

**Biology 31**  
**Introduction to Environmental Studies**  
**Instructions for Term Project**

Students will conduct an in-depth examination of the scientific research and other evidence behind an environmental or resource issue of interest using peer-reviewed scientific literature. Students can also choose to examine the science surrounding an existing or proposed technology related to an environmental or resource problem. The analysis will include the role of any relevant historical, social, cultural, political, and economic aspects of the issue either in the cause of the problem or the proposed solutions. Topics need to be selected by the 12<sup>th</sup> week of the semester.

Students are to write a research paper on a topic of their choice that is to be a minimum of 1000 words not including references. All projects will be **due the second to last day of class** and are worth a total of 100 points. The following is a more detailed explanation of what is expected.

- Students have the option to select their own topics. Otherwise, the instructor will assign them. To find a subject to research, browse through the textbook, resource links at the instructors website, the textbook website, or news articles. Some suggestions for study are also listed at the end of this document. The assignment is intentionally open-ended to permit students to delve into an area of interest.
- Students can choose to research an environmental or resource problem in a given region or study a specific aspect of an issue. For example, students can elect to study existing or predicted impacts of climate change in a specific country or region of a country. On the other hand, one could examine the research evidence of a specific impact of climate change such as drought, more severe storms, emergence of infectious diseases, impacts on coral reefs etc at a global level.
- Topics should be decided upon by **the 12<sup>th</sup> week of the semester at the latest**. On or before this date, students must hand in or email a description of the topic they plan to study or make an appointment to speak with the instructor.
- Each student should **communicate regularly with the instructor and each other about their project and to ask any questions after class or during office hours** throughout the semester. It is also very important to conduct searches of literature databases and relevant websites for documents as early as possible. This portion of the project may prove to be the most time consuming so **DO NOT PROCRASTINATE**.
- Because of the vast amount of information available on some topics, students will most likely use summary research reports (scientific consensus reports) from panels of experts in the area (sometimes referred to as secondary sources) rather than individually reported scientific investigations (referred to as primary sources). These secondary sources can be found by searching websites of government agencies and other related research organizations. The links to many of these sites are provided at the instructor's website. They are by no means the only sources available and can provide a starting place to find other relevant information. If on the other hand, students study a more specific subject such as the health impacts of concentrated feeding animal operations on surrounding communities, a search of scientific research databases and the use of original research in this area will be where most information will be found.
- **Students MUST cite a minimum of three peer-reviewed documents.** This means that the research cited must have been evaluated by a group of experts in the area and considered sound science. Peer-reviewed research is most frequently found in academic journals and research reports by government agencies. The latter are usually reviews of the existing research on a given topic and are sometimes also referred to as a scientific consensus report. The documents you reference that provide historical, social, or political aspects of the issue can be obtained from non-peer reviewed sources. Review class notes, the textbook, and links at the instructor's website for further clarification of the meaning of peer review. The following definition is from Wikipedia: Peer review (known as refereeing in some academic fields) is a process of subjecting an author's scholarly work, research or ideas to the scrutiny of others who are experts in the same field. It is used primarily by editors to select and to screen submitted manuscripts, and by funding agencies, to decide the awarding of grants. The peer review process aims to make authors meet the standards of their discipline, and of science in general. Publications and awards that have not undergone peer review are likely to be regarded with suspicion by scholars and professionals in many fields. Even refereed journals, however, can contain errors (<http://en.wikipedia.org/wiki/Peer-review>). **NOT CITING PEER-REVIEWED LITERATURE WILL RESULT IN AN AUTOMATIC 30 POINT DEDUCTION AND A FAILING GRADE FOR YOUR TERM PROJECT.**

