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Section I: Program Review

The Department is going through a major re-building process after several retirements and the recruitment of two new faculty, now in their second year. This year, the Department has focused on its Periodic Review, which we have used to organize plans for a new curriculum and to justify moving toward a new academic program structure. We envision having a free-standing Bachelor of Science (BS) in Environmental Science as well as a Bachelor of Arts (BA) in Environmental Studies.
Section II: Development of New Curriculum

Faculty have developed several new courses to meet the needs of the students, based on program review results and the development of the Bachelor of Science track. Appendix II includes the course descriptions for six new courses to be proposed fall 2009:

ENVS 12   Joy of Garbage
An overview of environmental problems related to the essential human problem of waste management. Lectures and coursework apply foundational scientific concepts from chemistry, physics, and biology, as well as sociological, political, and archaeological evidence, in understanding issues like nuclear waste disposal, toxicological threats to human health, the economics of recycling, biogeochemical cycles, groundwater pollution, risk assessment, and landfill design.

ENVS 144  Sustainability in the Tropics
Examines environmental issues specific to the tropics, where 40% of the global population now lives and the bulk of future population growth will occur. Emphasis on the uniqueness of tropical ecosystems in terms of climatic, geologic, pedological, and biological diversity; traditional and post-colonial agricultural and forest management systems; sociocultural and political aspects of environmental issues.

ENVS 149  Agroecology
This survey course looks at the ecological dimensions of food and fiber production in managed environments. Its focus ranges from climatic and geologic processes affecting soil and water environments, to issues of nutrient management, to energy and genetic dimensions of crop production. The course addresses both traditional and high-tech agricultural production systems from the perspectives of natural systems and societal contexts.

ENVS 151  Restoration Ecology
An overview of concepts and practices in restoration ecology, emphasizing the application of ecological principles to restoration design, implementation, and monitoring. Major course topics will include historical ecology, soils and hydrology, plant and animal ecology, exotic species, endangered species concerns, mitigation, monitoring, planning, and assessment, as they apply in a restoration context. Students will work in local restoration projects; field trips required.

ENVS 158  Wetlands
This course will introduce and discuss the definition of a wetland; characteristics of wetland systems; the principles of wetland ecology; the functions of wetlands; and regulations and permitting process regarding development near and within wetlands. This class is appropriate for students planning careers in natural resource management while working in consulting, industry, government, or a non-profit organization. While students will have the basis for conducting wetland delineations or wetland functional assessments, they will require more training to professionally conduct such assessments. There are no specific
prerequisites for this class, but it is expected that students are familiar with basic principles of chemistry, physics, and biology.

**ENVS 163 Whole Earth Resource Management**
This course will evaluate sustainable management of ecosystems by local and indigenous people. Students will become acquainted with the approaches, methods and analyses used by ethnoecologists and ethnobiologists who are researching contemporary issues in biocultural diversity and sustainable resource management. The goal of this course is to familiarize students with the fields of ethnobiology, ethnoecology and Traditional Ecological Knowledge (TEK). TEK is “a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment. An attribute of societies with historical continuity in resource use practice.” (Berkes, F. 1999. Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Talor & Francis.)
Section III: Individual Faculty Assessments

The following statements were provided by the three full-time faculty of the department in spring 2009. They are followed by detailed assessment reports for each course taught.

Dr. Dudley Burton

Activities of Professor Dudley Burton

Beyond my regular teaching and advising in the Department, I have recently put a great deal of energy and effort into the initial development of a planned Certificate Program in Toxicology. We have had expressions of interest from several State agencies to develop an academic program to train mid-level professionals to fill positions in their agencies dealing with the regulation and management of toxic materials. Spring semester we offered an initial seminar in “Risk Assessment” where the academic framework and critical issues are being addressed.

1. In my research and community work, I am dealing with issues—and with entrepreneurs trying to start businesses--in alternative energy, energy conservation, water supply and management, and sustainable agriculture. More specifically, these areas include low-temperature heat to electricity; roof and petroleum storage tank shading; desalination; and growing algae for energy production, carbon absorption, and other purposes. Most of these initiatives define themselves, directly or indirectly, in the context of “Peak Oil,” the idea that global oil supplies are, or are near, starting to decline. The fundamental task, therefore, is trying to think through the economic, political, and environmental implications of the changes to lifestyle, food supplies, and economic development that these energy shortages will produce. The current financial crisis has complicated efforts in all of these areas enormously, even as it has demonstrated that such innovations are essential to move our economy in a more sustainable direction.

2. In the fall, I serve on several personnel review committees. I am also a long-time member of the University Recycling Committee.

Dr. Burton’s Course Assessment Reports

Assessment Report for ENVS 11, Environmental Issues and Critical Thinking, Fall 2008

GOALS:

1. Students will be introduced to a range of environmental issues and problems;
2. Students will critique each issue in reference to the underlying science, alternative solutions, and influential legal and social issues;
3. Students will develop skills to evaluate the construction of arguments for logical consistency, subjectivity vs. objectivity, underlying assumptions, and effectiveness.
4. Students will gain a deeper understanding of their own environmental beliefs, and how these are imbedded in the larger socio-cultural ideologies and systems.
5. Students will feel more connected to their communities by developing, implementing, and reporting on an action project.
**Goal 1** is assessed by responses to a question on the final exam:

1. Apply your critical thinking skills to two (2) of the following statements:
   a) I ought to be able to buy anything my money and my credit will allow.
   b) That idea is great because it is President-elect Obama's.
   c) The food system is robust and productive. How can it possibly fail us?
   d) Why should we spend billions of dollars on infrastructure when everything is fine.

Based on a random sample of 4 responses to this question, 4 students met or exceeded the standard, 0 students approached the standard, and 0 students failed to meet the standard.

**Goal 2**

Two major sections of the course dealt with a) views and arguments of the Presidential candidates, and b) recommendations on critical environmental policies for the newly elected-President Obama.

