ENVIRONMENTAL SCIENCE-BIO 158-FALL 2013
LECTURE MONDAY, WEDNESDAY 01:00PM - 02:49PM, JM 135
LABORATORY MONDAY, WEDNESDAY 03:15PM - 04:28PM, JM 135

Instructor: Steven Albee-Scott, Ph.D.
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Required:

Text: **Environment: The Science Behind the Stories**, Withgott & Laposata; ISBN-10: 0321897064 • ISBN-13: 9780321897060

Lab Manual: **Portfolio and handouts**

Calculator: helpful in lab. Cell phones and other electronic devices may used during class, but only as research aids.

Course Description:

This course serves as a foundation for Environmental Science majors. It is also suitable for non-majors interested in environmental topics. Emphasis is placed on laboratory experience, environmental surveys, and class discussions to reinforce scientific principles. Environmental case studies are covered in detail. In laboratory, the students will learn how to analyze quantitative environmental data through application. This class has a laboratory component.
Prerequisites: ENG 085*, ENG 090* and MAT 020* or higher

Students will develop a scientific skill-set to understand the four strands of scientific investigation, content, process, communication, and the nature of science. Students will use the critical thinking to evaluate scientific information, data, and current environmental science issues. The foundation for environmental science will be constructed using the four strands. The fundamental concepts in environmental science, like ecological cycles, evolution, analytical chemistry, molecular biology, genetics, and biotechnology, are presented in context with current issues. The students will compare and contrast the content and process through communications with their peers and the instructor ultimately understanding the nature of science. The four strands will improve the student's scientific literacy which will support the enduring understanding of the building blocks of environmental science and biology. This course is designed for people interested in environmental issues using their computational skills, and includes a strong laboratory component.

Upon completing this course students will retain a skill-set derived from critical thinking and environmental scientific methodology. This skill-set can be used in classes following environmental science, and in problem solving needs through-out their lives. Although this

course is an introductory class, introductory does not translate into easy. This course does not require background knowledge in environmental science. It will require effort to build the scientific foundation and the philosophical underpinnings of critical thinking and scientific thought. Students will have to spend time studying the material to succeed. For this course, you should expect to study 8 hours a week, and depending on your study skill-set, this time commitment may increase or decrease. You are responsible for the resulting grade that you shall receive.

Course Objectives:

Upon completing this course I will be able to:

- Understand how the nature of science is a result of the content, process, and communication; and, how this process is self correcting.
- Indentify the big ideas in scientific discourse including how levels of ecological hierarchy pertain to biotic and abiotic properties.
- Integrate information of natural processes that govern the natural world into laboratory and field practice.
- Critically evaluate data drawn from natural phenomena to establish a scientific baseline.
- Understand the connection between population growth patterns, socioeconomic development, and environmental degradation.
- Measure environmental variables and interpret results of scientific studies of environmental problems.
- Understand how the mechanisms of evolutionary change, natural selection, mutation, migration, genetic drift, and sexual selection affect populations.
- Understand sustainability as it relates to ecological health.
- Understand factors affecting global climate change and human impact on the environment.

Associate Degree Outcomes:

All JCC graduates should develop or enhance certain essential skills while enrolled in college, as defined by the Board of Trustees. The Associate Degree Outcomes addressed in this class are:

ADO 4: Scientific Reasoning. Students will be able to design and carry out valid experiments to asses a given hypothesis, and to draw appropriate conclusions based on the results.

ADO 7: Critical Thinking. Students will learn to critically analyze and interpret scientific data from scientific experiments, as in the analysis carried out in numerous labs that involve interpreting and graphing data.

Incompletes - Consistent with JCC policy, incompletes are granted with instructor permission only in situations where a student is **passing** the course and encounters an unusual emergency that prevents them from completing coursework.

Instructor Absence/School Closing: If I am unable to attend class, the building secretary will be notified, and a notice will be posted outside our room. If the college is closed due to inclement weather, announcements are made on local radio stations. With the exception of these two situations, **ASSUME WE WILL HAVE CLASS.**

Plagiarism and Cheating - Be sure that homework and any assignments are your own work. Copying anyone else's work is **plagiarism,** and plagiarized work will **not be accepted**. Evidence of plagiarism or cheating on any exam, lab, lab quiz or assignment will result in a "0" score for that assignment and notification of the Academic Dean - please see the JCC Academic Honesty Policy.

Collaboration
While JCC encourages students to collaborate in study groups, work teams, and with lab partners, each student should take responsibility for accurately representing his/her own contribution.

Consequences/Procedures
A faculty member who suspects a student of academic dishonesty may penalize the student by taking appropriate action up to and including assigning a failing grade for the paper, project, report, exam or the course itself. Instructors should document instances of academic dishonesty in writing to the Dean of Faculty.

