# APTC (EHSC) 3080: INTRODUCTION TO ENVIRONMENTAL SCIENCES AND ENGINEERING

## TENTATIVE SYLLABUS – FALL SEMESTER, 2013

**Mission Statement:**
Provide students with an appreciation of the complexity of environmental systems, a good understanding of the fate and transport of substances that contaminate our air, surface water, soil, and subsurface water systems, the ability to measure environmental parameters, analyze them, interpret them, and evaluate their environmental importance.

**Additional Objectives:**
1. Promote critical thinking.
2. Enhance problem solving abilities.
3. Improve technical written and oral communication skills.

**Problem Solving**
Knowing how to use mathematics to determine the cause, extent, and remedy of environmental problems is essential for any environmental practitioner. In this class, we will spend several weeks learning how to set up and solve a variety of environmental problems. Working knowledge of algebra, trigonometry, physics, and chemistry are necessary.

**Labs and Lab Reports**
We will be conducting laboratories frequently to reinforce the materials presented in the class and to provide experiential learning. A comprehensive laboratory report summarizing the lab's activities and including requested materials (graphs, tables of results) will be due one week after the lab. Laboratory reports must be prepared using an appropriate reporting style to receive full credit. A laboratory report style guide is available in the student center. Please do not remove the guide from the student center. A lab report guide and an example lab report are attached to this syllabus. USE THEM. The lab reports are your opportunity to demonstrate to me that you understand the material and to also demonstrate that you can analyze information, appraise the information, assess the pros and cons, make judgments, and defend you decisions.

**Oral Presentations**
Students will be expected to give two to three oral presentations to the class during the semester. Presentation topics will vary and are discussed again below. This will give you an opportunity to polish you public speaking skills as well as to demonstrate to me that you can read and draw appropriate conclusions from technical publications. Expectations for the oral presentations are described below.

**Environmental Research Project**
The 2013 research project will be to characterize 3 water bodies (ponds or rivers/streams) near or on the UGA Tifton Campus. The water bodies will be determined during the course of the class. Students will be divided into teams. Each team will use the information learned in class and during the laboratories to assess the water quality of the rivers/ponds. This will be your biggest opportunity to synthesize the materials you learned and demonstrate that you can use your knowledge to characterize the rivers/ponds and explain their condition. To properly explain

the rivers'/ponds' condition, you must be able to understand the transport process that provide inputs to the ponds as well as the biogeochemical processes that take place in the rivers/ponds. Each team will submit a written report for their project. Details of the report style will be provided later. A few days later, each team will make a twenty-minute oral presentation of their project to the class. The team's grade will be a combination of how the written report and oral presentation are scored. The numeric score will be multiplied by the number of students in each team. Team members will then decide collectively how many points will be assigned to each of the team's members. In other words, the team will be responsible for determining the contribution of each member to the team's overall grade.

**Instructor:**

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**Guest Lecturers:**

Experts in various aspects of environmental science and engineering will occasionally present lectures or provide demonstrations of products. Students will be notified in advance of appearance by guest lecturers.

**Prerequisites**

CHEM 1211 and (PHYS 1111 or 1211) and MATH 1113

**Credits:**

3 credit hours; two 50-minute lectures (Monday, Friday), one 2-hour lab per week (Wednesday)

**Text:** (see attachments at the end of the syllabus)
*Collapse: How Societies Choose to Fail or Succeed* by Jared Diamond
*The Big Thirst* by Charles Fishman

We will be using these books as a supplement to our in-class discussions. Each student will be expected to read the books.

*Collapse:* In addition to reading the book, each student will be expected to become an expert on 2 chapters of the book. To demonstrate their expert knowledge, students will be expected to submit a written 1-page summary of each of their chapters as well as make a 20 minute oral presentation of the summary to the class.

*The Big Thirst:* Group discussions and quizzes will be used to evaluate students' understanding of the issues discussed in this book.

Additional reading materials will be supplied by the instructor and will include benchmark research articles and other appropriate materials.