This goal is assessed in two ways: A. the class discussion, and B. a final exam question.

   A. The professor engaged students and guided discussion to include relevant key environmental issues, specifically energy policy, pollution control policy, water policy, and endangered species management. Eight students participated in that exercise.
     4 students met the professors expectations.
     2 students approached the expectations.
     2 students failed to meet the expectation.

   B. The final exam question was
     “Why did we choose Infrastructure, Food, and the Next Presidency as important areas to apply critical thinking?”

     Of the 4 students who answered this question, 3 met or exceeded the expectation. One student approached the expectation, and 0 students failed to meet the expectation.

**Goal 3** is assessed by responses to a question on the final exam:

   “Identify, illustrate, and explain 6 types of logical flaws and fallacies.”

Only 2 students chose to answer this question on the final. Both met the expectation. There was also substantial discussion during the class of different types of flaws and fallacies.

**Goal 4**

Each student was required as a major writing assignment to write an autobiography explaining not only their temporal history, but also their intellectual development. This was a much-appreciated and useful exercise.

100% of students completing this assignment met or exceeded the expectations.

**Goal 5**
Each student was expected to complete a community involvement assignment. Along the way, many complained that they could not co-ordinate schedules, the tasks given by the field sponsors were not useful, or there were not tasks to do given the season and lack of rainfall.

On this goal, 20% of students met or exceeded the standard, 20% approached the standard, and 60% failed to meet the standard. The professor recognizes that this aspect of the course will need considerable re-thinking.

Assessment Report for ENVS 112, International Environmental Problems, Fall 2008

The student learning objectives of this course as an Advanced Study GE course are:

1. To better understand international environmental problems as a set of social issues
2. To better understand how these international environmental problems pose domestic issues that confront and divide America today. (GE criteria D2/A)
3. Because we are involved in a global economy, a global culture, and a global political system, thousands of acts we all perform have environmental ramifications around the world. Our third objective is to better understand the consequences of our acts for the global environment. (GE criteria D2/B)
4. To better understand how corporations, governments, cultural groups, non-governmental organizations, and international organizations inter-relate with respect to international environmental problems. This includes a consideration of the diversity of human society as an aspect of understanding and dealing with international environmental problems. (GE criteria D2/B)
5. To better understand poverty, population, resource scarcity, ethnicity, gender, and socio-economic status as facts involved in international environmental problems. This includes the contribution of men and women and people of various ethnicities and socio-economic groups make in dealing with international environmental problems. (GE criteria D2/D,F)
6. To define and understand various perspectives on how to interpret and act upon these issues. (GE criteria D2/C,G,H)
7. To sharpen analytical skills (GE criteria D2/F)
8. To improve reading and writing skills (GE criteria D2/I)
9. To improve skills of speaking and persuasion.

This course used energy issues and policies as seen from the perspective of different countries in the world as the basis for addressing these goals. Course requirements included book reviews, class presentations, a major report on a country of one’s choice, and evaluations of other students’ class presentations.

The following are the countries covered in this semester’s work:
- Brazil
- Sudan
- Japan
- Cuba
- China
- France
- Italy
- Switzerland
- N/S Korea
- Iceland
- Ireland
- Germany
- Egypt
- Spain
- Canada
- UA Emirates
- S Africa
- Sweden

1. International environmental problems as social issues. 100% met this standard.
2. How international environmental problems pose domestic issues. 80% met this standard, while 20% were approaching the standard.
3. Understand the consequences of our acts for the global environment 70% met this standard, while 30% were approaching the standard.
4. How corporations, governments, cultural groups, non-governmental organizations, and international organizations inter-relate. 100% met this standard.
5. Poverty, population, resource scarcity, ethnicity, gender, and socio-economic status as facts involved in international environmental problems. 100% met this standard.
6. Perspectives on how to interpret and act upon these issues. 90% met this standard, while 10% were approaching the standard.
7. To sharpen analytical skills. 80% met this standard, while 20% were approaching the standard.
8. To improve reading and writing skills. 100% met this standard.
9. To improve skills of speaking and persuasion. 100% met this standard.

Assessment Report for ENVS 111, Environmental Ethics, Spring 2009

Course assessment and redesign were not a primary focus for this version of the course. Rather, my attention was on other courses. However, for this course I wanted to make sure that we used relevant materials, that reading materials were available. There were opportunities for students to present the results of their inquiries, and there were plenty of opportunities for discussion. I would say these things happened well.
I also would say that there are a number of students who had difficulty trying to think about the ethical issues in environmental conflicts. Several students dropped the course throughout the semester and some failed to appear for the final exam, so I am assuming that these are students who had difficulty understanding what the course might have been about.

One problem this year was that there was not a single edition of the book *Taking Sides* available to cover all the issues. The older editions were out of print and the newer editions were not yet available. However, I did put multiple copies of multiple editions of the book on reserve in the library so students could have access to any basic materials that they needed. This did not seem to be a problem during the course of the semester.

Writing assignments for the course included weekly one-page responses to reading material for the discussion that week, as well as a large paper based on the topic the student had chosen for presentation in the class. These were reviewed generally in accordance with the South Carolina assessment of writing materials referred to in the discussion in ENVS 190. The one page assignments were to assure that students read the materials and thought about them, and they did seem to have the desired effect in terms of generally having students prepared to discuss issues.

Overall, in the course I would say that students were more anxious to discuss substantive environmental issues than to focus on the ethical dimensions of those issues. I often had to draw this perspective out in the discussions and to focus attention on the ethical dimensions of the problems, rather than scientific or ecological or even experiential forms.
Assessment for ENVS 190, Senior Thesis, Spring 2009

The course this semester received a great deal of my attention with regard to helping students through the process, providing information to students, seeing draft materials, providing support for students’ work, and finally, evaluating students’ outputs. The table provided here provides a detailed summary of the assessment of the course in terms of the South Carolina assessment of writing performance.