Student Appeal Process
In the event of a dispute, both students and faculty should follow the Conflict Resolution Policy. The policy is presented in the Student Rights and Responsibilities section of the student handbook. **The first step of this process is to set up a scheduled conference with the instructor to discuss the issues of concern.**

Extra Credit - is not given in the course. Focus your time and energy on completing course assignments and studying for lab quizzes and lecture exams.

Course Help and Special Needs - if you have special needs that I should be aware of in order to help you to best learn course material, please let me know as soon as possible. Students requiring special assistance (including those affected by the Americans with Disabilities Act) should contact the **Center for Student Success** in **Bert Walker Hall**, **Room 123**, **796-8415**. Tutoring services are free at JCC - if at any point in the course you feel that you would benefit from a tutor, contact me and/or the CSS.

Computer Resources – reliable computer access is necessary for this course, as some course materials can be accessed only through the course webpage. I will post announcements and grades, as well as many other course materials like discussion papers through this system.

Grading Scale - Grades will be rounded to the nearest percent. Grades may be curved at the instructor's discretion.

Percent	Grade	Percent	Grade	Percent	Grade
90 - 100%	4.0	75 – 79 %	2.5	60 – 64 %	1.0
85 – 89 %	3.5	70 – 74 %	2.0	55 – 59 %	0.5
80 – 84 %	3.0	65 – 69 %	1.5		

Student Responsibilities:

Attendance - I expect that you will do your best to attend every class. Because testing is primarily from lectures, and discussion papers are only accepted from those completing a discussion in person, missing class makes it very hard to do well.

Keep Up With Homework - If you miss class, it is your responsibility to find out if homework is due on the day you return. In class assignments cannot be made up.

Contribute to a courteous learning environment – Our class time is valuable. Please be punctual, especially on exam days, to avoid disruption to others and to be aware of class announcements. Anyone who interferes with the learning of others will be asked to leave class. This includes talking while I am talking, using cell phones or other devices during class, or being disruptive or disrespectful to others.

Study - This is a difficult course that will take significant study time outside of class. You will need to use the text and electronic resources, review notes and study to prep for exams and lab practicals.

Grading:

Lecture and Field exams account for 40% of the overall grade, and the portfolio representing your scientific investigations will be 60% of your grade. The grading schematic is described here. To determine your overall course grade at any point, ask your instructor:

Exams – There will be approximately four exams in the course, which may include multiple choice, fill-in, short answer, problem solving, and essay. A missed exam will be given with the appropriate excuse or the instructor's discretion.

Homework assignments - will be accepted up to one class day late, but with a 10% point reduction of possible points after the first five minutes of class time the day they are due. Unless otherwise directed, all assignments should be typed, and will not be accepted otherwise. In class assignments cannot be made up due to the laboratory nature of the class. Deadlines are not negotiable, and technology failure is not an excuse for late work. Protect your work carefully, including saving early and often, backing up work in more than one place, etc.

Portfolio – The Environmental Science Portfolio

The traditional view of science and science education is the dissemination of information from a traditional educational setting wherein the students have no ownership for the work that they perform in the class and are not asked to reflect on the work that they are asked to do. This introduction to science is an unscientific process that is 99% preparation and 1% application. The scientific tests run by the class are usually critical of the scientific process and the nature of science and novel hypothesis testing is pushed to more advanced classes. The environmental science portfolio is designed with the idea of implementing authentic scientific research in the introductory classes. Portfolio development is based upon the acquisition of skills by the students evidenced by the material in their portfolio. Due to the philosophical nature of environmental science, the portfolio allows the student time to reflect on the work that they are doing in class. Reflection increases the likelihood that class time will be meaningful to the students and be integrated into their own scientific world view. The process will set aside time for the students to reflect on, process, and integrate the information into their construction of reality.

The portfolio is a meaningful assessment that the student can take with them as evidence of their learning. Other students will only have a superficial representation of their work evidenced as grades with little information supplying the reviewer the depth or quality of their learning. The portfolio will challenge the students to present what they know as a reflection of personal growth and development as a professional environmental scientist; and the portfolio is evidence of the student's professionalism and their capacities in environmental science when applying for a position at a university or employer.