**Grading:**
The grade you receive in this course will be determined from your performance on two announced exams, unannounced quizzes, homework assignments, oral presentations, lab reports, an environmental research project and a comprehensive final exam. These factors will be weighted as follows:

| | |
|---|---|
| Announced Exams | 20% |
| Unannounced Quizzes | 10% |
| Homework Assignments/Lab Reports/Class Presentations | 40% |
| Research Project | 20% |
| Final Exam | 10% |

Grades will be assigned as follows:

| | | | |
|---|---|---|---|
| A | above 93 | D+ | 67-69 |
| A- | 90-92 | D | 63-66 |
| B+ | 87-89 | D- | 60-62 |
| B | 83-86 | F | less than 59 |
| B- | 80-82 | | |
| C+ | 77-79 | | |
| C | 73-76 | | |
| C- | 70-72 | | |

Up to thirty percent of the grade on all written assignments (homework assignments and papers) and oral presentations will be based on quality of communication. Spelling, grammar, punctuation, and clarity of writing are evidence of written communication quality. Enunciation, voice projection, clarity and logical order of the presentation and effective use of visual aids are evidence of oral communication quality.

**Attendance**
Students are expected to attend class on a regular basis. If you are absent from class, it is your responsibility to make up any work that is missed.

Some labs will be conducted off-campus and will be difficult or impossible to make up. Lab reports for missed labs that are not made up will not be accepted.

Make-up work must be completed within a week of original due date or return of student to class after the approval of the instructor. Exams and other assignments that are missed due to unexcused absences will be counted as zero (0).

**Food and Drink in the Classroom:**
University policy prohibits tobacco products, food or drink in all labs and classrooms.

**Academic Honesty:**
Students are reminded that they are bound by the University's Academic Honesty Policy. If you have misplaced your copy, the policy is posted on the Web at:

http://www.uga.edu/ovpi/academic_honesty/culture_honesty.htm

All academic work must meet the standards contained in "A Culture of Honesty." Each student is responsible to inform themselves about those standards before performing any academic work.

For this course, all lab reports or other outside assignments – unless explicitly stated otherwise – are to be worked individually.

**Help Outside and Within the Classroom**
Help is available to you should you have difficulty with this course. Please make an appointment to arrange for a help session immediately after class or by using email.

Students with disabilities who require reasonable accommodations in order to participate in course activities or meet course requirements should contact the instructor during regular office hours or by appointment. For more information, please visit the University's Disability Resources Center at: www.drc.uga.edu or (706) 542-8719.

**Note**
The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

**Topical Outline:**
Water Pollution
TMDLs (Total Maximum Daily Loads)
Water and its Pollutants
Materials Balance
Nutrients in Aquatic Environments (Nitrogen, Phosphorus)
Dissolved Oxygen
Chlorophyll
Humans and the Environment (from readings and class presentations)

**Planned Laboratories** (Dates will be a function of environmental conditions.)
Little River Experimental Watershed sampling
Nutrients
Chlorophyll
BOD (Biochemical Oxygen Demand)
Fecal Coliform

**Email**

I will communicate with you via email. Check your UGA email every day.

A full mailbox is not an acceptable excuse for not receiving an assignment or files needed to complete an assignment.

## EXPECTATIONS

1. This class will promote critical thinking, problem solving, and technical communication.

2. Homework Assignments – Will consist of solving problems, lab reports, and a research project. All assignments submitted for a grade must have a PROFESSIONAL APPEARANCE to receive full credit.

3. Problems – To be eligible for full credit, all problem solving homework assignments must:
   a. be submitted in the proper format (see examples which will be handed out);
   b. address all the questions presented by the problem;
   c. be your individual work unless I specifically say otherwise.
   d. Assignments will be due at the end of the next class period or as specified by the instructor.

      Problem Solving Format (see attached examples)
      A. Problem statement: Copy problem statement.
      B. Solve problem methodically showing all work (see examples). No partial credit will be given unless I can follow all your work.
      C. Clearly state any assumptions you have made.
      D. Underline or box the solutions.
      E. All problems must be turned in on engineering paper and written in pencil. Assignments with crossed-out or scratched-out errors will not be accepted.