INSERT TABLE

Perhaps more than usual, this course seemed to be a struggle intellectually as well as temperamentally or psychologically. Perhaps that is a reflection of the state of the world and economy, but it seemed that students struggled to maintain attention to their work and to focus on a timely writing activities.
Assessment for Risk Management Seminar, Spring 2009

The Risk Analysis Seminar consisted of a series of excellent presentations by professionals in the fields of toxicology, environmental assessment, remediation, etc. This seminar was intended to be the first in a series of courses to develop a curriculum and a certificate program in toxicology and related risk management issues. (Given the budget crisis, some of these ideas may be put on hold.) The student clientele for this course was small because students had not known about the course before, and it was extremely difficult to get interest on the part of students from other majors to participate in the seminar. However, to a person, the seminar presenters were knowledgeable, well-prepared, articulate, and able to communicate their expertise to the students. There was good interaction between students and faculty people. Students were assessed as pass/no pass based on their notebooks maintained over the course of the semester, and these reflected a range of efforts, from extremely serious and complete to marginal. However, it is fair to say that all the students who were in class were there because they were interested in the materials, and this provided a good motivation for their attentiveness to the discussions. As a one-hour course and pass/no pass basis, there was not a great deal of additional research or performance expected.
Activities of Professor Virginia Matzek

1. Working on piloting a new sustainability option in General Education, under the auspices of the Compass program; and developing opportunities for faculty development associated with sustainability in the curriculum.

2. Researching invasive species issues and carbon sequestration in woodland restoration projects.

3. Involving students in research through field methods class; inviting researchers and practitioners into the classroom as guest speakers.

4. Partnering with local agency (SAFCA) to give students experience in environmental monitoring for endangered species (Valley Elderberry Longhorn Beetle).

5. Engaging students in service learning and community outreach projects in Restoration Ecology (ENVS 196), Field Methods (ENVS 121) and GE course (ENVS 10).

Dr. Virginia Matzek’s Course Assessment Reports

Assessment Report for ENVS10, Environmental Science, Fall 2008

Assessment checklist for ENVS 10 final exam

Learning Goals for Area B2:

- Demonstrate a knowledge and understanding of natural phenomena.
- Apply the methodologies of science when approaching a scientific problem.
- Explain the limitations of scientific inquiry.

Method of assessment: embedded questions in final exam.

Students assessed: 40 (due to choices on exam, not all students answered every question)

Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard

Sample question # 1 – learning goal “explain limitations of scientific inquiry”

**IDs.** You need to give both the definition of the term AND its relevance or significance to an environmental issue discussed in class.

1 = answer defines term and correctly applies it to releases of synthetic chemicals to environment without prior testing (precautionary principle)

2 = answer defines term correctly but applies it incorrectly; or vice versa

3 = answer neither defines or applies term correctly

Sample question #2 –learning goal “understand natural phenomena”

**IDs.** You need to give both the definition of the term AND its relevance or significance to an environmental issue discussed in class.
1 = answer defines term and correctly applies it to phenomenon of groundwater recharge
2 = answer defines term correctly but applies it incorrectly; or vice versa
3 = answer neither defines or applies term correctly

Sample question #3 – learning goal “understand natural phenomena”

**Definitions.** You need to give both the definition of the term AND its relevance or significance to an environmental issue discussed in class.

“dead zone”

1 = correctly describes and explains causation of hypoxia in aquatic systems
2 = answer describes, but does not explain causation
3 = answer cannot describe or explain hypoxia correctly

Sample question #4 – learning goal “understand natural phenomena”

24. DNA mutation: (more than one choice may be correct)

   a. is the source of variation in organisms that evolution acts upon
   b. is caused when cells divide or repair themselves, and a mistake is made in transcribing the new or repaired DNA
   c. is undeniable evidence that a person has been exposed to a toxin or radioactivity
   d. is always bad for organisms because it is the source of cancer and some other non-contagious diseases

1 = answer given is a & b only
2 = answer given is either a or b only
3 = c or d included in answer
Sample question #6 – learning goal “apply methodologies of science”

26. An epidemiological approach to understanding the connection between a disease and the environment could include:

a. overlaying maps of malaria incidence with maps of rivers, wetlands, marshes, and other places mosquitoes breed

b. comparing the rate of “blue-baby syndrome” in rural areas served by wells and in urban areas served by city water supplies

c. exposing frogs to water contaminated with atrazine and then examining their gonads and testosterone levels

1 = answer is a & b only
2 = answer is either a or b only
3 = answer includes c or d

Sample question #7 – learning goal “apply methodologies of science”

30. The phenomenon in the graph shown above:

a. is an example of a toxicological experiment

b. shows that when females were given a chemical to control their testosterone, it had the same effect as treating males with atrazine, but this chemical did not control testosterone in males

c. shows a “feminizing” effect of atrazine in males

d. would have to be from an experiment conducted on humans in order for any useful conclusions to be drawn from it

1 = answer is a and c only
2 = answer is a or c only; could be paired with d
3 = answer includes b
Results for Fall 08:

Total for learning goal “limits of scientific inquiry”
1 = 54% 2=46% 3=0%

Total for learning goal “understanding natural phenomena”
1= 54% 2= 20% 3= 26%

Total for learning goal “scientific method”
1 = 58% 2=36% 3= 6%

Note that I had 13/44 students, or 30%, receive D’s or F’s for the final grade in this course. Student performance was unusually poor in this class this year.

Assessment Report for ENVS 120, Quantitative Methods, Fall 2008

Learning goals assessed:
- Ability to reason quantitatively
- Ability to carry out research tasks appropriate to solving environmental problems

Assessment method: Questions on final exam
Students assessed: 34
Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard

Problem set #1 – learning goal “ability to reason quantitatively”

Students were shown an output table from a statistical software program and a graphic relating to a regression problem (relating distance from a logging clearcut to the density of a plant species). Questions were considered together for the rubric.

