



CE 421L2

Environmental Engineering Lab

Fall 2014

Credits: 0, Lab hours: 3, Meeting Times/Location: M, 1:00-3:50pm, U217

Instructor: Tara Kulkarni, Ph.D., P.E., Office U 224, Phone 485-2268, tkulkarn@norwich.edu

Office Hours: T 10 am-12 noon, W 1pm – 3pm, F 1pm - 2 pm or by appointment

Required Textbooks:

- Davis M. L., and D.A. Cornwell (2013); **Introduction to Environmental Engineering; Fifth Edition;** Mc-Graw Hill; ISBN 978-0-07-340114-0

Course Information: This laboratory complements the classroom lessons and activities of the Environmental Engineering course. Through experiments based on gravimetric, volumetric, and instrumental forms of analyses, modeling, and field investigations, students will explore pollution of air, water and land. Field visits and a service-learning project will provide for hands on learning and practice of the environmental engineering fundamentals covered in the classroom. 3 hours lab per week.

Prerequisite/Co-Requisite: CE 421 Required Course.

Course Goals/Learning Outcomes / Expected Performance Criteria:

A student successfully completing CE 421L2 will be able to perform basic physical and chemical water analyses in the laboratory and in the field, describe the composition of municipal solid waste, use open source environmental models developed by the United States Environmental Protection Agency (USEPA), develop a basic understanding of Geographical Information Systems (GIS) and apply it to prepare basic environmental contamination maps, and research and respond through design and analyses, to the needs of a community partner by engaging in a service-learning project. Student performance is evaluated through lab reports, peer and community partner feedback.

Course Objectives and the Relationship to ABET Criterion (a through k)

b. an ability to design and conduct experiments, as well as to analyze and interpret data. Lab reports based on experimental procedures, field-testing and reporting, and service-learning projects will be used to assess these objectives.

Topics Covered: (See tentative schedule with topics and dates on the last page).

1. Lab safety rules, and instrumentation
2. Physical water quality tests such as temperature, and turbidity
3. Chemical surface and groundwater water quality tests such as pH, acidity, alkalinity, dissolved oxygen, conductivity, nitrates, phosphates, hardness, salinity, etc.
4. Solid waste composition and characterization and visit to a Vermont solid waste processing

facility.

5. Environmental modeling (flowcharts, spreadsheets open source USEPA models).
6. Introduction to Geographical Information Systems (GIS).
7. Air Pollution measurements and modeling.
8. Noise pollution measurements and analysis.
9. Service-learning projects with Vermont schools as community partners.

Course Policies:

Attendance: You attendance is required during all lab periods. It is entirely your responsibility to make up any labs you miss, provided it is a lab that can be made up.

Lab Safety Rules: Will be posted to the NUoodle course page.

Lab notes and handouts: These will be posted on NUoodle (with supplementary information) in addition to the copy you will receive in the lab. You should use your Norwich login information to access NUoodle.

Laboratory report: As indicated in the tentative lab schedule, lab reports are a mix of individual and team reports. For team reports, you will work in assigned teams of 2-3 students in the lab. One report will be required per team on the assigned due date. Each lab report should include the following sections:

Cover page (5): This must include the names of each member of your team and the pledge “I have abided by the Norwich University honor code” initialed by each member of the team.

Introduction and theory (25) – This should be a short paragraph providing the context and need of the lab activity.

Materials (10): This should include a list of all the equipment, glassware and chemicals used to perform the lab activities.

Procedure (10): This should present in detail the procedure you followed in the lab to complete the lab activity.

Results (10): These should be presented neatly in tables and/or figures as necessary. Sample calculations should be provided in appropriate units.

Discussion (15): The analysis section is an interpretation of the results. A complete discussion will address not only the results obtained in the lab activity and what they mean, but also the implications of higher or lower order results and what changes in the lab materials or procedure may affect the results. Providing a context for the results obtained in the lab activity and relating it to the discipline of environmental engineering will make for a more complete entry in this section.

Conclusion/Recommendations (10): This section should build upon the previous section and provide a final set of conclusions/recommendations based on the lab activity.

References: This is an optional section. If you do refer to any publications/online websites/applications in laying out the theory of the report or in your discussion section, list all such citations here.

Appendix: (10) This section should contain lab/field notes and other relevant material.

Team member contribution (5): In a team report, the contribution made by each team member must be clearly indicated.

Submission Guidelines: All lab reports (individual and team) must be submitted in both hard copy and electronic formats. All electronic reports must be uploaded to the NUoodle course page on or before the due date.

Project: A 4-5 weeklong service-learning project is an integral part of this course. Project topics will be announced in the second week of October after we have had a chance to cover various fundamental concepts and preliminary engineering design methodologies. You will work in teams of approximately 3-4 students with a community partner on an environmental project relevant to your curriculum and that will satisfy the needs of the community partner. Additional details will be provided in the classroom at the appropriate time.

The project may be a research or engineering design initiative based on the requirements provided by your community partner. A presentation and written report are essential for the successful completion of the project. The service-learning component also requires reflection pieces periodically and further information on these will be provided in class. Service-Learning labs reports will each have an individual and team submission component.

Grades: The lab activities account for 20% (200 points) of your grade in the Environmental Engineering

course. Each lab report will be graded on a 100-point scale. Note that the numbers in parentheses in the section on Laboratory Reports indicate the maximum points for that section.

Lab reports: 10%

Project activities, report, team and community member assessment = 10%

Total = 20%

Notices:

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with me as soon as possible. All discussions will remain confidential.

If English is your second language and you need help with your English in this course, please let me know. You can get help at the Academic Achievement Center (AAC), and I encourage you to meet with the AAC's ESL Specialist. The AAC is on the 4th floor of the Kreitzberg Library, x2130. You may also be eligible for academic accommodations, and AAC staff can work with you on that process.

SPECIAL NOTE 1: Please note that I have created a common NUoodle course page for both sections of this class. I will use it extensively during the semester to post content, review your discussions and Friday news items, post assignments, as well as update your grades. Please make sure you can access this site.

SPECIAL NOTE 2: Please note that per the new email policy, I can only communicate with you through your Norwich assigned email addresses and expect all of your communication to me to be directed to my Norwich assigned email address as well.

Tentative Lab Schedule:

Week/ Dates	Activity	
1. 8/25	Introduction to the lab, instrumentation, lab and safety rules, and building filters to test physical water quality characteristics	T
2. 9/1	No lab – Labor Day Holiday	
3. 9/8	Lake acidification and water hardness	T
4. 9/15	Dissolved oxygen and nutrients	T
5. 9/22	Water quality testing in the field	T
6. 9/29	Risk Assessment – Environmental Modeling	T
7. 10/6	Building a Green Infrastructure Model	T
8. 10/13	Using Geographical Information System (GIS) in Environmental Engineering	I
9. 10/20	Solid and/or hazardous waste facility tour	I
10. 10/27	Service-Learning Lab 1 – Visit community partners and determine scope of the project	T, I
11. 11/3	Service-Learning Lab 2 – Data collection + presentation of background research	T, I
12. 11/10	Service-Learning Lab 3 – Coordinate with community partner and work on designs/research/project activities	T, I
13. 11/17	Service-Learning Lab 4 – Visit community partners for final presentations	T, I
14. 11/24	No Lab – Thanksgiving Break	
15. 12/1	Mini experiments in Air and Noise Pollution	T

T- Team; I-Individual