

## ENVIRONMENTAL SCIENCE: FOCUS ON SUSTAINABILITY

Lecturer: Dr. Sandra Swenson

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Office: Rm.5.66.07, ph: 212.237.8820

Office Hours: M-W 12:30 – 2:30PM or by appointment

Course description:

This course examines the core topics in environmental science and how environmental science informs sustainability, environmental policies, economics, and personal choices. Students will learn principles from the sciences of ecology and toxicology to study the relationships between living organisms, including humans, and their physical environment. The course will also consider environmental risks due to economic, political and cultural factors. Discussion will focus on how the Earth's resources are limited, and how these resources can best be used to benefit ecosystems and leave the environment healthy for future generations.

During this course of study, students will:

1. Identify and apply the fundamental concepts and methods of a life or physical science.

- Develop scientific literacy
- Acquire broad background knowledge in the physical and biological sciences.
- Correctly use basic terminology in biology and chemistry.
- Outline the basic concepts of environmental science, including:
  - sustainability
  - human impact
  - toxicology
  - ecology
- Recognize fundamental concepts of risk assessment and management.

2. Apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation.

- Critically evaluate major conflicts within the realm of the environmental sciences.
- Understand the role of creativity in problem solving and the application of scientific principles in gathering and interpreting scientific data.
- Recognize the significance of the scientific process in understanding controversial issues.
- Learn how to draw appropriate scientific conclusions from evidence and experimental data in both research and legal settings.
- Consider the dynamic relationship between politics, economics & societal issues that might influence scientific research.

3. Use the tools of a scientific discipline to carry out collaborative laboratory investigations.

- Demonstrate lab safety and proper laboratory protocol.
- Test various products for the presence of potentially toxic substances (e.g aluminum, lead) and investigate the potential effects of heavy metals in the environment.

- Students will practice the skills of collaborative learning in a laboratory environment by working in groups to fulfill laboratory exercises. They will do this by allocating specific responsibility to each lab member, discussing their procedure, and finalizing their results. Ultimately, students are responsible for completing their own lab report. Students will assess themselves on how responsible they are for their own work as well as how well the whole group works together. (See Rubric)
- Develop competence in oral and written forms of scientific communication

4. Gather, analyze, and interpret data and present it in an effective written laboratory or fieldwork report.

- Students will practically apply observation and/or measurement in a larger scientific context and thereby assess the validity of the data they collect.
- Participate in field studies in the NY City urban environment, including, but not limited to, Superfund cleanup sites and Jamaica Bay National Park
- Describe the basic practices of testing resource quality and the impacts of waste disposal on the environment.

5. Identify and apply research ethics and unbiased assessment in gathering and reporting scientific data.

- Students will discriminate between scientific and non-scientific resources by describing the basic components of a scientific investigation, and contrast this with non-scientific statements.
- Interpret environmental research findings as published in the popular media.
- Interpret environmental research findings in primary documents.
- Recognize and communicate the difference between research on environmental issues and non-research based statements.

Course website & Readings: Important course announcements, course readings, homework assignments, and other resources will be posted to the course Blackboard. There are extensive web links and news articles that students are responsible for reading.

Course material: Turning Technologies Response Card: Register on line at: <http://www.turningtechnologies.com/>  
I recommend renting the response card from the JJ Bookstore.

Readings: All assignments can be found on the John Jay College Blackboard. Any changes or announcements will be made on that site. You should check Blackboard and your John Jay College email regularly for course information. You must have a valid John Jay email account and have access to BlackBoard for ongoing updates and notifications.

Blackboard Student Support is provided by ITSS. Students should be directed to contact ITSS at [blackboardstudent@jjay.cuny.edu](mailto:blackboardstudent@jjay.cuny.edu) and through the Help Desk at 212.237.8200.

- Essentials of Environmental Science by Andrew Friedland. WH Freeman Company: Ebooks access through the bookstore.  
Author: Friedland, et al.

EBOOK: ESSENTIALS OF ENVIRONMENTAL SCIENCE

ISBN: 9781464109836

Author: Friedland, et al.

LAB MANUAL IS AVAILABLE IN THE BOOKSTORE.

