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Environmental Engineering Senior Design I

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CUNY City College

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ENGR 59869: Environmental Engineering Senior Design I
Grove School of Engineering, City College of New York - CUNY
Fall 2020, Mondays 2:00 pm – 4:40 pm, Steinman Hall Room 424 and/or via CCNY Zoom
Instructor: Professor Pamela JB Clenace, Ph.D., CHMM
Office Hours: Mondays - 12:50 pm - 1:50 pm
Email: pclenace@ccny.cuny.edu

Course Description:

Engineering Design - Engineering design is a process of devising a system, component, or process to meet desired needs and specifications within constraints. It is an iterative, creative, decision-making process in which the basic sciences, mathematics, and engineering sciences are applied to convert resources into solutions. Engineering design involves identifying opportunities, developing requirements, performing analysis and synthesis, generating multiple solutions, evaluating solutions against requirements, considering risks, and making trade-offs, for the purpose of obtaining a high-quality solution under the given circumstances. For illustrative purposes only, examples of possible constraints include accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, regulations, schedule, standards, sustainability, or usability.

Course Requirements:

This is a two-semester design sequence for Earth System Science and Environmental Engineering Students. The student is required to design and implement a solution that addresses a specific Earth system/environmental engineering problem or question. The weekly lectures expose students to principals of engineering design, including identification of a problem, background research, social environmental, ethical and economic considerations, intellectual property and patents and proposal writing including methods of engineering analysis and modeling. A detailed design proposal is completed during the first semester. 3 credits

Prerequisites: EAS 21700 (Systems Analysis of the Earth) and students must pass three out of five following courses: ENGR 30100 (Introduction to Satellite Remote Sensing and Imaging), ENGR 59910 (Introduction to GIS), CE 36500 (Hydraulic Engineering), CE 37200 (Environmental Impact Assessment), CE 47400 (Environmental Engineering).

Learning Objectives:

- learn the skill of professional collaboration
- engage in team design process
- master research and analytical skills
- participate and communicate in a team setting
- develop an engineering solution
- learn how to apply engineering codes and standards
- document team's technical process

Student/Teams' Responsibility:

Each student will be assigned to a team and the team will work on a project for two semesters. The team will select a team leader to lead the team. The team leader is responsible for ensuring that the team adheres to the group requirements by leading in developing, adhering and submitting timely work plans, weekly reports, project schedules, and design report submittals; and organizing the class presentations. The team leader will receive 2% extra credit for the final grade for his/her leadership role for the semester and if agreed by the other team members, another team leader may be selected for the spring semester. Each team member is responsible for conducting and performing his/her responsibility/portion of the project. Also, each team is responsible for conducting their own research, collecting data, collecting any other relevant information or conducting any task necessary to complete the project, and obtaining mentors or experts for guidance.

Assignments:

In the first semester of engineering senior design, activities shall include the following:

- **Develop the engineering 30% design project:** Each team member will be required to develop the team's proposal, under the supervision of their technical mentor. Weekly meetings will be held in class or on-line with the course instructor. Students are also expected to make time to meet with their team and mentors, and to work on the implementation of their project outside of class time.
- **Progress Reports/Schedules:** At the beginning of the semester, each team shall submit a project schedule, which shall include critical paths. Each week a progress schedule, along with a brief summary, outlining changes to the schedule shall be submitted. **The reports must include the information listed below (see 'Progress Reports' guidelines section).**
- **Project work plan:** Each team will be required to develop and to submit a project work plan. The purpose of the work plan is to create a visual reference for the goal, objectives, tasks and who is responsible for each area. See below for details.
- **In-class Presentations:** Each team will give a presentation on their project.
- **Draft 30% Design Report:** Each team will prepare a written 30% design report; with complete documentation of the project design (see 'Draft 30% Design Project Report' guidelines section). The hardcopy of the 30% draft design report must be submitted at the beginning of the class (if in class lectures have resumed) and on Blackboard on Monday November 23rd, by 1:30 pm. No late submittals will be accepted.
- **Panel Presentation:** Each team will make a final presentation based on their 30% Design Report. All team members must participate in the team's presentation. The presentation will be evaluated by a panel of faculty members and practicing professionals (see 'Design Project Panel Presentation' guidelines section). The final panel presentations will be held on November 23rd, November 30th and December 7th. Each team will have a maximum of 40

minutes for their presentation and there will be a maximum of 30 minutes for a question and answer session for the panelist and class. All students will be required to attend all the teams' presentations, and this attendance will be worth 5% of your final grade.

- **External Events:** All students are required to attend two external events (see instructions below). **Only one of these events may be a webinar** (if in person conferences have resumed). The external event shall be related to a science and/or engineering topic. This is an individual assignment. The 1-2 page summary report shall consist of the date attended or the date of the webinar, the event name, purpose, location, key speakers, other relevant information, and what the student learned from the event shall be explained. Photos are encouraged. See schedule for due dates for external event summaries submittals on Blackboard. Points will be deducted if two or more students report on the same event.

