

Sample Request for Re-evaluation for Natural Science with Lab

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| <p>1. Did the course include a laboratory?</p> | <p>Yes. ENV 121 included a required laboratory component that met weekly and complemented the lecture material. The course involved multiple hands-on laboratory activities, including experiments on soil salinity and plant growth (radish seed lab), water quality analysis, tragedy of the common's simulations, ecology and forest plot analysis, rock and soil identification, population estimation techniques, and mechanical and chemical weathering of rocks. These labs required direct data collection, observation, and analysis of natural systems.</p> |
| <p>2. How and in what ways were you tasked with demonstrating understanding of scientific methods that advance scientific knowledge?</p> | <p>Understanding of scientific methods was demonstrated through structured laboratory investigations that followed the scientific method. Each lab required pre-lab preparation, identification of variables (independent, dependent, and control), data collection using standardized procedures, and post-lab analysis. I was required to interpret results based on recorded data and explain outcomes using scientific reasoning rather than speculation. This process reinforced how scientific knowledge is generated through systematic observation, experimentation, and evidence-based conclusions.</p> |
| <p>3. How and in what ways did you develop explanatory hypotheses for observations, report and display scientific data, and interpret data in a scientifically sound manner?</p> | <p>In this course, explanatory hypotheses were developed before conducting experiments in order to predict possible outcomes based on the environmental factors being tested. For example, in the radish seed soil salinity lab, a hypothesis was made predicting that radish seeds would grow less as salt concentration increased. This helped guide the experiment and gave a basis for comparison once results were collected.</p> <p>Scientific data was reported by recording the number of seeds that germinated under different salt concentrations and organizing this information into group and class data sets. The results were displayed through data tables and statistical outputs, including p-values from t-tests that compared each salt concentration group to the control group. This allowed differences between treatments to be clearly observed and measured.</p> <p>Data was interpreted by analyzing statistical significance and overall trends rather than relying on the original hypothesis alone. The results showed that the 0.25 salt concentration</p> |

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| | <p>group was significantly different from the control ($p = 0.004859932$), while the other salt concentrations were not statistically significant. These findings demonstrated that radish seeds were still able to grow in saline conditions, although growth varied across concentrations. By comparing individual group results with combined class data, patterns and variability were identified, showing how salinity can influence germination without completely preventing growth. Conclusions were drawn based on recorded data and statistical analysis, ensuring interpretations were based on evidence rather than assumptions.</p> |
| <p>4. Describe how you used theories and models as unifying principles to understand natural phenomenon.</p> | <p>The course applied ecological theories and scientific models to interpret natural systems across both lecture and lab components. For example, ecosystem models were used to understand energy flow, population dynamics, and species interactions, while geological models explained processes such as rock cycling and weathering. By integrating field observations with these theoretical frameworks, I developed an understanding of how physical, chemical, and biological processes interact within natural systems.</p> |
| <p>5. How did you demonstrate understanding of how scientific methods and resultant knowledge are applied to address specific technological and/or societal challenges?</p> | <p>Scientific methods were applied to real-world challenges through population and ecology labs. I used mark-recapture techniques to estimate population size, a method commonly used in wildlife management and conservation biology. Additionally, plot and quadrat sampling techniques were applied to estimate population density and species distribution within defined areas, allowing for systematic and repeatable ecological measurements. These methods demonstrated how scientific data collection informs decision-making related to conservation, resource management, and population sustainability. Students also examined factors distinguishing open and closed populations and analyzed variables that contribute to population change, directly linking scientific methodology to societal and environmental problem-solving.</p> |