4. Lab Reports – To be eligible for full credit, all lab reports must:
   a. demonstrate that you analyzed the technique we presented during the lab, evaluated and explained the results by applying your classroom knowledge, and extended the analysis to real life situations;
   b. be submitted in the proper format;
   c. address all the questions/issues presented in the lab assignment;
   d. be your individual work unless I specifically say otherwise.
   e. Lab reports will be due one week after the lab exercise.
   f. Lab report format: see next pages.

5. *Collapse* presentations
   a. 12-15 minute oral presentations of chapters in the book *Collapse*. Duration of the presentation will be included in the grade as will the professional appearance of visual aids, speaking demeanor, and clarity of presentation.
   b. PowerPoint presentations or other visual aids are encouraged to illustrate the summary. Effective presentations will use images of the areas described in the book to emphasize the impact of humans on these areas.
   c. Each presentation and each summary must provide proper geographical and historical context, explain all pertinent points of the chapter, address the 5-point framework, and relate material in this chapter to other societies discussed in the book and to current problems.
   d. See attached example grading sheet.

6. Environmental Research Project
   a. Work in teams of 3 or 4.

b. The 2013 research project will be to characterize 3 water bodies (ponds or rivers/streams) near or on the UGA Tifton Campus. The water bodies will be determined during the course of the class. Each team will use the information learned in class and during the laboratories to assess the water quality of the rivers/ponds. This will be your biggest opportunity to synthesize the materials you learned and demonstrate that you can use your knowledge to characterize the rivers/ponds and explain their condition.

c. To properly explain the rivers'/ponds' condition, you must be able to understand the transport process that provide inputs to the ponds as well as the biogeochemical processes that take place in the rivers/ponds. Each team will submit a written report for their project. Details of the report style will be provided later. A few days later, each team will make a twenty-minute oral presentation of their project to the class.

d. The team's grade will be a combination of how the written report and oral presentation are scored. The team's numeric score will be multiplied by the number of students in each team. Team members will then decide collectively how many points will be assigned to each of the team's members. In other words, the team will be responsible for determining the contribution of each member to the team's overall grade.

e. Your project will consist of the following three phases:
   i. Literature Review – read up on the topic. You will cite the sources you use in your project report.
   ii. Experimental phase – quantifying the problem. You will make field and/or lab measurements to quantify the problem. These lab measurements will take place during our regularly scheduled labs.
   iii. Draw conclusions and offer recommendations for solving any water quality problems you have identified. The recommendations must be based on sound-science and workable. Use scientific literature to support your choices.
   iv. Submit written report of project using the proper style.
   Twenty-minute oral presentation of your project to the class.

# STUDENT GUIDE FOR
# PREPARING A LABORATORY REPORT

A well written laboratory report demonstrates the writer's comprehension of the scientific principles behind the laboratory.

Typical Components of a laboratory report are:

**Title Page**
Information on this page should include the name of the experiment, the names of student, and the date. Titles should be simple, informative, and less than ten words. Titles such as "Lab #4" are not informative and thus should not be used.

**Abstract**
This page should summarize the essential aspects of the report including the purpose of the experiment, key findings, and significant major conclusions. The abstract should be concise but enables the reader to decide whether they need to read the whole report. The abstract should be 100-200 words.

**Introduction**
This section should include background material to the laboratory such as the theory, previous research, and formulas needed to understand the work. When appropriate, the hypothesis that is to be proven by the experiment should be given. In the absence of a hypothesis, the reason for conducting the laboratory should be clearly stated.

**Methods and Materials**
This section can be described as an instruction manual that helps someone else to duplicate the laboratory. The equipment, how to use the equipment, and procedure used in the laboratory should be explained. This section should focus on "what equipment was used", "how was the equipment used", "what sequence of events took place", "how were the data recorded", and "how were the data analyzed", etc.

