

WEST VIRGINIA UNIVERSITY  
**CE 347: INTRODUCTION TO ENVIRONMENTAL ENGINEERING**  
Jennifer Weidhaas, Ph.D., P.E.  
Spring 2015

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LECTURE DAY/TIME/ROOM	TR 11:00-12:15 PM/ESB 207
LABORATORY DAY/TIME/ROOM	W or R 2:00-4:50 PM
FORMAT	3 hour lecture, 3 hour lab: 4 credit hr
OFFICE	ESB 647
OFFICE HOURS	T,R 10:00-11:00 & 12:30-1:30 or by appointment
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**TEACHING ASSISTANTS**

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**COURSE OBJECTIVE**

Introduction to Environmental Engineering is a required course in the WVU CEE curriculum. The purpose of this course is to gain familiarity with environmental engineering concepts and understand the overlap between environmental engineering and other sub-disciplines in civil engineering. At the completion of the course you will be familiar with 1) water quality and parameters used to measure water quality, 2) water and wastewater unit processes, 3) air pollution and pollution control principles, 3) solid waste management principles, 4) hazardous waste management principles and 5) environmental laws applying to all CE disciplines. You will also gain experience in critical thinking skills, communication skills, environmental ethics and laboratory procedures. During the course you will get a chance to tour local facilities (for example a water treatment plant) that will provide you with a real world view of environmental engineering and treatment processes.

**EXPECTED LEARNING OUTCOMES**

Upon successful completion of this course you will be able to:

1. DESCRIBE pertinent air and water quality parameters and DESIGN, CONDUCT and ANALYZE associated measurement techniques (ABET student outcome B and G)
2. DESCRIBE how environmental engineering concepts and laws apply to all sub-disciplines of Civil Engineering and more broadly affect society (ABET student outcome H and I)
3. SOLVE mass/material balances for environmental systems
4. RECOMMEND appropriate unit processes for water and wastewater treatment
5. DESIGN solid waste and hazardous waste management systems

**GRADING POLICY**

Weighted average grades will be calculated based on the following distribution:

Quizzes	5%	Exam #1	10%
Homework assignments	30%	Exam #2	10%
Laboratory assignments	35%	Exam #3	10%

Final grades will be based on 90%, 80%, 70%...corresponding to A, B, C, ... Assignments are due at the beginning class. Late assignments **will not be accepted** without prior written approval from the instructor.

**REQUIRED TEXT**

Davis M.L, DA Cornwell, 2012, Introduction to Environmental Engineering, 5<sup>th</sup> Edition, McGraw Hill, New York, NY, pp 1040

**PREREQUISITES**

Instructor's consent

## TENTATIVE COURSE OUTLINE

Date	Topic	Readings	Homework	Laboratory
Jan 13, 15	S1 Introduction; S2 Environmental Laws S3 Units of Measurement and Distributions	Chapter 1 (Section 1-2, 1-3, 1-5 and 1-6); Handouts		Section 2 (1/14): Lab safety Section 3 (1/15): Lab safety
Jan 20, 22	No class Jan 20 S4 Materials Balance	Chapter 2 (pp 26-44)	Info Sheets due HW 1 Due	Section 2 (1/21): Lab 1 Section 3 (1/22): Lab 1
Jan 27, 29	S5 Risk Assessment S6 Environmental and Water Chemistry	Chapter 3 (pp 86-105) Chapter 5 (pp 217-242)	HW 2 Due	All sections: Lab 1 reports due
Feb 3, 5	S7 Water Resources S8 Water Quality and Pollution	Chapter 4 (pp 111-123 & 159-183 ) Chapter 7 (pp 389-426, 436-440 )	HW 3 Due	Section 2 (2/4): Lab 2 Section 3 (2/5): Lab 2
Feb 10, 12	S9 Reactions S10 Reactor Theory	Chapter 2 (pp 44-57)	HW 4 Due	All sections: Lab 2 reports due
Feb 17, 19	<b>Exam #1 (Feb 19)</b> S11 Water supply and treatment	Chapter 6 (pp 251-229)		Section 1(2/18): Lab 3 Section 2 (2/19): Lab 3
Feb 24, 26	Water supply and treatment	Chapter 6 (pp 229-334) Chapter 6 (pp 335-365)	HW 5 Due	All sections: Lab 3 reports due
Mar 3, 5	S12 Biological Concepts S13 Wastewater treatment	Chapter 8 (pp 456-464) & handouts Chapter 8 (pp 464-486)	HW 6 Due	Section 1 (3/4): Lab 4 Section 2 (3/5): Lab 4
Mar 10, 12	Wastewater treatment	Chapter 8 (486-522)	HW 7 Due	All sections: Lab 4 reports due
Mar 17, 19	<i>Treatment plant tour</i> <b>Exam #2 (Mar 19)</b>	Chapter 8 (pp 522-557)	HW 8 Due	Section 1 (3/18): Lab 5 Section 2 (3/19): Lab 5
Mar 24, 26	Spring Break (Have fun! Be safe!)			
Mar 31, Apr 2	S14 Air pollution	Chapter 9 (pp 582-588, pp 597-613), Chapter 9 (pp 623-673)		All sections: Lab 5 reports due
April 7, 9	Air Pollution S15 Solid waste management	Chapter 11 (pp 786-822)		Section 1 (4/8): Lab 6 Section 2 (4/9): Lab 6
April 14, 16	Solid waste management	Chapter 11 (pp 822-847)	HW 9 Due	All sections: Lab 6 reports due
April 21, 24	S16 Hazardous waste management	Chapter 12 (pp 867-899)	HW 10 Due	Section 1 (4/22): Lab 7 Section 2 (4/23): Lab 7
April 28, 30	Hazardous waste management <i>WVU storm water systems tour</i>	Chapter 12 (pp 899-935)		All sections: Lab 7 reports due All sections: Lab cleanup
May	<b>Exam #3; Monday May 4, 3 to 5 PM</b>			