26. What is the equation of the regression line?

1 = correct equation, shows work to predict density exactly by solving for x=300
2 = incorrect equation, or estimates density from visual inspection of regression line
3 = neither question answered correctly

Results: 1= 85% 2=12% 3=3%

Problem set #2 – learning goal “ability to reason quantitatively”
Students were shown data from a fictional study of environmental attitudes to be analyzed with a chi-square test. Correct answers to the questions required knowing how to apply statistical formulas.

28. What would be the expected count for the cell corresponding to an answer of “sometimes” and a region of “Midwest”? (4 pts)

Results: 1 = 85% 2=9% 3=9%

Problem set # 3 – learning goal “research tasks”

Students were shown a graphic from a fictional study using a commonly encountered experimental design that they learned to recognize (but not perform) in the class. Understanding complex data results is a good research skill. They were asked to answer the following questions about the graph:

32. Choose the correct statement(s) from the choices below: (5 pts)
   a. this is a chi-square analysis of association between two categorical variables, “industry worked in” and “smoking status”
   b. this is a two-way ANOVA with factors “industry worked in” and “smoking status”
   c. the cancer rate among non-smokers did not differ significantly, regardless of industry
   d. the cancer rate of non-smoking textile workers was not significantly different from that of smoking textile workers
   e. among smokers, the variance is smaller for textile workers than asbestos and fiberglass workers

Results: 1=71% 2=15% 3=15%

Problem set # 4 – learning goal “research tasks”

Students were shown an output table from statistical software representing the results of a scientific experiment on endangered species. They had to decide whether the results met the test of statistical significance, and state their conclusion without using jargon.

20. Do you reject the null? Explain. (4 pts)

21. What is your plain English conclusion of the results of this study? (4 pts)
1 = correctly fails to reject null based on critical F; jargon-free explanation
2 = correctly fails to reject null, but for wrong reason or with poor explanation
3 = rejects null or shows evidence of failure to understand setup of experiment

Results: 1=74% 2=15% 3=15%

Problem set #5 –learning goal “research tasks”

Students were given a word problem relating to an experimental question and asked to decide what test was most appropriate to analyze the data. This is very high-level statistical reasoning that even graduate students struggle with. The rubric deals with both the conceptual correctness of the null hypothesis and the kind of data analysis warranted.

13. What kind of statistical test is needed? (2 pts)

14. What are the null and alternative hypotheses (specific to the example)? (4 pts)

1 = correctly identified as a proportions test and correctly understood that proportion should be compared to random (0.5)
2 = understood a proportions test was wanted but thought it was a two-sample or that successes and failures should be compared
3 = incorrectly identified this as a means test or did not answer

Results: 1=74% 2=18% 3=9%

Note: 11% of students got D or F for the final grade in the course. There were 2 F’s on the final exam.
Assessment report for ENVS 121, Field Methods, Fall 2008

Learning goals assessed:
- Ability to reason quantitatively
- Ability to carry out research tasks appropriate to solving environmental problems
- Ability to assess problems & solutions by applying scientific concepts

Assessment method: Questions on final exam and quality of final research papers
Students assessed: 16
Rubric: 1=meeting/exceeding standard, 2=approaching standard, 3=failing standard

Task #1 – learning goal “ability to reason quantitatively”

As part of their final paper writeup, students had to analyze data they collected on a field trip to the Cosumnes River. Data on the diameter of 320+ trees, collected using a “point-quarter” method of vegetation sampling, were converted to an estimate of the total carbon accumulation of the forest, using allometric equations and conversion factors adopted for use with standard carbon accounting protocols. This was quite a laborious two-part undertaking; the rubric accounts for both parts of the calculations.

1 = both point-quarter analysis and conversion to carbon done correctly (within 5% of true figure)
2 = either point-quarter or carbon conversion done incorrectly
3 = both point-quarter and carbon conversion done incorrectly

Results: 1=81% 2=19% 3=0%

Task #2 – learning goal “ability to carry out research tasks”

Final take-home exam included portions requiring students to search out peer-reviewed articles that described studies using the methods we had learned in class, and to answer questions about the papers. The rubric accounts for both the appropriateness of the articles and the quality of the students’ analyses.

1 = appropriate articles chosen and good summaries/answers
2 = appropriate articles chosen, but weak on summarizing or answering questions
3 = inability to choose appropriate articles, or reliance on non-peer reviewed sources

Results: 1 = 88% 2=12% 3=0%

Task #3 – learning goal “ability to carry out research tasks”

The final paper writeup required students to cite evidence from the peer-reviewed literature to back up their contentions about the methodology and purpose of carbon accounting. The rubric accounts for the appropriateness and relevance of the articles, and the students’ understanding of how to cite scientific literature.
1 = appropriate articles chosen; paraphrased and cited correctly; relevant evidence to support contention in writeup
2 = appropriate articles chosen, but either paraphrased or cited poorly or not strictly relevant to claims made in writeup
3 = inappropriate articles chosen; plagiarized or inappropriately quoted; irrelevant

Results: 1= 81%  2= 6% 3= 12%

Task #4 – learning goal “apply scientific concepts”

Three exam questions were used to evaluate this learning goal; one on the pros and cons of area-based vs. line-based vs. plotless methods in vegetation sampling; one on the appropriateness of two different indices of biodiversity in scientific work; and one on the accuracy of soil bulk density measurements as applied to a particular study. In each case, the point of the question is for the student to understand how the choice of method affected the results. The rubric is based on whether the students always, sometimes, or never applied this concept in answering the question; because there was a choice of questions, not all students answered 3/3.