The portfolio is expected to teach people how to express what they have:

- Reflected upon for the class
- Reflected on their own skill-set and development
- Done literature research and accessed information for performing their functions as scientists
- Integrated the knowledge to future assessment and hypothesis testing

As described, the portfolio will be similar to a scientific lab book that contains summaries of hypothesis tests and processing of the refutation or failure of the refutation of the tested hypothesis. The students should record their reflections on the critical discussions and critical evaluations of issues discussed in the environmental science class and hypothesis testing. The students should record their reflections and critical analysis of scientific papers and readings from class. The students should actively record their reflections on their own reviews of books and articles that they come across during class. The reflections should show evidence of independent research and the results from that research. The portfolio should contain reflections from those of their peers and discussions that they have from people participating in their education. The portfolio should contain reflections on their field experiences and observations that they make while they are in the field testing ecological hypotheses. The students should reflect on their performance for each task that they perform as professional environmental scientists and describe the successes and failures from those experiences and ways that the experience may be improved in the future. The students should record any scientific presentations and scientific activities with notes on the observations and reactions of their peers. The portfolio should contain examples of their own scientific research.

The environmental science portfolio is a record of the student's professional development as an environmental scientist. The documentation is progressive with respect to how the scientific process changes for the student over the course of the program. The progressions will be shown within the framework of scientific achievements and the continuing process of testing hypotheses and building upon what was learned from reflected on previous scientific experiences and hypothesis testing. Considering that science is a social exercise, the portfolio will also show evidence of participation and engagement with others as the lab group successfully tests environmental science hypotheses. The portfolio will have evidence of the nature of science, approximately four tested hypotheses with aims

and results, professionalism in the writing, responsibilities and development as a professional environmental scientist, and philosophical implications of environmental science in society.

The portfolio will also have a record of

- An informed decision making processes
- An informed attitudes about environmental science
- A professional perspective on environmental science
- Thoughtful insight into environmental science
- An awareness of the complex nature of environmental science

The portfolio should be constructed as follows:

1. Issues discussed in environmental science (be specific)
2. Scientific tests performed as a class and the implications
3. Independent scientific tests and assessments
4. Personal papers, presentations, and reflections
5. Lab group papers, presentations, and reflections
6. Professional experiences, internships, and field work

Materials, which go into the portfolio, must be your own work due to the professional intent of the portfolio.

The portfolio will be assessed for both breadth and depth of the covered work. This assessment will include a check on the frequency and consistency of high quality entries, completion of scientific field work, laboratory tests, comprehensiveness, qualitative assessment based on the critical reviews of assessments (see handout of critical thinking skill-set). The depth of critical thinking and reflection will be evident when the portfolio is read. In other words, both analytical and synthetic thought will be evident upon reading. The portfolio should be organized, sequenced, and bulleted with headings and subheadings. The portfolio should be typed, paginated, spell checked, and legible wherever possible. The students should keep in mind a set of environmental science standards or skill-sets that universities or employers are looking for within the portfolio.

Tentative Schedule:

Section Title	Session	Topic	Ch.	Lab
Nature of Environmental Science	1	Introduction	1	Introduction to Lab Format Descriptive Statistics
	2	Sustainability and the Future	1	Descriptive Statistics
	3	Matter, Chemistry, and Environment	2	Community Structure: Insects
	4	Matter, Chemistry, and Environment	2	Community Structure: Insects
Earth Systems	5	Energy, Geology, Abiotic Factors	2	Community Structure: Trees
	6	Energy, Geology, Abiotic Factors	2	Community Structure: Trees
	7	Exam 1		Community Structure: Trees
Evolution	8	Evolution	3	Species Diversity: Fungi
	9	Evolution	3	Species Diversity: Fungi
	10	Biodiversity, Levels of Organization	3, 11	Species Diversity: Fungi
Ecology	11	Population Ecology	3, 8	Habitat and Niche
	12	Species Interactions, Community Ecology	4	Habitat and Niche
	13	Ecosystem Ecology, Ecosystems	5	Ecological Transects
	14	Ecosystem Ecology, Ecosystems	5	Ecological Transects
	15	Exam 2		
Ethics and Policy	16	Environmental Ethics	6	Dahlem Center Review
	17	Environmental Policy	7	Dahlem Center Invasive Species
Soils	18	Soil and Agriculture, Biotechnology	9, 10	Soil Analysis
	19	Soil and Agriculture, Biotechnology	9, 10	DNA Extraction
	20	Soil and Agriculture, Biotechnology	9, 10	DNA Amplification
	21	Exam 3		DNA Sequencing Prep
Forests	22	Forests, Forest Management, Microbial Ecology	12	Age Analysis
	23	Forests, Forest Management, Microbial Ecology	12	Age Analysis
	24	Exam 4 Final		Portfolio Evaluation

** Scientific papers and additional chapter sections may be required for each topic

Important Dates***: Refer to the Deans' web page

I have read the BIO 158 course information packet (course information, course calendar and academic honesty policy). I understand the information they contain. However, I would like public/private clarification (circle one) on the items will email you about at albeescsteven@jccmi.edu