers at each phase.
- Understand and apply the various systems-related analytical tools including optimization, economic analysis, network theory, queuing theory, decision theory, systems dynamics, and real options
- Be aware of and appreciate the current and emerging issues associated with civil systems development such as CE systems vulnerability, resilience, sustainability, smart cities, the internet of things, and big data.

The course exposes the CE undergraduate to real life instances and applications and lessons learned that are associated with each phase of the CE system development process, and inculcates in the student, the need for life-long learning in today's fast-evolving world. The course also helps the CE undergraduate to develop vital skills of technical report-writing and oral presentation. The course applies the concepts to problems in the various areas of civil engineering and provides a vast array of illustrations, examples, numerical problems, case histories, and case studies in the various civil engineering disciplines: architectural, construction, environmental, geotechnical, hydraulics, materials, structures, and transportation. The didactic mechanisms in the course includes lecture presentations, quizzes, video shows, homework assignments, software demonstrations, jeopardy competitions, a term project, and lectures by external speakers.

Course Material

The textbook for the course is:
Introduction to Civil Engineering Systems, by S. Labi, published by Wiley, 2014.
Supplementary texts are:
Fundamental Principles of Systems Analysis and Decision-Making, by P. Ossenbruggen
Systems Engineering with Economics, Probability, Statistics, C.J. Khisty, J. Mohammadi, A. Amekudzi
Civil and Environmental Systems Engineering, by C.S. Revelle and E. Whitlatch

Also, supplemental course materials including powerpoints will be provided on the course web site. The address is:
https://mycourses.purdue.edu/

Class Attendance

Yup! Everyone expects you to attend classes except those that are designated as "optional". Absences should be preceded by notification (e-mail or otherwise).

Homework Policy

Please turn in your homework just before the start of class session on the day that they are due. Justifiable excuses for late submission should be preceded by early notification (e-mail or otherwise) with a good explanation. Every late day of submission results in 20% loss of overall points for the assignment. Let's resolve any adjustments to homework grades within two weeks of the day on which that homework assignment is returned. All questions about homework scores should first be directed to the TA. All grades must be finalized within this period -- in other words, no additional

points shall be awarded at the end of the semester to "boost" your grade even if you are just below the grade cutoff.

Grading Policy

There will be a mid-term exam and a final exam. With or without prior notification, in-class quizzes may be given. The grading distribution for the course is as follows:

Quizzes	20%
Mid-Term Exam	20%
Final Exam	30%
Term Project	30%
Homework	10% (Voluntary, Extra Credit)

Grade Limits will be as follows:

90 – 100%	A
80 – 89.99%	B
70 – 79.99%	C
60 – 69.99%	D
<60%	F

In the course of the semester, the above grading scheme may be amended at the discretion of the Instructor.

Student Conduct:

You are expected to abide by the Purdue University Student Conduct Code. Further, it is assumed that you subscribe to a personal code of ethics based on a value system that is adheres to the highest standards of academic integrity. Naturally, I do not expect any breach of academic honesty or disruptive classroom behavior but if this happens, I will have no choice but to handle in accordance with established university procedures. You will be required to carry out assignments independently unless otherwise instructed.

I am assuming you want to have a great and stress-free semester. Let's make it an interesting one too! Go Boilers!

COURSE OUTLINE