All attachments or assignments are to be submitted in either a pdf or .doc (dot doc) format (do not upload .pages (dot pages)) on Blackboard.

Blackboard Use Policy:

1. You are required to use Blackboard in class for submitting all the assignments (no paper copies are allowed (except for the technical design reports or otherwise instructed). Your grades will be posted on Blackboard.
2. If you experience any issues logging in, please contact the Service Desk
 - a. Location: NA 1/301 (main desk: inside the cITy TECH Center)
 - b. Phone: 212 650-7878
 - c. <https://www.ccny.cuny.edu/it/help>
3. You are encouraged to bring your laptops/tablets/phones to the class as there may be in-class writing assignments as a part of your participation grade. You may want to borrow a laptop through the CCNY Laptop Loaner Program: <https://www.ccny.cuny.edu/it/laptop-loaner-program>.
4. You will not be penalized if you don't bring your electronics to class. Please always have a notebook and a pen with you.

Grading Policy:

The Final Grade will be based on fulfilling the following requirements:

Teams' work plan (Team Grade) - 5%
Draft 30% Design Report (Team Grade 15%, Individual Grade 10%) - 25%
30% Design panel presentation (Team Grade 10%, Individual Grade 10%) - 20%
External Events (2 events, Individual Grade) - 10%*
In Class Technical Presentation (Individual Grade) - 10%
Participation in class discussions and regular attendance (Individual Grade) -10%
Weekly team reports and weekly project schedules (Team Grade) - 10%*
Attendance for all final presentations** - 5%
Respect*** - 5%
Total: 100%

*3% of the grade per day will be deducted for each assignment submitted after the deadline (this includes weekends). After two weeks of no submission of the assignment, a zero grade will be given.

**Attendance for the final presentations is mandatory. If classes are conducted remotely, students must have video and audio access available during the entire presentations. Deduction of the 5% grade will be made if students are not immediately available to answer requests or questions via chat or verbally, or if they are not present or are away during the presentations.

*** Respect will entail coming to class on time, being prepared for class, no cell phone or computer (except for remote learning) usage during class (unless directed by the instructor), respecting the instructor (especially, listening to advice and implementing the advice), guest speakers, and your fellow classmates. Only appropriate language and tone is to be used (no offensive or threatening language, no yelling, and no physical abuse), and no rude gestures or emails/texts are to be used or sent to anyone.

Extra Credit:

Extra credit may be issued upon the instructor's discretion. Also, 2% extra credit will be given for the final grade for each team leader.

Grading Late Submissions:

To acknowledge the effort of those who do submit their papers on time and discourage students from late submissions, **3% of the performance grade per day will be deducted** for each assignment submitted after the deadline (this includes weekends). In other words, if the assignment was submitted after the specified date and time, the grade will be 3% lower than it would have been if the assignment was submitted on time. The grade will be 6% less if the assignment is submitted 48 hours after the deadline, and so on. **If the assignment is not handed in after two weeks after the deadline, the student will receive a zero grade for the assignment.** This rule does not apply to students who requested (and received) an extension via email before the assignment due date and to students who submitted a letter issued by the AccessAbility Center/Student Disability Services (AAC/SDS).

Should you experience an extraordinary hardship, you may request a deadline extension, which will be granted on a case by case basis.

To request an extension, please do the following:

1. Contact me in writing (via email) to request the extension prior to the deadline (the same day will not suffice).
2. Describe the status of your assignment and the reason you feel you deserve an extension.
3. Propose a new deadline date.
4. Wait to hear back from me, as I will grant extensions at my discretion.

Absolutely no bulk submission of past due assignments after the last day of classes!

Quality of Performance	Letter Grade	% Range	GPA
Excellent - work is of exceptional quality	A+	97 - 100	4
	A	94 - 96.9	
	A-	90 - 93.9	3.7
Good - work is of above average quality	B+	87 - 89.9	3.3
	B	84 - 86.9	3
	B-	80 - 83.9	2.7
Satisfactory	C+	77 - 79.9	2.3
	C	73 - 76.9	2
Poor	C-	70 - 72.9	1.7
	D+	67 - 69.9	1
	D	64 - 66.9	
	D-	60 - 63.9	
Failure	F	< 59.9	0

Class and Civil Decorum:

No food or drink are allowed in the classroom, except water. All trash including paper and water bottles must be removed from the room after class. If class is given remotely, please try to keep your area as quiet as possible.

