CE 485- SERVICE LEARNING PIPEWORK NETWORK DESIGN Spring 2024

Course Description (from the course catalog):
The objective is to provide the tools required to design water distribution systems for an underdeveloped community. In Maca Grande, Ecuador, an underdeveloped community needs to walk miles uphill to get dirty water from a spring each day to use. NJIT EWB is working with the Engineers In Action (EIA), CODEINSE, and Life Giving Water International to help this community get access to clean water from nearby springs. The project consists of installing a quality filtration or a spring cap, a storage system and a water distribution system from the springs to the village of 300 inhabitants. The spring cap and the storage system is already constructed, and the team will be designing the water distribution system during spring 2024 in collaboration with the community, Engineers In Action (EIA), CODEINSE, and Life Giving Water International. By volunteering to provide the technical knowledge in design of the water distribution system for the inhabitants of Maca Grande, Ecuador, students taking this course will fulfill the service learning component. The design will be implemented in November.

Co-requisite or Pre-requisite:
Prerequisite: Junior Standing

Course Section: 102

Lectures: Thursdays 6:00–8:50 PM EST/EDT

Instructor: Dr. Jay Meegoda
Office: Colton 221
Office Hours: Tuesdays and Thursdays. 4–6 PM, or by appointment
Email: meegoda@njit.edu

Communication:
Communication by the Instructor will primarily be done through email. It is your responsibility to check e-mail regularly.

Text: R. J. Houghtalen, A. O. Akan, N. H. C. Hwang, *Fundamentals of Hydraulic Engineering Systems*, 5th Edition, Pearson, ISBN: 9780134292380.
Since the hard copy is priced the same as a normal textbook, it may be advantageous to use the Pearson+ subscription system, which charges a monthly fee for use of the textbook. The ISBN for this resource is 9780137525768.
For best results, please read the assigned reading (including example problems) before it is covered in class.

References:

1. **R. G. Dean & R. A. Dalrymple, *Coastal Processes with Engineering Applications*, Cambridge University Press, ISBN: 9780511754500**
   This is the essential textbook on coastal engineering. The lessons in this course on coastal engineering will be based on this textbook. It is available online through the NJIT library.
2. **J.A. Roberson, J. J. Cassidy, and M. H. Chaudhry, *Hydraulic Engineering Applications*, 2nd ed., ISBN: 978-0-471-12466-5**
   This is another hydraulic engineering textbook, but it has not been updated as recently and is a bit longer, with more emphasis on hydrology.
3. **J. E. Gribbin, Introduction to Hydraulics and Hydrology with Applications for Stormwater Management, Delmar Thomson Learning, ISBN: 9780766827943**
   This is a textbook with more practical details on stormwater management.

Items Required for this Course:

1. **Computer to access course resources**
2. **DeepNote or Google Colab account (or another way to create Jupyter notebooks with Python such as installing Anaconda)**
3. **Calculator capable of solving cubic functions**
4. **HEC-RAS, EPANET, HEC-HMS, and EPA-SWMM software (free to download, available on lab computers)**

Grading Policy:

- **Homework:** 15%
- **Midterm Exam:** 25%
- **Final Report:** 30%
- **Final Presentation:** 20%
- **Attendance/Participation:** 10%

Grading Scale:

A:	**100-90**
B+:	**89-85**
B:	**84-80**
C+:	**79-70**
C:	**69-60**
D:	**59-50**
F:	**Below 50**

Assignment Policy:

All assignments are due by 11:59:59 PM on Saturdays, unless otherwise specified. Late assignments will automatically be deducted 10% per day they are late and will not be accepted after 72 hours.

Schedule

Week	Service Learning	Hydraulic Engineering
1	What is service learning and why it Is important	Review of Fluid Mechanics
2	Past Service-Learning Projects	Introduction to Python
3	Introduction to the Community	Groundwater
4	Topography and Other Technical Details	Hydraulic Measurements
5	Technical Details of Other Projects in the Community	Hydraulic Measurements Computation & Applications
6	Conversations with Community Partners	Storage & Pipe Networks
7	Basics of Hydraulics	Pumps & Water Hammer
8		**Midterm**
9	Design of water distribution system	Using EPANET
10	Design of water distribution system	Hydrology Basics
11	Development of CAD drawings	Drainage Design
12	Presentation of the Design to the Community	Drainage Networks
13	Quantification of the Project Material including Earthwork	
14	Calculation. of the Project Cost	
15	Project Presentation to the NJIT community	

Attendance and Participation:
Please do your best to be fully present during lectures and avoid distractions for yourself and for your fellow students. As noted above, attendance and participation is a non-negligible component of your grade. If a student must miss a class or an exam, please contact the professor to discuss the issue at least **24 hours prior to** the class or exam. Students will not be allowed to make up exams or quizzes if the professor is not contacted prior to the class, and quizzes will only be made up after the dropped quiz has been used. If a student had a serious medical issue, death in the family, or other excusable emergency absence, the student is required to obtain an excused absence from the Dean of Students prior to asking for a make-up.

Students with Disabilities:
NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Office of Accessibility Resources and Services.

Additional Support:
College studies provide many new challenges and opportunities, and many students experience some form of distress as a result. If you feel overwhelmed or would like to talk with someone about your mental or emotional state, please reach out to C-CAPS or the Dean of Students.

Withdrawals:
In order to ensure 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.

Exam Policy:
Exams will be given in person during class time.

Academic Integrity:
"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"*

Syllabus Information:
The dates and topics of the syllabus are subject to change with consultation with the students.

Copyright:
All course content (including this syllabus, lecture materials, homework assignments, and exams) is protected content. Students should not make copies of any course materials or distribute these materials in the public domain, including sites such as Chegg, CourseHero, etc.

Transition to Remote Instruction
Prior to the start of this semester, please read through the NJIT Guidance for Transitioning to Remote Instruction page and register for the Campus Wide Notification System. In the event that NJIT transitions to remote instruction, I will share course-specific delivery information with students via email and through the Canvas Announcement tool. It is

recommended that students have their notifications turned ON for Canvas Announcements. If you do not have adequate computing equipment for remote instruction, please contact the Dean of Students (dos@njit.edu).

Class Recordings:
Class sessions may be recorded by the instructor. These recordings shall only be used as an educational resource and are not to be distributed or used outside of this class. Information on how to access recorded lectures will be made available by your instructor. Any recordings that contain identifiable information about students will not be used beyond this semester.

Outcomes Course Matrix –

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Select appropriate laboratory and field methods for determining mechanical properties of coarse grained and fine grained soils interacting with the environment.			
Class presentation, class discussions, Homework	1,2,3,4,5,6,7	1,2,3	HW, Design and Presentation
Student Learning Outcome 2: Estimation or measurement of such based on laboratory and field tests and use of such in geotechnical designs.			
Class presentation, class discussions, Homework	1,2,3,4,5,6,7	1,2,3	HW, Design and Presentation
Student Learning Outcome 3: Interpretation of laboratory or field tests.			
Class presentation, class discussions, Homework	1,2,3,4,5,6,7	1,2,3	HW, Design and Presentation

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 in 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