TURNING TECHNOLOGIES RESPONSE CARD ISBN: 9781934931394

Extra Credit Reading

Lead Wars: The Politics of Science and the Fate of America's Children by Gerald Markowitz and David Rosner [on reserve in the library]

-OR-

World on the Edge by Lester R. Brown, 2011, Earth Policy Institute ISBN 978-0-393-33949-9

### Summary of Course Requirements:

Students are responsible for bringing the Response Cards (Turning Technologies) to every class and for accessing Blackboard once per day to check for new announcements. Students must learn how to use the Discussion Board section on BB. See help options under Blackboard 9.1

Cell phones and similar devices must be turned off in class. No electronic devices of any type (phones, computers, calculators, iPods, etc.) are allowed in course exams. Students found using phones or other electronic devices during an exam will not be given credit for that exam. Students must take exams during the scheduled times. Students with a documented conflict should speak with the professor.

### Grading Scale:

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Midterm = 15 Points	<ul style="list-style-type: none"><li>• Personal Photo-ID MUST be present at all lecture exams.</li><li>• This is an important component of the course and requires participation by all students. All in-class work is due the same day and cannot be made up.</li></ul>
Quizzes, Case Studies HW (Podcasts, etc.) and in-class projects (includes attendance) = 40 Points	
Final Exam = 15 Points	<ul style="list-style-type: none"><li>• ALL examinations must be taken in the class period in which you are registered.</li></ul>
Lab Grade = 30 Points All beepers, phones, headphones, etc. MUST be turned off in class.	<ul style="list-style-type: none"><li>• Plagiarism or cheating will not be tolerated. Any student suspected of cheating will be recommended for expulsion.</li></ul>

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Lab constitutes 30% of your total lecture grade: 6% Attendance, participation/group work; 7% Group Case Study; 5% Lab Manual Reports (In –Class); 6% Exam 1 & 6% Exam 2

#### 1. Attendance and participation

Lab participation includes adherence to safety rules, involvement in experimental procedures and station cleanup. Students will be required to work in groups and each student should participate in the Laboratory exercises. The Instructor will observe each student's involvement in the laboratory recitations and exercises and the students will be evaluated accordingly. The Lab safety rules will be strictly enforced at all times and students are expected to observe them while in the Lab. In that respect, under no circumstance should food be brought into lab or dispose of food in waste receptacles.

#### 2. Case Study Paper

Collaborative Group Case study: Each student is expected to collaborate on a research paper and present his or her topic during lab. A hard copy and electronic submission should be made to Turnitin.com. A separate handout will provide additional details on the requirements for the successful completion of this assignment. Case study Research Paper will be due on XXXX No late submissions. Please see additional Handout for Research Guidelines.

#### 3. Lab Manual Reports

The Lab Manual Reports are to be completed during the Laboratory exercise and should be handed in at the end of each Lab (prior to the student leaving the Lab). The Reports are to be neatly completed (legible) and all results noted, calculations completed and questions answered as related to the respective laboratory exercise.

#### 4. Lab Practical Exam 1 and 2

There will be practical exams for the Lab. Each exam will cover information discussed in the Recitation as related to the laboratory exercises, and also the laboratory exercises (calculations, interpretation etc). NO Personal phones or PDA's may be used.

Practical 1 will be administered on XXXX and Practical 2 will be on XXXX

There will be no make-up exams or labs.

#### ATTENDANCE

LECTURE: THERE MAY BE UP TO 96 STUDENTS IN EACH LECTURE WITH EACH LAB CONSISTING OF 24 STUDENTS. It is important that you know your lab section and you specific lab schedule as it may vary for the students you sit near in lecture.

An important part of the course grade is earned through in-class participation and laboratory work; therefore, it is essential for students to attend lecture and lab if they wish to be successful. No make-ups will be given for missed in-class activities and laboratory work unless there is a documented medical excuse. If you miss an exam (or foresee that you will miss an exam) for any reason, you **MUST** contact the instructor as soon as possible.

An Incomplete Grade may be given only to those students who would pass the course if they were to satisfactorily complete course requirements. It is within the discretion of the faculty member as to whether or not to give the grade of Incomplete.

Course Structure: SCI 112 consists of a lecture component and a laboratory component, completion of both is mandatory. There are two (2) lecture exams consisting of ~50 - 60 questions. All students must take the exams during the indicated periods. If you have a documented emergency, please see me to discuss options. Both exams count; no grade is dropped. The laboratory portion, worth 30% of the final grade, will be derived from the scores of two (2) practical exams, quizzes, in-class activities, and class participation. Any student having difficulty with the class should see the instructor as soon as possible.

No extra help can be given after the final exam is administered.

#### Grade of INC (Incomplete)

An Incomplete Grade may be given only to those students who would pass the course if they were to satisfactorily complete course requirements. It is within the discretion of the faculty member as to whether or not to give the grade of Incomplete.

