NJIT CIVIL AND ENVIRONMENTAL ENGINEERING

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CE 494 – 103 - Civil Engineering Design I **Spring 2024**

Texts: No new texts. Various online resources and previous CE course books.

Instructor: John Mayo, P.E. contact information: jfm2@njit.edu

Prerequisite: *Senior standing in civil engineering. Simulates the submission and acceptance process normally associated with the initial design phases for a civil engineering project. Familiarizes students with the preparation of sketch plats, preliminary engineering design, and a related environmental assessment. Requirements include written submittals and oral presentations in defense of the project.*

Class	Date	Description
1	1/17	First class meeting, project overview and professional expectations. Lecture - Introduction to land development, boundary surveys, topographic mapping. Land use and regulatory code, Environmental constraints and subdivision planning.
2	1/24	Formation of project teams. Lecture - Engineering estimations and preliminary detention basin design, soil maps, computing peak flows using the Rational Method and Modified Rational Method. Detention basin design. Stormwater runoff and water quality standards
3	1/31	**Phase 1 Materials Due** Lecture – Engineering calculations and reporting. Project management, CAD data management. Roadway Design: Alignments, Profiles and Cross Sections.
4	2/7	Lecture - TIN Surfaces – Roadway Grading and Civil 3D Corridors,
5	2/14	No Class
6	2/21	Lecture - Cul-de-sac and Intersection Design.
7	2/28	Lecture - Stormwater Management, Drainage Area Maps, Detention Basin Sizing and Grading.
8	3/6	Lecture - Stormwater Management: Sewer Capacity. Using Civil 3D Pipe Networks
9	3/13	Lecture - Sanitary and Domestic Water Services. Sewer Capacity and Site Utilities Sanitary System Design, Watermain Layouts. H&H Engineering Applications and Calculators.
10	3/20	Spring Recess
11	3/21	Lecture - Earthworks, Grid Volumes and the Average End Area Method.
12	3/27	Environmental Impact Reports – Environmental constraints (floodplains, wetlands, riparian zones), soil erosion and sediment control
13	4/3	Lecture - Residential grading plans and TIN grading techniques – 2D to 3D
14	4/10	Lecture - Residential grading plans and grading techniques – driveways, walkout basements, retaining walls, swales and berms
15	4/17	Lecture - Public speaking, oral presentation requirements. – Discussion – Planning Board Reports. Project Review: Calculations, Reporting, Map Sets, Managing Data and Plot Times. - Informal project review with individual groups. All groups are required to have drafts of all material for review either printed or on your personal computing device.
16	4/24	Presentations, **Planning board reports due**. **Deadline for Submission of Phase II materials**.

Grading Scale:

Grading 200 total points are assigned to the entire project

Point Total	Grade
A:	200-180
B+:	179-171
B:	170-160
C+:	159-151
C:	150-130
D:	129-120
F:	Below 120

Withdrawals:

In order to insure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals.

NJIT Honor Code:

The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students. The Honor Code can be found at (https://www5.njit.edu/policies/sites/policies/files/NJIT-University-Policy-on-Academic-Integrity.pdf).

CE 494 – Civil Engineering Design I

Description:

Simulate the submission and acceptance process normally associated with the initial design phases for a civil engineering project. Familiarize students with the preparation of sketch plats, preliminary engineering design, and a related environmental assessment. Requirements include written reports and oral presentations in defense of the project.

Prerequisites: Senior standing in Civil Engineering

Textbook(s)/Materials Required:

No new textbooks. Students are expected to utilize the textbooks from preparatory courses as well as other related references.

Course Objectives:

1. Simulate the submission and acceptance process normally associated with the initial design phases for a civil engineering project to familiarize students with the preparation of sketch plats, preliminary engineering design, and a related environmental assessment.

Topics: Depends on Site Selected. Typically the following topics are covered:

Introduction to project site, zoning requirement and other constraints

Subdividing Property

Street Design

Grading Plans

Environmental Impact Analyses and Report

Sanitary Sewer Design

Stormwater Management System Design

Soil Program and Sediment Control

Water Supply Layout

Quantities and Cost Estimate

Schedule: Lecture/Recitation- 3 hour class, once per week

Program Objectives Addressed: 1, 2

Prepared By: John Mayo, PE **Date:** Spring 2024

Course Objectives Matrix – CE 494 Civil Engineering Design I

Strategies and Actions	**Student Learning Outcomes**	**Outcomes (a-k)**	**Prog. Object.**	**Assessment Methods/Metrics**
Course Objective 1: Simulate the submission and acceptance process normally associated with the initial design phases for a civil engineering project. To familiarize students with the preparation of sketch plats, preliminary engineering design, and a related environmental assessment.				
Present an open ended civil engineering practice design problem for solution by teams of students.	Learn how to identify, formulate, and solve open ended civil engineering practice design problems by applying knowledge of mathematics, science, and engineering integrated with CAD.	a, c, d, e, k	1, 2	Final project report and periodic progress reports.
Discuss specific code, performance, cost, time, quality and safety objectives.	Learn how to identify, formulate and solve area specific civil and environmental engineering practice design problems that meet specified code, performance, cost, time, quality and safety objectives.	c, d, e, f, h, i, j	1, 2	Final project report and periodic progress reports.
Work individually and within multi-disciplinary design teams.	Learn how to function and communicate effectively both individually and within multi-disciplinary design teams.	d, g	1, 2	Final project report, periodic progress reports, oral presentation of project.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our Program Educational Objectives are reflected in the achievements of our recent alumni:

1. Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward safe, practical, resilient, sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.
2. Professional Growth: Alumni will advance their technical and interpersonal skills through professional growth and development activities such a graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.
3. Service: Alumni will perform service to society and the engineering profession through membership and participation professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Revised 02/20/2024