1 = student consistently (100%) applied the concept
2 = student inconsistently applied the concept
3 = student failed to grasp concept or did not apply it

Results: 1= 75% 2= 25% 3= 0%

Assessment Report for ENVS 120, Quantitative Methods, Spring 2009

Learning goals assessed:
- Ability to reason quantitatively
- Ability to carry out research tasks appropriate to solving environmental problems

Assessment method: Questions on final exam
Students assessed: 18
Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard
2 students (11%) failed the final exam. One student failed the class.

Problem set #1 – learning goal “ability to reason quantitatively”

Students were shown an output table from a statistical software program and a graphic relating to a regression problem (relating the shipping capacity of a port to the number of invasive species established there.) Questions were considered together for the rubric.

30. What is the equation of the regression line?

31. Predict invasive species establishment at a port with shipping traffic capacity of 2.5 million TEU.
1 = correct equation, shows work to predict establishment exactly by solving for x=2.5
2 = incorrect equation, or estimates from visual inspection of regression line
3 = neither question answered correctly

Results: 1= 67% 2=17% 3=17%

Problem set #2 – learning goal “ability to reason quantitatively”

Students were shown data from a fictional study of environmental attitudes to be analyzed with a chi-square test. Correct answers to the questions required knowing how to apply statistical formulas.

33. What would be the expected count for the cell corresponding to an answer of “always” and an income level >$200,000 (4 pts)

1= correct answers to both calculations
2 = correct answer only to first question; or shows work correctly but makes math error
3 = incorrect answer to both questions

Results: 1= 61% 2=22% 3=17%

Problem set #3 – learning goal “research tasks”

Students were shown a graphic from a fictional study using a commonly encountered experimental design that they learned to recognize (but not perform) in the class. Understanding complex data results is a good research skill. They were asked to answer the following questions about the graph:

32. Choose the correct statement(s) from the choices below: (5 pts)
   f. this is a chi-square analysis of association between two categorical variables, “industry worked in” and “smoking status”
   g. this is a two-way ANOVA with factors “industry worked in” and “smoking status”
   h. the cancer rate among non-smokers did not differ significantly, regardless of industry
   i. the cancer rate of non-smoking textile workers was not significantly different from that of smoking textile workers
   j. among smokers, the variance is smaller for textile workers than asbestos and fiberglass workers

1 = not more than one incorrect out of five
2 = not more than two incorrect out of five
3 = three or more incorrect out of five

Results: 1=72%  2=17%  3=11%

Problem set #4 – learning goal “research tasks”

Students were shown an output table from statistical software representing the results of a one-way ANOVA test comparing survivorship of oak acorns when protected by aboveground and belowground exclosures. They had to decide whether the results met the test of statistical significance, and show they could apply a different confidence level.

24. Do you reject the null? Explain. (4 pts)

25. What would be the critical value of the F statistic for a confidence level of 99%?

1 = correctly rejects null based on critical F and specifies correct F for α=.01
2 = rejects null for wrong reason or gives wrong answer to #25
3 = accepts null (regardless of answer to #25)

Results: 1=61%  2= 28%  3=11%

Problem set #5 – learning goal “research tasks”

Students were given a word problem relating to an experimental question and asked to set up null and alternative hypotheses necessary to the appropriate analysis of the data. This is very high order reasoning. The rubric assesses the accuracy of the student’s setup for the analysis.

16. This is a proportions test. Is it one-sample or two-sample? Is it one-tailed or two-tailed? Explain why. (2 pts)

17. What are the null and alternative hypotheses (specific to the example)? (4 pts)

1 = correct answers to question 13 and compared one-sample null to 0.5
2 = thought it was a two-sample test and/or compared successes to failures
3 = used hypotheses appropriate to a means test; or didn’t answer question

Results: 1=56%  2=33%  3=11%
Assessment Report for ENVS 121, Field Methods, Spring 2009

Learning goals assessed:
- Ability to reason quantitatively
- Ability to carry out research tasks appropriate to solving environmental problems
- Ability to assess problems & solutions by applying scientific concepts

Assessment method: Quality of work in final research papers
Students assessed: 14
Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard

Task #1 – learning goal “ability to reason quantitatively”

As part of their final paper writeup, students had to analyze data they collected on field trips to the American River and Secret Ravine. Among their tasks were to construct a D50 curve for sediment sizes in the bottom of the river, which involved converting the given data to cumulative percentages, then plotting them in Excel. Students also had to know to convert readings >128mm to a single 128+ value. Rubric accounts for variation in how completely students understood and applied the concept.

1 = D50 curve plotted correctly
2 = Cumulative percentages correct but problems in graphing or dealing with 128+ data
3 = Cumulative percentages incorrect; lack of understanding of problem; missing from paper

Results: 1 = 86%  2=7%  3=7%

Task #2 – learning goal “ability to reason quantitatively”

As part of their final paper writeup, students had to analyze data they collected on field trips to the American River and Secret Ravine. Among their tasks were to calculate the Shannon biodiversity index and evenness for two invertebrate populations sampled. Rubric accounts for variation in how completely students understood and applied the concept.

1 = Shannon biodiversity and evenness calculated correctly
2 = Either biodiversity or evenness correct, but other wrong; or, used Simpson index
3 = Both biodiversity & evenness incorrect or missing

Results: 1 = 79%  2=7%  3=14%

Task # 3 – learning goal “ability to carry out research tasks”

Final paper required citing at least two scientific papers for each of three topics: water chemistry, benthic invertebrate bioassays, and fluvial geomorphology. The rubric accounts for the appropriateness and relevance of the articles, and the students’ understanding of how to cite scientific literature.
1 = six appropriate articles chosen; correctly cited with appropriate style
2 = one or two articles are missing or inappropriately cited/applied to the paper
3 = >2 inappropriately cited or missing sources

Results: 1 = 50%  2=14%  3=36%

Task #4 – learning goal “apply scientific concepts”

As part of their final paper writeup, students had to analyze data they collected on field trips to the American River and Secret Ravine. Among their tasks were to correctly construct a calibration curve to correct for drift in the instrument readings, and use it to correct their data. Rubric accounts for variation in how completely students understood and applied the concept.