Accommodations for Students with Disabilities: Students with hearing, visual, or mobility impairments; learning disabilities and attention deficit disorders; chronic illnesses and psychological impairments may be entitled to special accommodation under the Americans with Disabilities Act (ADA). In order to receive accommodation, students must register with the Office of Accessibility

Services (O.A.S., Room 1233-N, 212-237-8031, <http://www.jjay.cuny.edu/2023.php>) which will define, for both students and faculty, the appropriate accommodations. Faculty are not allowed to work directly with students to attempt to accommodate disabilities, and accommodations cannot be applied retroactively (after-the-fact).

Statement of the College Policy on Plagiarism: Plagiarism is the presentation of someone else's ideas, words, or artistic, scientific, or technical work as one's own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentations) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited. Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has free guides designed to help students with problems of documentation.

This course will utilize the services of Turnitin.com, a plagiarism prevention system approved by the College Council. All students must submit an electronic copy of their final paper using either the Word, WordPerfect, RTF, PDF or HTML format (including the reference page) to Turnitin.com for processing by the date listed. In addition, a printed original must be submitted to the lab instructor by the scheduled

date (instructors may also require an electronic copy). All electronic files should be scanned for viruses before submission. Students transmitting electronic viruses will be heavily penalized.

SCI 112 ENVIRONMENTAL SCIENCE: A FOCUS ON SUSTAINABILITY

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COURSE OUTLINE

<p>Week1</p>	<p><u>Lecture Topic and Assignments</u> (2 lectures) Introduction to Environmental Science Historical perspective and an Overview; Website: The Environmental Protection Agency <a href="http://www.epa.gov/">http://www.epa.gov/</a> Matter, Energy, and Change: Why energy is an important component of understanding environmental science especially with respect to sustainability. Describe the discipline of environmental science as related to individuals, communities, and policy. In-class assignment: How big is your carbon footprint? Assignment: Introduce yourself on Blackboard <u>Reading &amp; Review</u> Ch 1 &amp; 2 and PPT 1 &amp; 2</p>
	<p>Laboratory Experiment (1 lab) Lab Safety, Perils of Plagiarism, Preview to Measurements, Scientific Notation &amp; Significant Figures Laboratory Equipment and Measurements. Metric System: Investigate Units of Measure- weight, volume, length, &amp; density using the Metric System and compare their values with the U.S. Customary System of Measures. Calculate percent error comparing their measurement to a standard unit. Collaborative groups of four: Collaboration is measured by a rubric in which students will assess themselves and discuss collaborative strategies with their peers (meta-cognition technique).</p>
<p>Week 2</p>	<p><u>Lecture Topic and Assignments</u> (2 lectures) Ecosystem Ecology and Biomes Describe the basic principles of ecology. In-class mini case study: Reversing the Deforestation of Haiti <u>Reading and Review</u> Ch 3 &amp; PPT 3</p>
	<p><u>Laboratory Experiment</u> (1 lab) Continued Collaborative groups of four students Scientific Notation &amp; Significant Figures Laboratory Equipment and Measurements. Metric System: Investigate Units of Measure- weight, volume, length, &amp; density using the Metric System and compare their values with the U.S. Customary System of Measures.</p>
<p>Week 3</p>	<p><u>Lecture Topic and Assignments</u> (2 lectures) Evolution, Biodiversity, and Community Ecology Explain the concept of biodiversity and its underlying mechanisms. In-class mini case study: Biodiversity and medicinal herbs. Of interest: <u>Field Guide to the Natural World of New York City</u> by Leslie Day 2007 <u>Reading and Review</u> Review the following websites and respond to questions on BB Urban biodiversity: <a href="http://natureinthecity.org/urbanbiodiversity.php">http://natureinthecity.org/urbanbiodiversity.php</a> Blog: <a href="http://cityparksblog.org/2012/05/17/celebrating-national-urban-biodiversity-">http://cityparksblog.org/2012/05/17/celebrating-national-urban-biodiversity-</a> <a href="http://www.nyc.gov/html/planyc2030/html/home/home.shtml">http://www.nyc.gov/html/planyc2030/html/home/home.shtml</a> <i>HW: ON BB Urban Ecology discussion</i></p>