The class environment is to be respectful, conducive to learning, and free from hostility. Therefore, no verbal or physical abuse will be tolerated. The instructor reserves the right to ask a student to leave the class if the student has demonstrated unacceptable behavior, e.g., use of threatening or foul language, verbal or physical abuse, class disruption, being argumentative and/or rude, or harassment of any type, etc). This will be considered as an unexcused absent. Also, if the student refuses to leave, the campus security will be called to escort the student from the class or if class is remote, the student will be disconnected from the class.

NOTE: The course instructor reserves the right to change the syllabus/schedule/grading policy/assignments anytime during the semester.

Lateness & Absence Policy:

Attendance is mandatory and will be taken at the beginning of each class. Two late arrivals will be treated as an absence. No more than two absences per semester may be excused due to a personal matter. A 15 min break may be given during class. Long periods (greater than 10 mins) of unexcused or multiple breaks during class will be counted as half an absent per class.

The CCNY Bulletin states the following Policy on Lateness and Absence: Students are expected to attend every class session of each course in which they are enrolled and to be on time. A WU grade will be assigned to a student by the instructor for excessive absence. Students are advised

to understand the instructor's policy at the first-class session. They should note that an instructor may treat lateness as equivalent to absence. No distinction is made between excused and unexcused absences. Each instructor retains the right to establish his or her own policy, but students should be guided by the following general College policy. In courses designated as clinical, performance, laboratory or fieldwork courses, the limit on absences is established by the individual instructor. For all other courses, the number of hours absent may not exceed twice the number of contact hours the course meets per week.

AAC/SDS Statement:

The AccessAbility Center/Student Disability Services ensures equal access and full participation to all of City College's programs, services, and activities by coordinating and implementing appropriate accommodations. If you are a student with a disability who requires accommodations and services, please visit the office in NAC 1/218, or contact AAC/SDS via email (disabilityservices@ccny.cuny.edu), or phone (212-650-5913 or TTY/TTD 212-650-8441).

Academic Integrity:

Academic dishonesty of any sort is strictly prohibited at The City College of New York.

Plagiarism is the act of presenting another person's ideas, research or writing as your own. Examples of plagiarism include:

- Copying another person's actual words or images without the use of quotation marks and footnotes attributing the words to their source.
- Presenting another person's ideas or theories in your own words without acknowledging the source.
- Failing to acknowledge collaborators on homework and laboratory assignments.
- Internet plagiarism, including submitting downloaded term papers or parts of term papers, paraphrasing or copying information from the internet without citing the source, or "cutting & pasting" from various sources without proper attribution.

Any plagiarism violation(s) will result in an "F" grade for the assignment.

Visit <https://www.ccny.cuny.edu/about/integrity> to download a copy of the University's academic integrity policy handout.

Or see <https://www.ccny.cuny.edu/sites/default/files/2014-Reasonable-Accommodations-Faculty-Guide-to-Teaching-Students-with-Disabilities.pdf> on page 56.

Guidelines for the Project workplan:

The following are guidelines are to be used to develop and submit your team's project workplan.

The work plan shall include the following components:

1. Identify the purpose of the work plan and the scope of work (SOW)
2. Write the introduction and background
3. Determine the project's goal(s) and objectives
4. List resources to be used
5. Identify any constraints
6. List who is responsible for each task
7. Describe the project strategy

Guidelines for the Draft 30% Design Project Reports:

The following are guidelines are to be used to submit an ethical written 30% design report. It is recommended to access a professional design report(s) for guidance on how to structurally organize your design report. It is understood that some sections may still require additional or future work, or some work is pending, however, a status of what has been completed and what needs to be completed for a 60% and a subsequent 95% design report must be explained.

The 30% design report shall include the following components:

1. Acknowledgements: list your mentor(s) and any stakeholder that may have contributed data, resources, expertise knowledge, funding, etc. (grading 5%)
2. Executive Summary: (1/2 page or less) summarize the project and the proposed solution: (grading 5%)
3. Introduction (grading: 15%)
 - a. Draft Problem Statement
 - i. Describe the engineering problem
 - ii. Describe project conceptualization
 - b. Draft Background Information
 - i. Site History, Site Geology, Land Use, Hydrogeology, etc.
 - c. Project Management
 - i. Breakdown of each team member's role in the project
 - ii. Flow chart of stakeholders involvement
4. Draft Technical Approach (grading: 20%)
 - a. Pre-Design Investigations
 - i. Sampling and sampling analysis, product testing, mapping, modeling, etc., if applicable
 1. List planned activities
 - b. Proposed Methodology
 - i. Describe technical methods to be used to solve the engineering problem
 1. List research, activities, etc that needs to be conducted
 - c. Preliminary Design and Specifications Drawings

- i. Specifications Outline
 - ii. Green Remediation to be used, if applicable
 - d. Regulatory Compliance Requirements
 - i. Design criteria or processing requirements
 - ii. Permits, codes, standards, regulations, etc.
 - 5. Draft Project Assessment (grading: 15%)
 - a. Risk Assessment
 - i. Qualitative and quantitative analysis
 - 1. List tasks that needs to be completed
 - a. Life-cycle assessment/Sustainability
 - b. Other related tasks
6. Draft Proposed Cost Estimate (grading: 15%)
 - a. List tasks that need to be completed
 - i. Capital cost (cost of fixed assets)
7. Draft Proposed Recommendations (grading: 15%)
 - a. List tasks that need to be completed
 - i. Design documents: drawings/procedures/specifications/diagrams
 - ii. Updated Project Schedule and an analysis of deviations from the original schedule
 - b. References

10% of the report grade will be determined by grammar/narrative style/formatting. The 30% design report should be concise, easy to read, and professional in tone and appearance.

