



Department of

Environmental & Civil Engineering

Mercer University

EVE 290L.001

Introduction to Environmental Engineering Laboratory

Fall 2019

Monday, 3:00 to 5:45 pm

Room: WSC 337

Instructor: André J. Butler, Associate Professor and Chair, Environmental and Civil Engineering

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2019-2020 Catalog Data:

An introduction to environmental engineering analyses with emphasis on traditional water and wastewater analyses. Parameters to be measured include: pH, alkalinity, hardness, total solids, suspended solids, dissolved solids, chemical oxygen demand, biochemical oxygen demand, dissolved oxygen, making standard solutions, and microbiological techniques.

Prerequisites:

CHM 111

Required Textbook:

None

Web Site:

http://faculty.mercer.edu/butler_aj/eve290L.htm

Course Objectives:

Upon the successful completion of this course, the student will be able to:

1. Apply knowledge of mathematics, science, and engineering to Environmental Engineering measurements.
2. Conduct laboratory experiments, and to collect, analyze, interpret, present, and discuss data.
3. Work effectively in a team.

Measures and assessment of the outcomes will be made by:

1. Preparation of 6 professional engineering reports
2. Quizzes
3. Primary instructor evaluation and student feedback on the perceived quality of the course and effectiveness of the instructors.

Course Standards:

1. **Attendance is required.** Students are expected to attend ALL classes and field trips. Students that miss a specific laboratory or field trip will receive a grade of ZERO for that particular assignment. Make up labs are not possible and no exceptions will be made. Students are expected to prepare for each lab by reading assignments prior to class.
2. Firearms/weapons are not allowed in Mercer University campus facilities. For more information, visit the MERPO website (<https://police.mercer.edu/>).
3. **No food or drink is allowed in the lab area.**
4. Please **turn off cell phones** before entering the classroom.
5. **Late Work:** Students will NOT be permitted to make up missed lab periods unless an emergency or unavoidable cause can be identified and approved.
6. The **honor code** provisions as outlined in the *Bulletin* and in the student handbook, *The Lair*, will be assumed for everyone. Plagiarism is a violation of the honor code and is prohibited. Your grade is your responsibility. Cheating of any kind will not be tolerated.
7. Students in need of accommodation due to a disability should contact the Access and Accommodation Office to complete the verification process to become approved for services. In order to receive accommodations, each term, students will request accommodation and faculty notification forms through the Access Office online system *Accommodate*. Students are strongly encouraged to schedule a meeting with each professor in a timely manner to discuss arrangements. Accommodations are not retroactive in nature. Note - Disability accommodations or status are not reflected on academic transcripts. Students with a history of a disability, perceived as having a disability or with a current disability who do not wish to use academic accommodations are also strongly encouraged to complete the verification process with the Access Office.

Students must request accommodations in a timely manner to receive accommodations in a timely manner.

8. **Mental Health and Wellness:** Mercer University faculty and staff recognize that mental health concerns can impact academic performance and interfere with daily life activities. Please notify your faculty member or academic advisor for academic assistance, as needed. CAPS can also provide support if you're feeling stressed, overwhelmed, anxious, depressed, lost or are struggling with personal issues. Please call or visit the [Counseling and Psychological Services \(CAPS\) website](#) for more information. These services are free and confidential, and support non-traditional, graduate, and undergraduate students. Students at Regional Academic Center locations may call a CAPS Office for assistance in finding local services (that may charge for their services) if distance to either campus creates challenges. CAPS locations include: MACON – Linden House (attached to the MEP Residence Hall), 478-301-2862; ATLANTA – 215 Sheffield Student Center, 678-547-6060.
9. This syllabus is subject to change. An instructor's posting to the Class Web Site will be considered written notification of any changes to the syllabus or class requirements.

Electronic Communication:

Electronic communication is an important adjunct to face-to-face communication, including from professor to students, students to professor, and students to students. You must have regular access to your e-mail.

Class Web-Site Info:

The Class Web Site will be used to administer some assignments, manage course content, and provide course materials.

EVE 290L
Tentative Schedule
Introduction to Environmental Engineering Laboratory

Class	DATE	TOPIC
1	Aug 26	Lecture - Introduction; Microbial Activity
2	Sep 02	Labor Day (NO CLASS)
3	Sep 09	Oxygen Uptake Rate Lab
4	Sep 16	Gas Transfer Lab
5	Sep 23	Lecture - Coagulation, Flocculation, Turbidity
6	Sep 30	Coagulation, Flocculation, and Turbidity Lab
7	Oct 07	Lecture - Biochemical Oxygen Demand
8	Oct 14	Biochemical Oxygen Demand Lab
9	Oct 21	Field Trip (WWTP)
10	Oct 28	Lecture - Solids Analysis
11	Nov 04	Solids Lab
12	Nov 11	Lecture - Beer's Law
13	Nov 18	Beer's Law Lab
	Nov 25	MAKE-UP PERIOD (if necessary)
	Dec 02	MAKE-UP PERIOD (if necessary)

STRUCTURE

Each student (or group, as assigned) will be responsible for conducting the experiment, analyzing the data, and producing a laboratory report.

Lab Periods (Classes 3, 4, 6, 8, 11, 13)

Six class periods will be devoted to introducing you to a variety of analytical and laboratory procedures. You will be required to read the appropriate handouts prior to class. During the class period the students, aided by the instructor, will perform the laboratory techniques. All data will be recorded in an orderly fashion in your notebook and/or the chalk board. Each student must submit a lab report for these experiments. Instructions for the lab report follow.

Lecture Periods (Classes 1, 5, 7, 10, 12)

Five class periods will be devoted to short lectures (30 – 50 minutes) covering topics to be addressed in the subsequent lab period(s).