	Ch 4 & PPT 4
	<p><u>Laboratory Experiment</u> (1 lab)</p> <p>Collaborative groups of four</p> <p>Water Quality I: This laboratory exercise measures the levels of various chemicals in water, understanding the source of the chemicals and their potential toxic effects. In particular, students will measure the levels of free and total chlorine, total hardness, nitrate and nitrite nitrogen, total copper, total alkalinity, pH and total iron.</p>
Week 4	<p><u>Lecture Topic and Assignments</u> (2 lectures)</p> <p><i>Quiz 1</i></p> <p>Human Population Growth</p> <p>Describe the potential limits to human population growth and analyze relationships among changes in population size, economic development, and resource consumption at global and local scales.</p> <p>In-class mini case study (web video): Curitiba, Brazil</p> <p><u>Reading and Review</u></p> <p>Podcast: Listen to PRI The World: Science and respond to questions on BB.</p> <p>Ch 5 &amp; PPT 5</p>
	<p><u>Laboratory Experiment</u> (1 lab)</p> <p>Water Clarification: This experiment will use two methods to clarify water. The first method for removing solids from water is to add a chemical (aluminum sulfate) that will help the solids precipitate and settle out of solution. These chemicals generally referred to as flocculants, increase the speed at which particles naturally settle from water. The second method will be by filtration using activated charcoal. Results will be compared.</p>
Week 5	<p><u>Lecture Topic and Assignments</u> (2 lectures)</p> <p>Nonrenewable and Renewable Energy</p> <p>Describe how energy use has varied over time and compare the energy efficiencies of the extraction and conversion of different fuels as well as the various means of generating electricity.</p> <p>A Delicate Balance I (short video) in class writing assignment.</p> <p><u>Reading and Review</u></p> <p>Ch 8 &amp; PPT 8</p> <p>Begin Field Study Group Project: Superfund Clean-up in NYC: Gowanus Canal, Hudson River, and Newtown Creek; due week 10</p> <p>This Field Study is a collaborative project with groups of four; each group member is assigned a specific area of research.</p>
	<p><u>Laboratory Experiment</u> (1 lab)</p> <p>Water Quality I &amp; II testing (continued)</p>
Week 6	<p><u>Lecture Topic and Assignments</u> (2 lectures)</p> <p>Water Resources and Water Pollution</p> <p>Identify Earth's natural sources of water and identify the factors that will affect the future availability of water.</p> <p><u>Reading and Review</u></p> <p>Data Analysis and Interpretation of real-time data: NYC RiverKeeper:<a href="http://www.riverkeeper.org/">http://www.riverkeeper.org/</a></p> <p>Individual work on graphing and interpretation of key sources of pollution around NYC. <a href="http://www.nyc.gov/html/dep/pdf/wssystem.pdf">http://www.nyc.gov/html/dep/pdf/wssystem.pdf</a></p> <p>Ch 9 &amp; PPT 9</p>
	<p><u>Laboratory Experiment</u> (1 lab)</p> <p>Recitation – wrap-up and review; prepare for Daphnia lab</p>
Week 7	<p><u>Lecture Topic and Assignments</u> (1 lecture, 1 exam)</p> <p><i>Exam 1 (Weeks 1 – 6)</i></p> <p>Solid Waste Generation and Disposal</p>

	<p>Define waste generation from an ecological and systems perspective.  Short video: Basal Action Network – E-Waste in developing nations  In-class mini case study: Jamaica Bay; examining the levels of nitrogen in the bay. GIS mapping.</p> <p><u>Reading and Review</u>  Preview: <a href="http://www.nyharborparks.org/visit/jaba.html">http://www.nyharborparks.org/visit/jaba.html</a>  <a href="http://www.ciesin.columbia.edu/">http://www.ciesin.columbia.edu/</a>  Ch 11 &amp; PPT 11</p>
	<p><u>Laboratory Experiment</u> (1 lab)  Environmental Effects on Daphnia</p> <p>The environment challenges each living thing to respond to external influences. This includes the air, water, heat and light, and the chemicals that enter our bodies. Like with humans, chemicals that enter a daphnia's body can also change their heart rate by interfering with the neurotransmitters the nerves use to transmit signals. Chemicals that speed up heart rate are known as stimulants, whereas chemicals that slow down the heart rate are known as depressants.</p>
Week 8	<p><u>Lecture Topic and Assignments</u> (2 lectures)  Air Pollution  Identify major air pollutants and where they come from and examine various approaches to the control and prevention of outdoor pollution.</p> <p><u>Reading and Review</u>  Preview: <a href="http://www.nyc.gov/html/dep/html/air/index.shtml">http://www.nyc.gov/html/dep/html/air/index.shtml</a>  Ch 10 &amp; PPT 10</p>
	<p><u>Laboratory Practical exam</u> (1 lab)</p>
Week 9	<p><u>Lecture Topic and Assignments</u> (2 lectures)  Land Resources and Agriculture  Explain how human land use affects the environment and describe approaches and policies that promote sustainable land use.  Pesticides and Fertilizers &amp; Rachel Carson Biography (in-class video and writing assignment)</p> <p><u>Reading and Review</u>  Preston, Jennifer, (2012, July 13). Drought Worsens for Farmers and Ranchers, <i>New York Times, Inc.</i>  Retrieved from <a href="http://www.nytimes.com">www.nytimes.com</a>  Ch 7 &amp; PPT 7</p>
	<p><u>Laboratory Experiment</u> (1 lab)  Collaborative groups of four</p> <p>Lead Detection: How to test for lead in samples that contain at least 1% lead. The second part of the experiment will demonstrate the effect of lead on protein, while the third part of the experiment will examine the effect of lead on enzymes.</p> <p>Group Case Study (Research paper): Metals in the Environment Class presentation due week 14</p>
Week 10	<p><u>Lecture Topic and Assignments</u> (2 lectures)  Human Health Risk  Identify the three major categories of human health risk and explain risk analysis.  In-class mini case study: Citizen Scientists  Field Study (and Research Paper) PPT Presentations (limit 12) and/or papers posted on Turnitin.com</p> <p><u>Reading and Review</u>  Ch 12 &amp; PPT 12</p>
	<p><u>Laboratory Experiment</u> (1 lab)  Lead Detection (continued)</p>