- Some helpful guidelines for identifying peer-reviewed literature are to ask the following questions:
  1. Are sources cited within the text of the document and is there a list of references at the end of it?
  2. Is there an abstract or executive summary at the beginning of the paper?
  3. Are the author(s) affiliation(s) listed? What about the funding sources?
  4. Is the paper written in an objective (non-biased) tone (usually in 3rd person)?
  5. Does the paper describe actual research (lab experiments, field observations, numerical analyses)? For scientific consensus reports, are the procedures for compiling and synthesizing the available research provided?
  6. Is there a conclusion and/or discussion section near the end of the paper that summarizes the findings?
- Use your own words, paraphrase, and cite those ideas and statements that are not your own. Any information that is a direct quote should be indicated in quotations marks in addition to being cited. It will be very easy for the instructor to Google phrases from your paper to verify whether or not the writing and ideas are your own so **DO NOT PLAGIARIZE**.
- The papers should begin with an introduction that clearly defines the topic and why it is of significance. The introduction should also include a brief explanation of the background on the issue such as the historical context. The body of the paper should be a summary and discussion of the current scientific research evidence related to your topic as well as an evaluation of the proposed solutions. The project should end with a brief restating of your findings and any conclusions based on your analysis and synthesis of the evidence. Also, consider and address the following questions as relevant to your topic:
  - Is there agreement in the scientific community regarding the research findings? If not, what is in disagreement? What level of scientific uncertainty exists?
  - What is the historical context in which the environmental issue or proposed technological solution is taking place?
  - How might social, political or economic factors be a cause of the problem? Consider whether there are any cultural practices or existing policies that are helpful or harmful? What “costs” are associated with not “fixing” the problem? “fixing” it?
  - Who are the stakeholders involved (those who stand to gain or lose) if any changes are made? What are the stakeholders’ positions on the issue and do they support their claims with sound science?
  - Consider who/what is harmed by the problem. Is any group disproportionately affected?
  - What are the existing or proposed solutions? What does the current scientific evidence tell us about the viability of any technological solutions? Consider any political, social, cultural, economic, educational and personal (lifestyle choices) solutions. What factors might hinder or facilitate the implementation of the proposed solutions?
  - **POINTS WILL BE DEDUCTED FOR EACH QUESTION THAT IS NOT ADDRESSED.**
- When preparing the paper, aim for an audience of your peers: educated intelligent people who may not have an exceptionally strong scientific background and may know little about your subject. Explain the science in a way that others will understand.
- The project must be well written and have good sentence construction, syntax, and punctuation. If you are unsure as to what constitutes proper writing style, consult a style manual such as Kate Turabian's, “A Manual for Writers of Term Papers, Theses, and Dissertations”, 1987.
- **Projects must contain a minimum of 5 citations**, 3 of which **MUST** be peer-reviewed as mentioned previously. **YOU MUST READ AND SUMMARIZE THE ORIGINAL RESEARCH ARTICLE OR SCIENTIFIC CONSENSUS REPORT** not merely cite a source such as a news article that describes the research.
- **Cite sources where they appear in the paper or presentation** by indicating the authors or organizations names followed by the year of publication. For example, a paper by Lester Brown published in 2006 would be referenced as (Brown, 2006). The full citation is to be included in a reference section at the end of the paper or presentation.
- **The first time that a reference is mentioned**, the investigators or organization that has conducted the research should be briefly described. For example, “The Intergovernmental Panel on Climate Change, a panel of experts on climate science, has found that...”
- Citations should be listed in alphabetical order at the end of the paper or presentation. Guidelines for how to format the citations are given at the end of this document.
- The project will be graded on how well the instructions are followed: the organization and presentation of material, whether the student has sought to address all questions relevant to the topic (see questions to consider listed above), the appropriateness of the sources and whether enough information from peer-reviewed literature

is included. Points will be deducted for grammar and spelling mistakes as well as for not properly citing the documents referenced.

- Papers may be handed in electronically or as a paper printout. If you choose to hand in a printed version use 0.5 inch margins, single spacing, and 11 point font.
- Further guidance on how to search for information relevant to your topic, identify peer-reviewed journal articles and research reports, reference the works cited in your paper, and how to avoid plagiarism are available at the instructor's website.

Below are a few suggestions for topics. For those that are broad, consider researching the problem in a given country or region of a country or a specific aspect of the topic.