Field Trip (Class 9)

One class period will be devoted to an off-campus experience at a local wastewater treatment facility. The trip will provide students with the opportunity to see and touch real-world environmental applications and techniques.

The Notebook

Each student is to retain a notebook for the class. This will contain all the notes, raw data, handouts, raw calculation, etc.

GRADING

6 lab reports	80%
Participation/Quizzes	20%

All assignments will be due at the **BEGINNING** of class on the specified due date. Each business day or fraction thereof of lateness will result in a reduction of the score by ten points.

Laboratory Safety Rules and Regulations

The following rules must be strictly observed.

1. Safety goggles and gloves will be used whenever working with acids, bases or other potentially dangerous chemicals, instruments or equipment.
2. **Wear suitable footwear (no open sandals) in the laboratory at all times.**
3. Never smoke in the laboratory.
4. **Perform only those exercises that are authorized.**
5. **Report all accidents and injuries immediately to your instructor.**
6. Familiarize yourself with the first aid equipment. Locate fire extinguishers, fire blankets, showers, and eyewashes.
7. Exercise caution in using glass tubing, especially when inserting stoppers. Do not use cracked or broken glass equipment.
8. No mouth pipetting under any circumstances. Safety pipette bulbs or rubber bulbs will be provided.
9. Never heat liquid in graduated cylinders. When heating in a test tube, never point its mouth towards anyone nor look down into it.
10. **Carefully read all labels on reagent bottles before using; an error may have serious consequences. Use only quantities and concentrations called for.**
11. Never pour water into concentrated acid. Always pour the acid slowly into the water while stirring the mixture constantly.
12. Use the hood whenever toxic or irritating gases are likely to be evolved. Never directly inhale vapors. Never taste a laboratory chemical.
13. **Avoid possible poisoning by contamination through the hands.**
14. **Always wash hands thoroughly after exposure to hazardous chemicals, and as a general rule, after each laboratory experience.**
15. Use only glassware that is initially clean.
16. A laboratory coat to protect clothing is a wise precaution.

The following laboratory regulations must be observed for efficiency and further safety in the laboratory.

1. Never throw solid materials into the sinks; use the waste jars.
2. Do not insert spatulas or pipettes into reagent bottles. Instead, transfer an approximate amount of the reagent desired to a glazed paper, a watch glass, or test tube. Do not carry stock bottles to your desk.
3. Weigh solids on glazed paper or on a watch glass; do not allow chemicals to come in contact with balance pan.
4. Clean up spilled materials immediately, using liberal quantities of water. Neutralize strong acids with sodium bicarbonate, and strong bases with acetic acid. After neutralization, wash area thoroughly with water.
5. Keep your working surfaces clean at all times. Use a damp cloth or sponge for wiping the surface and a towel for drying.
6. Before leaving the laboratory, make sure the water and gas are completely shut off. Return all special equipment to the designated place.

Preparation of Lab Report

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GENERAL

The laboratory report should be treated as any other engineering or scientific report. **Literate English should be employed.** The report should be neatly typed and be well organized to reflect the methodology of the experiment performed towards its conclusions. The report should be stapled or bound. Furthermore,

- Everything should be machine-generated. This includes, but is not restricted to: text, figures (drawing/sketches), graphs, and tables.
- The physical format is machine-generated; one-inch top, both, left and right margins: 8½ x 11 pages.

REPORT ORGANIZATION – each laboratory report must follow the organization given below. Headings given in boldface must be explicitly employed in the report.

THE COVER

The cover page should be organized into the following information:

- a. Title of Experiment.
- b. Student's Name.
- c. Name of the laboratory where the experiment was carried out.

Example:

Environmental Engineering Laboratory
Department of Environmental Engineering
Mercer University School of Engineering
1400 Coleman Ave, Macon, GA 31207

- d. Date of submission.

ABSTRACT

Succinctly describe (1) the objective of the experiment, (2) methods and/or materials utilized to reach the objective, and (3) the final results. The abstract should be short and to the point (no more than 5-7 sentences for these reports).

INTRODUCTION

Discuss the scientific and/or engineering theory relevant to the completion of the experiment.

MATERIALS AND METHODS

Discuss the procedures that were followed, as well as the equipment and supplies used, in order to achieve the overall objective. Include a photograph or computer-generated sketch of the apparatus.

DISCUSSION

Discuss important results discovered during the laboratory, including relevant charts, figures, and tables.

CONCLUSION

Briefly summarize the work that was completed. The conclusion should resemble the abstract (although NOT verbatim), and should highlight particular limitations that complicated matters, opportunities for improvement, etc.

REFERENCES

Follow the Modern Language Association (MLA) Style Guide.

TO BE INCLUDED IN AN APPENDIX, IF APPROPRIATE (the following serve to enhance the DISCUSSION section):

Raw Data

Logically present the raw data collected in the laboratory. Very minimal text may be necessary here.

Calculations

Show typical sample calculations, illustrating how the raw data were manipulated to achieve the final results.

WARNING:

If your lab report is just "copy-n-paste" from a handout or another source, your score will suffer.

LABORATORY REPORT EVALUATION

Name: _____

Date: _____

Lab Title: _____

Item	Value	Score
Abstract		
Summary of work	5	
Presentation of conclusions	5	
Introduction and Methods		
Background theory	10	
Experimental procedures with clear steps	5	
Materials used	5	
Discussion		
Appropriate graphs and tables (adequately discussed)	20	
Clear identification of key results	20	
Conclusion		
Limitations/difficulties and their effects.	5	
Answers to questions posed.	5	
Overall		
Neatness and grammar	5	
Adherence to format	5	
Adequacy of appendices	5	
References and citations	5	
Penalty		
	RAW NET SCORE	