**Results**
This section should present the data, observations, and outcome of the laboratory. While this section is the most straightforward section of the report, it is critical to give careful consideration to the proper method for presenting the data. Presenting the results in chronological order is simple and requires minimal prior planning, however this presentation method can make it difficult for the reader to identify and understand the most important information. The raw data should be summarized using statistical methods and then presented through the use of tables, graphs and/or figures. All tables, graphs/figures should have titles or captions. Titles and captions should contain enough information that the table/graph/figures can be understood without reading the report.

**Discussion**
This section should be considered the most important section of the report and should demonstrate your understanding of the scientific principle behind the experiment. In this section, you should interpret the results and convince the reader that your interpretation is

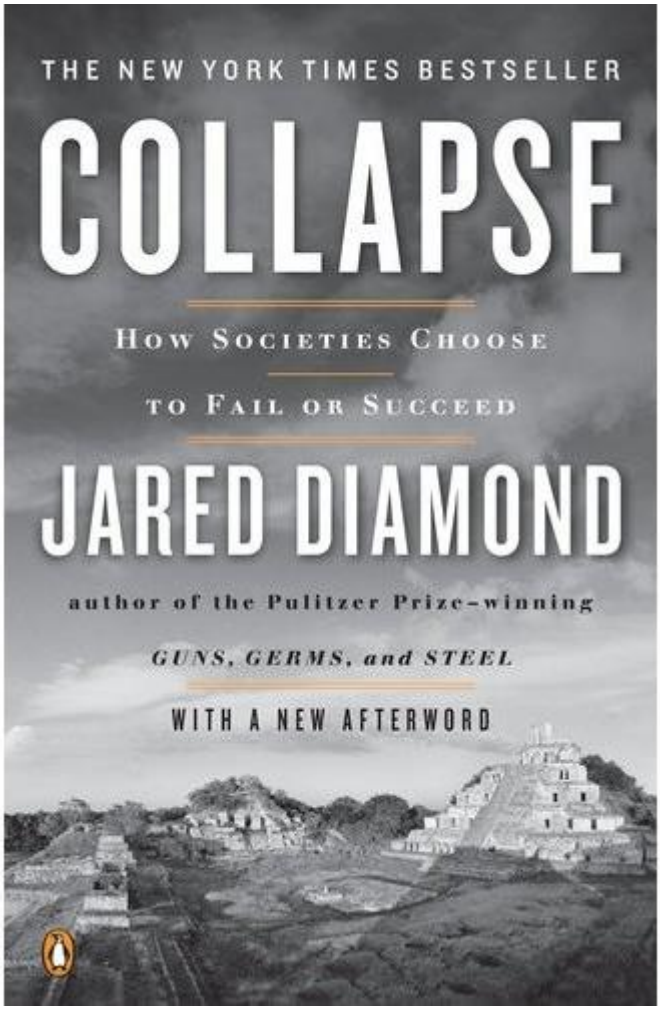
logical and correct. It is important that any limitations of your interpretation or of the scope of the laboratory are noted and to account for these limitations.

**Conclusion**
This section should be short and introduce no new ideas. The hypothesis of the study should be restated and if the hypothesis is proven should be noted. The conclusion is a good place to discuss future work that needs to be done to extend this work.

**References**
This section should list other work that you cited in your report or used to prepare your report.

**Appendices**
This section included information that augments your report but is not needed to understand your report. This can include the raw data, calculations, graphs/figures/tables not used in the main body of the report. The reader does not need to read this section.

