

Supplemental Material

CBE—Life Sciences Education

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SUPPLEMENTAL MATERIALS (1-4)

Supplemental Material 1. Essay prompts for assignments.

***Course: Biochemical Virology**

Assignment: A new viral disease has been spreading in eastern Europe, killing large numbers of pigs and other domestic animals. A treatment is desperately needed in order to prevent collapse of the economies of these countries. This virus does not seem to be similar to any other known virus and has proven to be elusive to vaccine-based therapy. As a scientist for the World Organization for Animal Health (OIE), you have been tasked with collaborating on strategies to combat this disease. What would you aim to discover about the virus? How would you discover this (e.g. tools, techniques, procedures, considerations)? Craft a proposal to the scientists working for the United Nations to inform them of your decision and plan.

Course: Chemical Ecology and Plant Systematics

Assignment: Over the course of the last 20 years, honeybee colonies have declined significantly due to pesticide use, fertilizers, and agricultural structures. Certain agricultural crops are resistant to these external pressures, while other fruits and vegetables are negatively affected. As a scientist for the United States Department of Agriculture (USDA), you are tasked with collaborating on a proposal to address this problem. What would you aim to discover about this issue? How would you discover this (e.g. tools, techniques, procedures, considerations)? Craft a proposal to the scientists working for the United Nations to inform them of your decision and plan.

Course: Environmental Restoration

Assignment: A recent forest fire has devastated a popular regional park that featured non-native trees. There are various factions within the community, broadly split into two camps: those in favor of eradicating the non-native trees because they interfere with the establishment of native trees, and those who view the non-native trees as culturally important resources that appeal to residents and tourists alike and therefore, should be replanted. As an environmental scientist for a conservation group, you have been tasked with collaborating on a proposal to restore the regional park using your scientific and socioeconomic expertise. What would you aim to discover about this issue? How would you discover this (e.g. tools, techniques, procedures, considerations)? Craft a proposal to the scientists working for the United States Forest Service (USFS) to inform them of your decision and plan.

***Each prompt was followed by the directions below:**

Please follow the rubric below. Feel free to pull on all sources in developing your essay. Make sure your paper is in APA format: Times New Roman font, 1” margins, single-spaced, proper APA referencing, etc. Please limit your essay to **two pages but make sure it is at least one**

page long. Include appropriate scientific writing and remember who your audience is (the USFS). Include at least two primary, peer-reviewed journal articles. Be sure to address this essay from a creative, holistic but realistic viewpoint. Pay close attention to your thesis statement, support your position, and be cognizant of paragraph transitions, grammar, and spelling.

RUBRIC

Rubric Elements	Guiding Questions	Score
Purposefulness	1.1 Is there a clearly stated purpose that calls for an integrative approach and a clear rationale or justification for taking this approach? (5 pts)	
	1.2 Does the paper use the writing genre effectively to communicate with its intended audience? (5 pts)	
Average Purposefulness Score		/5
Disciplinary Grounding	2.1 Does the paper use disciplinary knowledge accurately and effectively (e.g. concepts, perspectives, findings, examples, relevant and credible sources)? (5 pts)	
	2.2 Does the paper use disciplinary methods accurately and effectively (e.g. experimental design)? (5 pts)	
Average Disciplinary Grounding Score		/5
Integration	3.1 Does the paper include selected disciplinary perspectives and insights from two or more disciplinary traditions presented in the course or from elsewhere that are relevant to the paper's purpose? (5 pts)	
	3.2 Is there a sense of balance in the overall composition of the piece with regard to how disciplinary perspectives are brought together to advance the purpose of the piece? (5 pts)	
	3.3 Do the conclusions drawn by the paper indicate that understanding has been advanced by the integration of disciplinary views (e.g. the paper takes full advantage of the opportunities presented by the integration of disciplinary insights to advance its intended purpose both effectively and efficiently. The integration may result in novel or unexpected insights)? (5 pts)	
Average Integration Score		/5
Critical Awareness	4.1 Does the paper exhibit awareness of the limitations and benefits of the contributing disciplines? (5 pts)	
	Average Critical Awareness Score	

Supplemental Material 2. Interview questions for students.

Introduction

1. What is your major here at PSU?
2. How long have you been at PSU? When do you anticipate graduating?
3. In your science classes, do you prefer laboratory courses that have predetermined labs or courses that you can choose your laboratory experiment direction?
4. Have you ever done research as an undergraduate in a research lab?
5. What attracted you to the chemical ecology* course that you took this last winter term?

Interdisciplinary understanding

1. What does chemistry* mean to you?
2. What does biology* mean to you?
3. What does ecology* mean to you?
4. What does chemical ecology* mean to you?
5. What does interdisciplinary science mean to you?
6. Do you think that biophysics answers questions that biology and/or physics cannot answer on its own?
-Please explain.
7. Do you see benefit in learning disciplines by themselves?
-Please explain.
8. Do you feel like the biophysics course helped you bridge multiple disciplines together in a cohesive way?
 - If yes, can you please explain?
 - If no, can you please explain?
9. Can you give me an example of a moment during the biophysics course that challenged your understanding of biology, chemistry, physics, and or the intersection of the three?
10. Can you give me an example of a moment during the biophysics course that enhanced your understanding of biology, chemistry, physics, and/or the intersection of the three?
11. Do you think interdisciplinary science is important?
 - If so, why?
 - If not, why not?
12. Is there anything that you would like to share regarding your experiences as an undergraduate STEM student at PSU that we did not talk about?

***Course and discipline were exchanged based on the course that the interviewees were enrolled in.**

Supplemental Material 3. Faculty participant demographics.

	Participants (%)
Years at current position	
5+ Years	89
2-4 Years	9
<1 Year	4
Gender	
Male	63
Female	37
Carnegie Institution Classification	
Research	49
Master	27
Other	7
Baccalaureate	6
International University	4
Special Focus Profession	4
Associate	3
Department	
Natural/Physical Science	80
STEM Centers	15
Computer Science	4
Math	2

Supplemental Material 4. Faculty survey questions.

1. How do you define interdisciplinary science?
2. Do you teach courses that you consider to be interdisciplinary?
3. Does your course(s) have learning outcomes related to students' understanding of the interdisciplinary nature of science?
4. Please explain how you assess these learning outcomes related to students' understanding of the interdisciplinary nature of science.