Lafayette College  
Department of Civil and Environmental Engineering  
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CE 321: Introduction to Environmental Engineering and Science  Fall 2016

Instructor: Arthur D. Kney, Ph.D., P.E.  
Office: 318 AEC  
Phone: (610) 330-5439

Lectures: 3 Lectures/Wk – MWF from 8:00 – 8:50 a.m. (Rm. 315 AEC)

Laboratory: Tuesday from 8:00-10:50 a.m. or 1:10-4:00 p.m. (Rm. 117 AEC)

Office Hours: Mon. and Wed. from 11:00 - 11:50 a.m. or 3:10 - 4:00 p.m. or by appointment

Text:  

Reference Texts:  

Prerequisites: Mathematics 162, Chemistry 121, or permission of instructor.

Course Website: http://sites.lafayette.edu/kneya/courses/courses-taught/ce-321  
All homework assignments, homework solutions and laboratory information will be posted on the Course Website.

Course Moodle Site: https://moodle.lafayette.edu  
All handouts will be posted on Moodle. Hard copies of handout will not be supplied by instructor. Students are responsible for bringing handouts to class.

Overview: CE 321 is the first of a series of required lab courses in each of the seven sub-fields (construction management, environmental, geotechnical, structural, surveying, transportation, and water resources) of Civil Engineering. It is also a core course for the Environmental Science minor. Environmental engineers seek practical solutions to a variety of problems related to environmental pollution and sustainability.

Course Description: CE 321 introduces the student to applications of engineering principles to a variety of environmental topics. The topics will revolve around local issues within the Bushkill Watershed;
therefore we will adopt a watershed approach to better understand the various topics. Topics include environmental chemistry, hydrology, risk assessment, water supply and pollution control, solid and hazardous wastes, and environmental management. Laboratories consist of field trips, computer modeling exercises, sample collection, and chemical analysis methods.

**Purpose:** Environmental Engineering and Science is a required course for those in pursuit of a Bachelor of Science (BS) degree in Civil Engineering. This course is also a core component for those in pursuit of a minor in Environmental Science. CE 321 is designed to be taken in a student’s sophomore year.

**Course Objective:** CE 321 is designed to instill a general understanding of environmental engineering and science through class discussion/lectures, an interactive/multidisciplinary class project and an assortment of hands-on laboratories. Students will demonstrate an understanding of the use of fundamental tools through general tests, quizzes, laboratory activities, special projects and discussions. Additionally, an objective of the course is to illustrate the importance of the field in future environmental science and civil engineering courses through various activities and exercises.

**Student Outcomes:**

1) demonstrate an understanding of key concepts in chemistry, biology, hydrology, geology, and ecology that are fundamental to environmental engineering (3a);

2) apply science and engineering principles to a variety of environmental problems, including reactor modeling, nutrient transport, water/wastewater treatment (3a, 3e);

3) demonstrate fundamental civil engineering skills during the laboratory sessions, including observation and inspection, computer analysis, concept of uncertainty and laboratory and field testing (3b);

4) demonstrate effective written and oral communication skills through a team-based poster project (3g);

5) demonstrate knowledge of contemporary/emerging issues in environmental engineering and appreciate the need to engage in life-long learning (3f, 3h, 3i, 3j);

6) demonstrate an appreciation for realistic design constraints within environmental engineering that address economic and sustainable engineering practices through class discussions tied to contemporary and emerging issues as well as numerous design problems (3a, 3c).

**Grading:**

- Two mid-term exams: 20 % each
- Final Exam: 20 %
- Homework: 8 %
- Laboratory Exercises*: 10 %
- Poster Project: 12 %
- Attendance, quizzes, participation, effort (AQPE)**: 10 %

*Attendance is required at all laboratories. A zero will be given for any missed laboratories.

**More than two absences from class will result in a grade reduction of 1% for each unexcused class from the AQPE grade.

**Mid-term and Final Exams:** Each exam will cover only material up to the previous exam. However, some topics from earlier parts of the course provide the fundamentals for later material, and in that sense, the
exams are comprehensive. All exams are closed book and closed notes - the best way to prepare is to study your class notes, homework problems, and lab exercises; an equation sheet.

**Homework:** Assignments will be weekly/biweekly and will be due one week from the date assigned. Students are encouraged to work together on homework problems. (Note: working together does not mean copying – each student must do his/her own work!) Homework assignments are to be done in a neat, professional manner (i.e., on engineering paper or printed computer output) with solutions clearly explained - accompanied by supporting figures and graph when needed. Make sure that correct and consistent units are included with all numerical answers. It is also a good idea to check the "reasonableness" of your work after you are done your calculations and provide additional comment to answers that seem unreasonable. (SEE HOMEWORK GUIDELINES) Homework is typically due at the beginning of class on the due date. Late homework or lab assignments will be accepted only if the student has made prior arrangements with instructor. There will be a grade penalty of 10% for each day (weekday or weekend day) an assignment is late. Late means not handed in at assigned time (one minute past time due = one day late). Solutions will be posted on Dr. Kney’s course website: http://sites.lafayette.edu/kneya/courses/courses-taught/ce-321/

**Laboratory Exercises:** Labs for this class include chemistry labs, field trips for sampling, and visits to local sites of interest (water treatment plant, wastewater treatment plant, landfill, etc.). A few of the labs will consist of computer exercises in the CE computer lab (AEC 302). A written report of some kind will be required for each lab; however this will not always be a formal lab report. I will provide a handout with detailed instructions at the beginning of the lab period, and the write-up will be due at the beginning of lab the following week.