1 = Correct calibration curve; data converted and reported correctly
2 = Sound on calibration curve concept, but incorrect data conversion (e.g., y axis swapped for x)
3 = Lack of understanding of how to use a calibration curve to correct data; or, missing this piece

Results: 1=43% 2= 28% 3= 28%

Assessment Report for ENVS 196A, Restoration Ecology, Spring 2009

Learning goals assessed:

- Ability to write and speak clearly and persuasively
- Ability to carry out research tasks appropriate to solving environmental problems
- Ability to assess problems & solutions by applying scientific concepts
- Ability to assess problems & solutions by applying econ/political concepts
- Ability to identify/understand/evaluate competing perspectives

Assessment method: Quality of work in final research papers. Final papers were on a topic of student’s choice and required a novel synthesis of information from the peer-reviewed literature.

Students assessed: 8 (remaining students were non-majors)
Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard
1 student (13%) turned in a totally unacceptable paper and failed both the final and the course.

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Task #1 – learning goal “ability to write clearly and persuasively”

Grammar, spelling, and general quality of composition:

1 = Thoroughly proofread, grammatically correct
2 = A few grammar/spelling mistakes, but not enough to detract from reading experience
3 = Paper is noticeably poorly spelled or ungrammatical

Results: 1 = 50%  2=25%  3=25%
Task #2 – learning goal “ability to write clearly and persuasively”

Clarity of thesis statement and organization of argument:

1 = Clear question or hypothesis examined; well-organized and complete argument
2 = Topic too broad or thesis unclear; or some problems with organization, but not both
3 = Unclear thesis statement and disorganized argument

Results:  
1 = 75%  
2 = 13%  
3 = 13%

Task #3 – learning goal “ability to carry out research tasks”

Integration of cited sources from appropriate literature

1 = Appropriate sources, used to back up argument, correctly paraphrased and cited
2 = Problems with citation style, sources not well integrated or 1-2 inappropriate
3 = Plagiarism; inadequate sourcing; many inappropriate sources or too few sources

Results:  
1 = 50%  
2 = 25%  
3 = 25%

Task #4 – learning goal “assess problems/solutions with sci concepts”

1 = Paper thoroughly addresses major scientific issues appropriate to topic
2 = Vague or sketchy treatment of some scientific issues appropriate to topic
3 = Paper does not sufficiently address scientific issues appropriate to topic

Results:  
1 = 75%  
2 = 13%  
3 = 13%

Task #5 – learning goal “assess problems/solutions with econ/polit concepts”

1 = Paper thoroughly addresses major econ/poli issues appropriate to topic
2 = Vague or sketchy treatment of some econ/poli issues appropriate to topic
3 = Paper does not sufficiently address econ/poli issues appropriate to topic

Results:  
1 = 75%  
2 = 13%  
3 = 13%

Task #6 – learning goal “critically evaluates competing perspectives”

1 = Paper fairly addresses objections that could be raised to thesis statement
2 = Paper addresses most major objections that could be raised to thesis statement
3 = Paper does not address objections; or inappropriately dismisses objections

Results:  
1 = 63%  
2 = 25%  
3 = 13%
Activities of Professor Michelle Stevens

1. Research activities include continuing ongoing research on ecological and cultural restoration of Mesopotamian Marshes in Iraq. Have initiated renewed research trajectory on historic ecology of Sacramento-San Joaquin Delta, and am conducting comparative research on cultural and ecological management and restoration of the Tigris-Euphrates Delta and Sacramento-San Joaquin Delta. Activities include the following:
2. Service to Campus Community – Faculty Advisor for Environmental Student Organization. Earth Day activities planned for CSUS campus and Sacramento Community. Wrote a DOC grant and collaborated with ASI for campus earth day events; invited speaker Dr. Don Lotter on "Genetically Modified Food and the Failure of Science" on April 22 with tables and other Earth Day events; invited speaker Mr. Stephen Mose and movie “River of Renewal” on April 23; I spoke on the "Ecological and Cultural Restoration of the Mesopotamian Marshes from an Iraqi Perspective" on May 1; ESO joined ECOS for the Sacramento Earth Day event on April 26.
3. Attended Society of Wetland Scientists meeting in June 2009 – Chair of Student Presentations Award Committee, presented two oral presentations, chaired one session, and led a field to Leopold Reserve/ International Crane Foundation in June.
4. Attended docent training and led tours of Jepson Prairie Preserve for classes (ENVS 10 and ENVS 112) and the public, as well as participating in revision of Guide Book.
5. Involved students in research and environmental policy through evaluating the Delta Vision Strategy, inviting researchers and professionals into the classroom as guest speakers, and taking field trips to study areas.

Assessment Report for ENVS10, Environmental Science, Fall 2008

Assessment checklist for ENVS 10 final exam Learning Goals for Area B2:
• Demonstrate a knowledge and understanding of natural phenomena.

• Apply the methodologies of science when approaching a scientific problem.

• Explain the limitations of scientific inquiry.

Method of assessment: embedded questions in final exam.
Students assessed: 40 (due to choices on exam, not all students answered every question)
Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard

Learning Goals for Area B2:
• Demonstrate a knowledge and understanding of natural phenomena.
• Apply the methodologies of science when approaching a scientific problem.
• Explain the limitations of scientific inquiry.

Method of assessment: embedded questions in final exam

Fall 2008 Students assessed: 45 students in 10_6, 43 students in 10_3

Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard

Sample question # 1 – learning goal “explain limitations of scientific inquiry”

Part A
1 = Answer defines the scientific process. Then the student discusses the difficulty of analyzing such a complex and multi-dimensional data set. Complex temporal and spatial scales, lack of a control or replicates for Earth, difficulty of experimental design of climate change on Earth, difficult to measure, difficulty establishing causality and synergistic effects (sulfates, water) were all part of the complete answer.
2 = Answer question partially, missing some part of above
3 = Answer neither defines or applies term correctly

Class10_3
Question A. 1 = 33%  2=63%  3=5%
Class10_6
Question A. 1 = 44%  2=51%  3=5%

Part B
1 = Answer refers to the complex data sets scientists use to develop climate models, utilizing long-term data from ice cores, dendrochronology, and long term ocean and land temperature data sets. Computer models are used to interpret data and project future conditions.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question.