## **QUIZES**

Short quizzes (2-3 questions) will be given at the beginning of many classes. Quiz material will be pulled directly from assigned reading material for that days lecture and from the previous lecture material. Attendance on field trips will count as a quiz grade.

## **FIELD TRIPS**

We will take a tour of the wastewater water treatment plant in Star City and the storm water management systems on campus. Preliminary dates are indicated in the schedule.

## **SOCIAL JUSTICE STATEMENT**

“West Virginia University is committed to social justice. I concur with that commitment and expect to foster a nurturing learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700).”

## **ATTENDANCE POLICY**

You are expected to attend all classes. If you have a specific problem with attendance, notify the instructor prior to class, unless the emergency is such that this is not possible. Consistent with University guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make up exams for absences due to other reasons will be at the discretion of the instructor.

## **PLAGARISM AND ACADEMIC DISHONESTY STATEMENT**

Don't do it! Students found engaging in plagiarism, cheating or forgery during any assignment or test will be subject to the conduct code policies of the University that can be found on-line at [http://campuslife.wvu.edu/office\\_of\\_student\\_conduct](http://campuslife.wvu.edu/office_of_student_conduct)

## **E-CAMPUS**

Periodically material will be placed on the new E-Campus website (<https://ecampus.wvu.edu>) pertinent to this course. Specifically, supplemental lecture materials, homework assignments and solutions, the laboratory manual and the laboratory data will be placed on E-Campus. Almost all of the problems I work in class are given as PDF copies without solutions on E-Campus. I encourage you to print these out and bring them to class prior to the lecture to work through the solution in class.

## **LABORATORY**

The laboratory manual for each of the seven labs can be found on the E-campus website. Each lab section (Wednesday and Thursday) has its own folder on E-campus where the lab reports can be submitted for grading. Students will be required to submit their laboratory reports through the E-campus website. These reports will be evaluated by the teaching assistants through the turnitin.com website to check for grammar, plagiarism and to standardize the grading process. No paper copies of the lab reports will be accepted. Lab reports are due by 2 PM on the dates indicated on the syllabus. Late lab reports will NOT be accepted without prior written consent of the TA and/or professor.

The course number is: 201501-CE-347-001 (BB 9239080)

The course password is: 47im32qx

## **HOMEWORK**

Homework assignments are an integral part of the learning experience and will be carefully graded. A good homework solution will feature the elements listed below. Failure to provide a homework solution that includes any of these elements will result in the homework being returned to the student ungraded.

1. **Problem setup:** All given information, as well as the values of additional constants (and their sources), should be listed. A sketch or diagram should be provided where appropriate. A brief statement of the problem objective should be included.
2. **Equations:** The governing equations relevant to the solution of the problem should be written in algebraic form BEFORE substituting any numbers. If the equation must be derived, show all work. All relevant chemical reactions should be written and balanced.
3. **Assumptions:** List explicitly any assumptions necessary to solve the problem.
4. **Solution:** Present all work in a manner that can be understood by an engineering colleague. If the solution involves a programmable calculator spreadsheet or graphical technique, briefly describe the logic behind your solution approach.
5. **Answers:** Clearly indicate answers (e.g., box, underline, circle, or highlight). Include both the correct number of significant figures and the relevant units for each answer.

### Other homework requirements

- Use neat, clear, and legible handwriting. Printing is preferred.
- **Use a pencil.** If you make a mistake, clearly correct by erasing and re-doing the calculation. Do not cross out errors.
- At the top of each page of your homework, put your name, the date, the course, and the sheet number. Also clearly write the assignment at the top of the first page. Indicate total number of sheets on every sheet, for example "Sheet 1 of 4."
- Draw diagrams and label clearly. Use conventional symbols for support conditions.
- Show a majority of the steps in a solution. The more steps you show, the higher the potential grade.
- Label the steps of a solution so the grader, and yourself in a few years, will be able to tell what you are doing in different steps. Use brief statements such as "Determining the Floor Dead Loads."
- Label the answer by double underlining, boxing in, or writing "Ans." in the margin. Set the answer apart by right justifying or skipping a line.
- All answers must include a sign convention and appropriate units.
- Show results with the appropriate number of significant digits.

### Making Graphs in Excel

- All graphs **MUST** have labeled axes with UNITS!
- When making a line plot, the axes must be in a linear scale NOT by category.
- When plotting average and standard deviations of data, use the custom standard deviation error bars.