**Poster Project:** Kick off meeting, Friday, September 2nd – Oechsle 224 from 12-1 pm. Students will work in teams of three to research and report on an environmental engineering topic of current and/or local concern (Theme for 2016 – Water Challenges in the 21st Century: Local to Global). Each team will create a professional quality poster and present work at a poster session toward the end of the semester. At the session a number of students, faculty and outside experts will judge all posters. Groups and poster topics are to be decided upon by Monday, September 12th. A one-page summary and list of references is due on the Friday, September 23rd, and a draft poster is due on Monday, October 23rd (8.5x11 in color). A short presentation of the poster is to be prepared for individual group meetings that will be scheduled during the week of October 24th through 28th.

This is a multidisciplinary, semester long project. We will be working with the following four classes - 1) CHEM 252: Environmental Chemistry (Galloway – gallowam), 2) ECON 202: Environmental Economics (DeVault – devaultj), 3) EVST 100: Intro to the Environment (Armstrong – armstral), and 4) GOVT 231: Global Environmental Politics (Fabian – fabiank).

There will be a few informational lunch meetings that all students are required to attend. Currently we are planning four meetings during various lunch hours: Friday, September 2nd (Introduction), Friday, September 23rd (Poster Making Process), Friday, December 2nd (Prep for Final Presentation), Monday, December 12th (Awards Ceremony). See class schedule for room assignments.

The final poster session will be held on Thursday, December 8th in Farinon from 7 to 9 pm. Additional poster guidelines and grading information will be provided within the first two weeks of the semester.

**Note on Academic Dishonesty:** Within the Civil and Environmental Engineering (CEE) Department there is a zero tolerance for academic dishonesty. Dishonesty is generally defined as plagiarism as well as copying of any kind on homework and/or exam. Academic dishonesty within the department of CEE will be punished to the most severe limitations of college policy. Lafayette College has clear written policies on academic dishonesty which can be found in the Student Handbook.
Closing Statement: Until the last 40 or so years, the environmental impacts of the great technological and industrial advances of the past century were largely unknown or considered to be insignificant. Since the advent of the environmental movement in the late 1960s and a heightened public awareness of the limited resources of our planet, this has changed to the point where clean air and water is now of prime importance to the public. In recent years, recycling and other "green" practices have become mainstream in our society. Environmental engineers and scientists seek practical solutions to a variety of problems related to environmental pollution and sustainability.

Where are we today? What can **you** do to make a difference?

"The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustees of these resources, the Commonwealth shall conserve and maintain them for the benefit of all people."
- Article 1, Section 27 of the Pennsylvania Constitution

“Engineers ... shall strive to comply with the principles of sustainable development”
- ASCE Code of Ethics, Canon 1

Federal Credit Hour Statement: The student work in this course is in full compliance with the federal definition of a four [two or one as appropriate for half and quarter unit courses] credit hour course. Please see the Lafayette College Compliance webpage (http://registrar.lafayette.edu/additional-resources/cep-course-proposal/) for the full policy and practice statement.

FERPA Information: Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates Federal privacy laws. Courses using Moodle will make student information visible to other students in the class. Students are to be aware that this information is protected by these Federal privacy laws and must not be shared with anyone outside of the class. Questions can be referred to the Registrar’s Office.
**Laboratory Safety Rules**

*Guidelines for the Environmental Engineering Lab (AEC 117):*

- No eating or drinking
- Do not use equipment in the laboratory until you get the go-ahead from the instructor
- All lab work must be performed when the instructor is present, unless specific arrangements have been made in advance.
- Do not, under any circumstances, work alone in the lab
- Safety glasses must be worn in the lab.
- **Do not wear sandals or shorts**
- Know the location of the exits, first aid kit, safety shower, and eye wash. If chemical is spilled on your skin, flush immediately with tap water
- Gloves must be worn when handling concentrated acids or bases (caustics).
- Always add acid or base slowly to water; do not add water to concentrated acid or base
- Never return chemicals to the stock bottles, or insert a pipet or dropper directly into a stock bottle. First pour the chemical into a small beaker, then use the pipet
- Broken glass should be reported to the instructor, and placed in the square metal glass container, not in the trashcan
- Inorganic wastewaters can be diluted and poured in the sink with the water running; for organic wastes, use the designated waste container in the exhaust hood
- Bench areas must be tidy and chemicals returned to their proper cabinets after lab
- All glassware must be rinsed and placed in the sink after lab

*Guidelines for Field Trips*

- Do not go directly to the site; meet first at the designated site on campus
- **Be on time or be left behind** - some of the field trips will require the full three hours!
- Always bring a notebook or clipboard and take notes, you will need them for your write-up
- Do not wear shorts or sandals on the field trips to the water treatment plant, the wastewater plant, or the landfill
- I will arrange for rental vehicles (typically minivans) for the field trips – **additional College certified student drivers may be required due to the class size**
- Do not venture into Bushkill Creek under high flow conditions! Use caution and be sure of your footing when in the stream
- Avoid poison ivy (hairy vines, smooth, shiny dark green leaves in threes), which causes a nasty rash
- Ticks are common in tall grass, weeds and woods throughout the Easton area, and may carry Lyme disease. Check yourself thoroughly when we return from the field!
- In the event of heavy rain or snow, field trips may be rescheduled. In general we go rain-or-shine.