Results for Fall 08:
Class10_3
Question B. 1 = 14%  2 = 42%  3 = 44%
Class10_6
Question B. 1 = 22%  2 = 40%  3 = 38%

Assessment Report for ENVS 10, Environmental Science, Spring 2009

Assessment checklist for ENVS 10 final exam Learning Goals for Area B2:
• Demonstrate a knowledge and understanding of natural phenomena.
• Apply the methodologies of science when approaching a scientific problem.

• Explain the limitations of scientific inquiry.

Method of assessment: embedded questions in final exam.
Students assessed: 80
Rubric: 1=meeting/exceeding standard, 2= approaching standard, 3= failing standard

63. Global Warming and Climate Change are complex issues facing society. Why is it so difficult to apply the scientific method to a very complex environmental problem such as climate change? This question illustrates the limits to scientific inquiry.

a. What is the scientific method?
1 = Answer refers to elaborating on the steps of the scientific method, including observation, hypothesis generation, experimental testing, evaluation of results, retesting, and publication as they are specifically applied to climate change
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question
1. 71%  2. 20%  3. 9%

b. What types of data do scientists use to show that climate change is occurring, and that it is outside the normal range of variability?
1 = Answer refers to the complex data sets scientists use to develop climate models, utilizing long-term data from ice cores, dendrochronology, and long term ocean and land temperature data sets. Computer models are used to interpret data and project future conditions.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question
1. 49%  2. 31%  3. 20%

c. What are three key indicators of climate change?
1 = Answer refers to three of the factors discussed in reading material and lectures, including ice core data, long term weather patterns, changes in climate temperature and precipitation patterns, sea level rise, etc.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question
1. 80%  2. 19%  3. 1%

d. What do scientists predict for the future, if current climate change patterns and greenhouse gas emissions continue?
1 = Answer refers to data from the Intergovernmental Panel on Climate Change Report that was reviewed during lectures and in reading materials. In California, answer includes changing precipitation patterns, increased severity and intensity of storm events, earlier occurrence of spring and rainfall patterns, increased flood risk, decreased water supply and water quality, and sea level rise.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question
1. 50%  2. 40%  3. 10%

e. What can be done to reduce the impacts of climate change?
1 = Answer refers to the many public and private options discussed in class for reduction of greenhouse gas emissions and increasing carbon sinks through reforestation, forest and land conservation, and land use management practices.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question
Dr. Spearrow discussed the problems with Bisphenol A. It is used to make baby bottles and water bottles. According to the U.S. Centers for Disease Control, 95% of Americans have detectable levels of Bisphenol-A in their bodies. (4) In a recent CDC study, the observed BPA levels detected—0.1 to 9 parts per billion (ppb)—were at and above the concentrations known to reliably cause adverse effects in laboratory experiments. Bisphenol-A can alter the expression of several hundred genes with effects varying among specific tissues and also depending upon the timing of exposure. More than 130 studies suggest that BPA exposure at very low doses is linked to a staggering number of health problems, including prostate and breast cancer, obesity, attention deficit and hyperactivity disorder, brain damage, altered immune system, lowered sperm counts, and early puberty. Although the safe level of BPA exposure set by U.S. EPA based on experiments conducted prior to 1988 is 50 ppb, deleterious effects are noted on human health at lower doses. (6 points) a. You are a scientist working for EPA. You have the above scientific information available to you. How do you go about “proving” that Bisphenol A is causing unacceptable health effects at the 50 ppb dose? Remember that statistically you “fail to reject the Null hypothesis”, you do not prove anything.

1 = Answer refers to the application of the scientific process to testing Bisphenol A for health effects. Students should indicate that one needs a preponderance of experimental evidence to indicate that Bisphenol A is causing health effects, and one never really “proves” anything in science. Identification of the precautionary principle is also included in the correct response.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question

b. Who is most at risk from exposure to Bisphenol A? Meaning, what segment of the human population?

1 = Answer refers to identifying the most vulnerable groups in society such as developing fetuses, babies, elderly or sick people, pregnant women, and individuals with compromised immune systems.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question

b. How do you collect enough information to make the manufacturer stop using Bisphenol A in water bottles and baby bottles?

1 = Answer refers to collecting enough scientific data to influence public policy, and a discussion of how policy decisions are made. Using the example of DDT and Silent Spring written by Rachel Carson, and subsequent formation of the U.S. Environmental Protection Agency and restrictions on use of DDT would be one example students could use to answer this question.
2 = Answer question partially, missing some part of above
3 = Answer neither defines nor applies term correctly. Or failure to answer question


The student learning objectives of this course as an Advanced Study GE course are:

1. To better understand international environmental problems as a set of social issues
2. To better understand how these international environmental problems pose domestic issues that confront and divide America today. (GE criteria D2/A)
3. Because we are involved in a global economy, a global culture, and a global political system, thousands of acts we all perform have environmental ramifications around the world. Our third objective is to better understand the consequences of our acts for the global environment. (GE criteria D2/B)

4. To better understand how corporations, governments, cultural groups, non-governmental organizations, and international organizations inter-relate with respect to international environmental problems. This includes a consideration of the diversity of human society as an aspect of understanding and dealing with international environmental problems. (GE criteria D2/B)

5. To better understand poverty, population, resource scarcity, ethnicity, gender, and socio-economic status as facts involved in international environmental problems. This includes the contribution of men and women and people of various ethnicities and socio-economic groups make in dealing with international environmental problems. (GE criteria D2/D,F)