**Collapse: How Societies Choose to Fail or Succeed: Revised Edition**



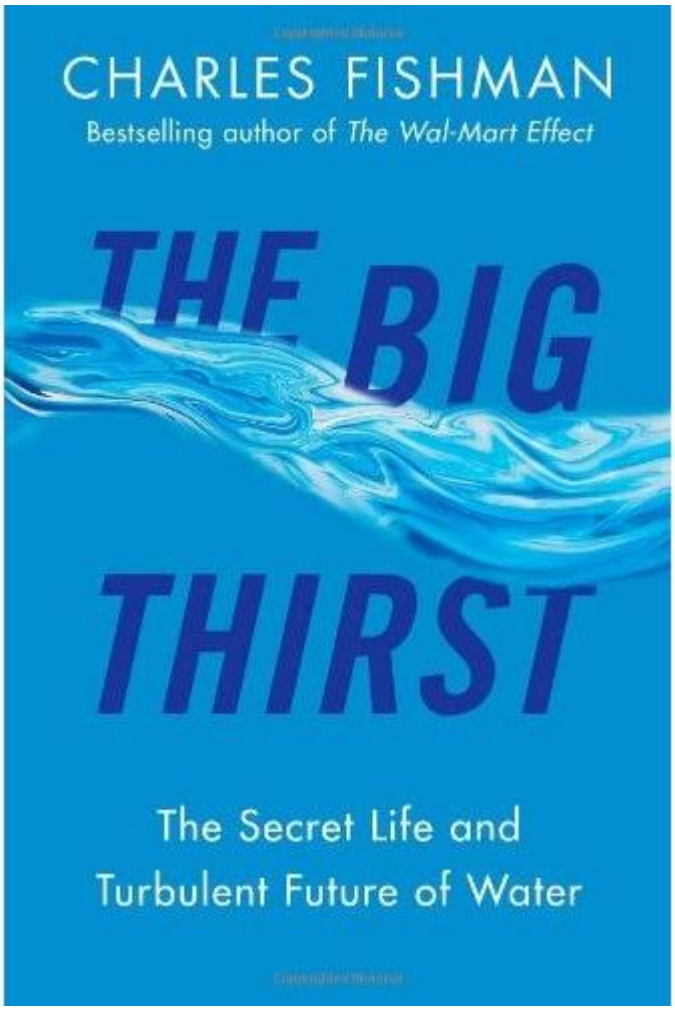

Online: $10.71 in paperback, $19.77 in hardcover + shipping
Free shipping for orders over $25.

## Book Description

Publication Date: **January 4, 2011**

From groundbreaking writer and thinker, Jared Diamond comes an epic, visionary new book on the mysterious collapse of past civilizations - and what this means for our future. Why do some societies flourish, while others founder? What happened to the people who made the forlorn long-abandoned statues of Easter Island or to the architects of the crumbling Maya pyramids? Will we go the same way, our skyscrapers one day standing derelict and overgrown like the temples at Angkor Wat? Bringing together new evidence from a startling range of sources and piecing together the myriad influences, from climate to culture, that make societies self-destruct, "Collapse" also shows how unlike our ancestors we can benefit from our knowledge of the past and learn to be survivors.

**The Big Thirst: The Secret Life and Turbulent Future of Water**




## Book Description

Publication Date: **April 12, 2011**

***The water*** coming out of your kitchen tap is four billion years old and might well have been sipped by a *Tyrannosaurus rex*. Rather than only three states of water—liquid, ice, and vapor—there is a fourth, "molecular water," fused into rock 400 miles deep in the Earth, and that's where most of the planet's water is found. Unlike most precious resources, water cannot be used up; it can always be made clean enough again to drink—indeed, water can be made so clean that it's toxic. Water is the most vital substance in our lives but also more amazing and mysterious than we appreciate. As Charles Fishman brings vibrantly to life in this surprising and mind-changing narrative, water runs our world in a host of awe-inspiring ways, yet we take it completely for granted. But the era of easy water is over.

Bringing readers on a lively and fascinating journey— from the wet moons of Saturn to the water-obsessed hotels of Las Vegas, where dolphins swim in the desert, and from a rice farm in the parched Australian outback to a high-tech IBM plant that makes an exotic breed of pure water found nowhere in nature—Fishman vividly shows that we've already left behind a century-long golden age when water was thoughtlessly abundant, free, and safe and entered a new era of high-stakes water.

Online: $16.25 in hardcover (paperback on yet available) + shipping