- Environmental toxins such as endocrine disruptors, metals, pesticides, natural toxins, air or water pollutants
- Overpopulation
- Habitat fragmentation and biodiversity loss
- Invasive species
- Urbanization and the design of livable cities
- Deforestation
- Deterioration of grasslands
- Loss of wetlands
- Desertification
- Agroforestry
- Industrial versus sustainable agriculture
- Soil degradation
- Genetically engineered crops
- Concentrated animal feeding operations
- Water scarcity
- Aquifer depletion
- Fisheries collapse
- Coral reef die-off
- Aquaculture
- Dam removal
- Indoor air pollution
- Ground level ozone or the ozone layer
- Climate change impacts in a specific region or close examination of a specific impact globally
- Carbon dioxide capture and storage
- Coal, uranium, gold, copper, or other metal mining
- Coal-fired power plants
- Oil depletion and peak oil
- Oil extraction and refining
- ANWR controversy and domestic petroleum exploration
- Nuclear energy
- Solar, wind, geothermal, biomass, or hydroelectric energy
- Electric cars
- Gas-electric hybrid cars and alternative fuel vehicles
- Biofuels
- Hydrogen fuel
- Fast trains and their potential in the U.S.
- Municipal wastewater treatment and recycling
- Waste incineration
- Trashing of the oceans
- Plastic bottles
- Plastics recycling
- Bioremediation
- Hazardous wastes and their disposal (e-waste, nuclear, etc...)
- Industrial ecology or ecological design
- Biomimicry
- Carbon blacks impact on global warming

Use the examples below to help format citations at the end of the paper or presentation (from “Assembling a list of works cited in your paper” at <http://library.duke.edu/research/citing/workscited/>)

Article from a printed journal

Kralj, M. M. (1994). Getting out of the box. *Consulting Psychology Journal*, 46 (2), 27-28.

Articles with multiple authors

Jones, G., Hanton, S., & Connaughton, D. (2002). What is this thing called mental toughness? An investigation of elite sport performers. *Journal of Applied Sport Psychology*, 14, 205-218

Articles from an online journal

Evnine, S. J. (2001). The universality of logic: On the connection between rationality and logical ability [Electronic version]. *Mind*, 110, 335-367.

Article from a printed magazine

Gawande, A. (2001, July 9). The man who couldn't stop eating. *The New Yorker*, 77, 66-75.

Article from an online magazine

Saletan, W. (2001, August 16). The ethicist's new clothes. *Slate*. Retrieved August 17, 2001, from [http://slate.msn.com/framegame/entries/01-08-16\\_113959.asp](http://slate.msn.com/framegame/entries/01-08-16_113959.asp)

Article from a printed newspaper

Holden, S. (1998, May 16). Frank Sinatra dies at 82. The New York Times, pp. A1, A22-A23.

Article from an online newspaper

Wright, S. (2001, January 25). Curriculum 2000 draws criticism. The Chronicle. Retrieved November 7, 2001, from <http://www.chronicle.duke.edu>

Book

Wright, R. (2004). A short history of progress. New York: Carroll & Graf Publishers.

Online book

Goodman, G. (1998). The moral philosophers. New York: Oxford University Press. Retrieved August 14, 2001, from Duke University, Duke University Libraries, netLibrary Web site: <http://www.netlibrary.com>

Scientific consensus report online

IPCC special report on carbon dioxide capture and storage (2007). Intergovernmental Panel on Climate Change, World Meteorological Organization and the United Nations Environment Programme. Website:

[http://arch.rivm.nl/env/int/ipcc/pages\\_media/SRCCS-final/IPCCSpecialReportonCarbondioxideCaptureandStorage.htm](http://arch.rivm.nl/env/int/ipcc/pages_media/SRCCS-final/IPCCSpecialReportonCarbondioxideCaptureandStorage.htm)

Article within a book

Cassel, J., & Zambella, B. (1996). Without a net: Supporting ourselves in a tremulous atmosphere. In T. W. Leonhardt (Ed.), Teaching and learning in a climate of constant change (pp. 75-92). Greenwich, CT: JAI Press Inc.

Webpage

National Park Service. (2003, February 11). Abraham Lincoln Birthplace National Historic Site. Retrieved February 13, 2003, from <http://www.nps.gov/abli/>

Government document

Hate Crimes Prevention Act of 1998: Hearing before the Committee on the Judiciary, United States Senate, 105th Cong., 2nd sess. 1 (1998).