Guidelines for the Design Project Panel Presentation:

Each team will prepare an oral presentation, which will be presented to the course instructor and a team of experts at the end of the semester:

- The panel must include your technical mentor, additional experts in your field, and the course instructor.

Guidelines for Weekly Progress Reports and Project Schedule:

Each team member is to take turns in submitting the teams' progress report and an updated project schedule each week. The progress report should be no more than 1 page (bullets are acceptable), attached with the progress schedule.

This semester, you will receive a team grade each week:

- Weekly progress reports are to be submitted on Blackboard every Friday by 10:00 pm (Sept 4th to Nov 6th). The designated team member for that week is responsible to submit the weekly reports and weekly project schedules to their mentors by the same dates. All team members should be copied on the weekly progress reports and project schedules.
- Weekly progress reports shall include:
 - o Date/times and attendees of team meetings/calls (inside and outside of class, with and without mentors)

- A summary of the team's progress and each team members' activities, and an explanation of successes and challenges.
- An updated weekly project schedule and an explanation of any changes to the schedule.

The following schedule is subject to change:

Course Schedule:

Monday, 31 August 2020

- Review of the course syllabus
- Lecture: Students will be assigned to teams and team projects
- Friday, September 4th, submittal of first team weekly report with project schedule

• Monday, 7 September 2020 – No Classes

• Monday, 14 September 2020

- Lecture: Basic Project Management - What is a design report? What is a work plan?
- Team meetings with course instructor

• Monday, 21 September 2020

- Guest Speaker: Mr. John Clenace, P.E. - The Importance of Project Scheduling
- Team meetings with course instructor

• Monday, 28 September 2020 – No Classes

• Tuesday, 29 September 2020

- Submittal of Teams' work plan (due by 1:30 pm on Blackboard)
- Lecture: Understanding the Importance of U.S. EPA and Regulations
- Team meetings with course instructor

• Monday, 5 October 2020

- Lecture: Environmental Engineering – Case Study
- Team meetings with course instructor

• Monday, 12 October 2020 – No Classes

• Wednesday, 14 October 2020

- Submittal of first external event summary (due by 1:30 pm on Blackboard)
- Team presentations: Report of team's progress – 20 mins max

• Monday, 19 October 2020

- Lecture: What is Epidemiology? And how does it relate to Environmental Engineering?
- Team meetings with course instructor

• **Monday, 26 October 2020**

- Lecture: EPA's Green Remediation Policy
- Team meetings with course instructor

• **Monday, 2 November 2020**

- Friday, November 6th - Submittal of last weekly report with project schedule
- Guest Speaker - Dr. Naresh Divineni - What is Risk Assessment?
- Team meetings with course instructor

• **Monday, 9 November 2020**

- Lecture: Report writing, 30% design - what's to be included and presentation skills
- Team meetings with course instructor

• **Monday, 16 November 2020**

- Submittal of second external event summary (due by 1:30 pm on Blackboard)
- Lecture: Ethics Part 1
- Team meetings with course instructor

• **Monday, 23 November 2020**

- All teams shall submit the 30% draft design report, which shall include the project schedule, and a copy of the team's presentation by 1:30 pm on Blackboard and a hard copy (if there's in class sessions) of the report at the beginning of the class (late submittals will not be accepted).
- Teams 2 and 4 will present their design project
- Panel Discussion Forum

• **Monday, 30 November 2020**

- Teams 3 and 5 will present their design project
- Panel Discussion Forum

• **Monday, 7 December 2020**

- Team 1 will present their design project
- Panel Discussion Forum
- Discussion: Course summary recap

*All students must have video and audio Blackboard Ultra Collaborate technical capabilities to attend classes, participate during classes, and participate during team meetings with course instructor. Please see course syllabus for details.

Key dates:

August 26th – CCNY - First day of class

August 31st – First day of class for Engr 59869

September 7th – No classes scheduled

September 28th – No classes scheduled

September 29th - Classes follow a Monday Schedule

October 12th - College Closed

October 14th - Classes follow a Monday schedule

December 7th – Last day of class for Engr 59869

December 9th – CCNY - Last day of classes