6. To define and understand various perspectives on how to interpret and act upon these issues. (GE criteria D2/C,G,H)

7. To sharpen analytical skills (GE criteria D2/F)

8. To improve reading and writing skills (GE criteria D2/I)

9. To improve skills of speaking and persuasion.

This course emphasizes conservation biology and biodiversity from the perspective of sustainable cultural and ecological land practices. Course materials included international conservation conventions, the Kyoto protocol and climate change, the IUCN Red List and the Convention on International Trade in Endangered Species, development of Peace Parks and Biosphere Reserves, and ethical consideration of indigenous and local knowledge. Students learned to analyze the stressors on functioning, sustainable ecosystems and indigenous/local human communities: these included habitat fragmentation, invasive species, deforestation, desertification, pollution, urbanization, industrialization, sociopolitical systems, and globalization. Course requirements included several short papers on a variety of topics, a biodiversity paper on an endangered species or ecosystem of their choice, a longer research paper, a Model United Nations assignment based on climate change, and a final essay proposing an International Forestry Protocol. The following evaluation is based on the final essay, which included writing a “Standing People Protocol” proposing an international agreement to protect the Earth’s forests.

Twenty students out of 23 in the class completed the essay. One student stopped coming to class and received an F and 2 students received incompletes, so the data does not include data from these three students who did not complete the final essay.

1. International environmental problems as social issues. 90% met this standard, while 10% were approaching the standard.
2. How international environmental problems pose domestic issues. 90% met this standard, while 10% were approaching the standard.
3. Understand the consequences of our acts for the global environment 90% met this standard, while 10% were approaching the standard.
4. How corporations, governments, cultural groups, non-governmental organizations, and international organizations inter-relate. 90% met this standard, while 10% were approaching the standard.
5. Poverty, population, resource scarcity, ethnicity, gender, and socio-economic status as facts involved in international environmental problems. 90% met this standard, while 10% were approaching the standard.
6. Perspectives on how to interpret and act upon these issues. 90% met this standard, while 10% were approaching the standard.

7. To sharpen analytical skills. This standard was not evaluated in the final essay.

8. To improve reading and writing skills. 100% met this standard.

9. To improve skills of speaking and persuasion. 100% met this standard.

Assessment Report for ENVS112, International Environmental Problems, Fall 2008

The following evaluation is based on the combined assignments for the class, with emphasis on the final essay, which included writing a “Standing People Protocol” proposing an international agreement to protect the Earth’s forests.

Thirty seven students were enrolled in the class: 34 students passed the class, and three students failed (stopped coming to class and didn’t complete assignments).

- International environmental problems as social issues. 90% met this standard, while 10% were approaching the standard.
- How international environmental problems pose domestic issues. 90% met this standard, while 10% were approaching the standard.
- Understand the consequences of our acts for the global environment. 90% met this standard, while 10% were approaching the standard.
- How corporations, governments, cultural groups, non-governmental organizations, and international organizations inter-relate. 90% met this standard, while 10% were approaching the standard.
- Poverty, population, resource scarcity, ethnicity, gender, and socio-economic status as facts involved in international environmental problems. 90% met this standard, while 10% were approaching the standard.
- Perspectives on how to interpret and act upon these issues. 90% met this standard, while 10% were approaching the standard.
- To sharpen analytical skills. This standard was not evaluated in the final essay.
- To improve reading and writing skills. 100% met this standard.
- To improve skills of speaking and persuasion. 100% met this standard.

Assessment Report for ENVS110, International Environmental Problems, Fall 2008

This course is designed to introduce the student to environmental issues that affect all of our lives. Specifically, we use environmental issues in California to address practical and conceptual issues. In this specific course, we evaluated the development and use of western water in California, concentrating specifically on the Sacramento-San Joaquin Delta. The Delta served as a focal point to discuss the following issues: California water supply and water shortage; flood control and levee instability; infrastructure for gas and electricity transmission and transportation conduits; crucial habitat and declining fish populations/food web resiliency within the Delta; urban encroachment into flood prone areas; recreation, boating, hunting, fishing and ecotourism within the Delta; agricultural support and polluted agricultural run-off; and socio-economic and institutional infrastructure responding to the crisis in the Delta. The capstone class project included an evaluation, written assessment and oral presentation on one of the nine different alternatives that have been proposed to alleviate problems in the Delta.

Learning goals assessed:
- Ability to write and speak clearly and persuasively
• Ability to carry out research tasks appropriate to solving environmental problems
• Ability to assess problems & solutions by applying scientific concepts
• Ability to assess problems & solutions by applying econ/political concepts
• Ability to identify/understand/evaluate competing perspectives

Of the thirty students were enrolled in the class, 27 passed and 3 failed. The assessment is based on the final class paper and presentation, which was based on evaluation of alternatives listed in the book Envisioning Futures for the Sacramento San Joaquin River Delta plus accompanying references, lectures and background research. Each student team chose one of the nine alternative approaches to a comprehensive solution for the Delta's problems. Each student conducted research, wrote a paper and prepared a presentation on their particular topic, using background information, supporting scientific and government documents, and discussions with knowledgeable individuals. This topic was “hot off the press”; the Delta Vision Strategic Plan, under the auspices of the Governors' Delta Vision Blue Ribbon Task Force, was released during the time the class was meeting.

• Students will sharpen analytical skills through persuasive argument and present it effectively in both written and oral presentation and discussion. 100% of students met this standard
• Ability to carry out research tasks appropriate to solving environmental problems. 95% met this standard, while 5% were approaching the standard
• Ability to assess problems & solutions by applying scientific concepts. 95% met this standard, while 5% were approaching the standard
• Ability to assess problems & solutions by applying economic/political concepts. 95% met this standard, while 5% were approaching the standard
• Ability to identify/understand/evaluate competing perspectives. 95% met this standard, while 5% were approaching the standard.