Week 11	<p><u>Lecture Topic and Assignments (2 lectures)</u>  Climate Alteration and Global Warming  Distinguish among global change, global climate change, and global warming.  Explain how solar radiation and greenhouse gases warm our planet and affect our oceans.  A Delicate balance II (short video) in class writing assignment.</p> <p><u>Reading and Review</u>  Ch 14 &amp; PPT 14</p>
	<p><u>Laboratory Experiment (1 lab)</u>  Collaborative groups of four  Aluminum Detection: Aluminum is known to inhibit the absorption of phosphorus (an element necessary for bone maintenance) causing bone weakness. Excessive aluminum dust causes bronchial asthma. The objective of this experiment is to test both a deodorant and an antiperspirant for the presence of aluminum.</p>
Week 12	<p><u>Lecture Topic and Assignments (2 lectures)</u>  <i>Quiz 2</i>  Conservation of Biodiversity  Identify the causes of a declining biodiversity and describe conservation.</p> <p><u>Reading and Review</u>  Caudill, Amanda (2011, Nov. 18) How Coffee Affects Biodiversity. <i>New York Times, Inc.</i> Retrieved from <a href="http://www.nytimes.com">www.nytimes.com</a>  <a href="http://www.amnh.org/our-research/center-for-biodiversity-conservation/publications/general-interest/biodiversity-assessment-handbook-for-new-york-city">http://www.amnh.org/our-research/center-for-biodiversity-conservation/publications/general-interest/biodiversity-assessment-handbook-for-new-york-city</a> [PDF on Blackboard]  Ch. 13 &amp; PPT 13</p>
	<p><u>Laboratory Experiment (1 lab)</u>  Aluminum Detection (continued)</p>
Week 13	<p><u>Lecture Topic and Assignments (2 lectures)</u>  Environmental Economics and Equity  Discuss sustainability in a variety of environmental contexts including human well being.  In-class mini case study: Assembly Plants, Free Trade, and Sustainable Systems</p> <p><u>Reading and Review</u>  Ch. 15 &amp; PPT 15</p>
	<p><u>Laboratory Experiment (1 lab)</u>  Presentation of Group Case studies: Metals in the Environment (or other option selected by the instructor)</p>
Week 14	<p><u>Lecture Topic and Assignments (1 lectures, 1 Review)</u>  Environmental Policy: Reducing pollution and stewarding the environment.  Pollutant Regulation - The Environmental Protection Agency (EPA)  Review for Final</p>
	<p><i>Laboratory Practical exam 2 (1 lab)</i></p>
Week 15	<p>Please check the Registrar's website to confirm the exact date and time of the final exam</p>

Grades for courses that have been completed through the final examination are as follows.

Grade	Numerical Value	Percentage Equivalent
A	4.0	93.0-100.0
A-	3.7	90.0- 92.9
B+	3.3	87.1- 89.9

B	3.0	83.0- 87.0
B-	2.7	80.0- 82.9
C+	2.3	77.1- 79.9
C	2.0	73.0- 77.0
C-	1.7	70.0- 72.9
D+	1.3	67.1- 69.9
D	1.0	63.0- 67.0
D-	0.7	60.0- 62.9
F	0.0	Below 60.0