**Executive Summary**

(After completing the questions on the next few pages, please replace this area with a written executive summary of the questions that follow, including your data analysis, findings, action plan, and improvements you have already made. This will be the top sheet of your report. This summary should be at least a paragraph, and can definitely be longer if desired.)

The assessments show clearly that students taking the physics courses assess well in most regards. The most difficult assessment score-wise is in the area of synthesis, analysis, and problem solving. These are higher order skills. We are in the process or creating new and original homework assignments to help the students better engage these areas without the “benefit” of solutions manuals. The only clear method to learn the physical concepts and mathematical procedures is to spend time on these aspects of the curriculum. To maintain appropriate standards the instructional area requires support from the college community to first realize these skills are *not* required of students in most instructional areas and require a great sense of time and practice to acquire these skills. There are reasons why doctors and engineers are highly paid professions.

Many of the ILOs do not closely match measured CLOs, but in some instances an assessment can be made, especially in the areas of social communication, technology, and written and verbal communication skills as seen in laboratory sessions. In these assessments the physics students score very well; these skills are critical for engineering fields and the sciences.

**Faculty Included in the Preparation and Sharing of this Report:**

Kenneth Meidl and Thomas Nomof

**Please provide a brief and cogent narrative in response to each of the following questions.**

1. Provide a quantitative analysis for each ILO your CLOs inform. Provide the total number of students who passed/total number of students assessed in each ILO column *and* the corresponding ILO passing rate as an aggregated percentage.

**INSTITUTIONAL LEARNING OUTCOMES Students Passed/Assessed TOTAL RATE**

Communication

1. *Articulate ideas through written, spoken, and visual forms appropriately 178/187 95%*

*and effectively in relation to a given audience and social context.*

1. *Utilize interpersonal and group communication skills, especially those that 160/168 95%*

*promote collaborative problem-solving, mutual understanding, and teamwork.*

1. *Mindfully and respectfully listen to, engage with and formally respond to the N/A N/A*

*ideas of others in meaningful ways.*

1. *Plan, design, and produce creative forms of expression through music, speech, N/A N/A*

*and the visual and performing arts.*

Creative, Critical and Analytical Thinking

1. *Analyze differences and make connections among intellectual ideas, academic N/A N/A*

*bodies of knowledge and disciplinary fields of study.*

1. *Develop and expand upon innovative ideas by analyzing current evidence and N/A N/A*

*praxis, employing historical and cultural knowledge, engaging in theoretical*

*inquiry, and utilizing methods of rational inference.*

1. *Utilize the scientific method and solve problems using qualitative and 178/187 95%*

*quantitative data.*

1. *Demonstrate the ability to make well-considered aesthetic judgments. N/A N/A*

Cultural Literacy and Social Responsibility

1. *Interpret and analyze ideas of value and meaning exhibited in literature, N/A N/A*

*religious practices, philosophical perspectives, art, architecture, music, language,*

*performance and other cultural forms.*

1. *Describe the historical and cultural complexities of the human condition in its N/A N/A*

*global context, including the emergence and perpetuation of inequalities and the*

*interplay of social, political, economic and physical geographies.*

1. *Analyze and evaluate the value of diversity, especially by collaborating with N/A N/A*

*people of different physical abilities and those with distinct linguistic, cultural,*

*religious, lifestyle, national, and political backgrounds.*

1. *Demonstrate a pragmatics of ethical principles, effective citizenship, and social 178/187 95%*

*responsibility through cross-cultural interactions, volunteerism, and civic*

*engagement.*

Information and Technology Literacy

*1. Effectively access information and critically evaluate sources of information. 340/355 96%*

*2. Analyze, synthesize and apply information practically and ethically within 128/178 72%*

*personal, professional and academic contexts.*

*3. Identify, utilize and evaluate the value of a variety of technologies relevant to 177/228 78%*

*academic and workplace settings.*

Personal and Professional Development

*1. Identify and assess individual values, knowledge, skills, and abilities in order to set 257/362 71%*

*and achieve lifelong personal, educational, and professional goals.*

*2. Practice decision-making that builds self-awareness, fosters self-reliance, and N/A N/A*

*nourishes physical, mental, and social health.*

*3. Apply skills of cooperation, collaboration, negotiation, and group decision-making. 178/187 95%*

*4. Exhibit quality judgment, dependability, and accountability while maintaining N/A N/A*

*flexibility in an ever-changing world.*

1. Reflect on, consider and analyze the data you have. ***What does your CLO data tell you about how your students are achieving ILOs?*** *Be detailed, descriptive and analytical* in this qualitative assessment of each ILO in relation to your CLO data. **Are your results satisfactory?**

*Creative, Critical, and Analytical Thinking*

178 students out of 187 successfully accomplished this ILO. We assume that this is the result of weekly laboratory sessions utilizing the scientific method requiring students to quantitatively analyze data. This is satisfactory.

*Communication*

For the first two ILO’s in the communication category we assessed, we discovered that 95% of our students successfully met the criteria. These outcomes correlate nicely with our laboratory curriculum. Students are required to work collaboratively and develop communication and interpersonal skills in the process.

*Cultural Literacy and Social Responsibility*

178 out of 187 students met this assessment. While not measured directly, the laboratory portion of the physics curriculum allows for students to interact directly with each other on problem solving, data taking, data analysis, and decision making with displaying appropriate social interactions.

*Personal and professional Development*

Two ILO’s met with sufficient relevance for us to make an assessment in regards to the instructional program. The first ILO where individuals identify values and knowledge, skills, and abilities was measured with 257 students out of 362 for a 71% pass rate. Most of the students in the physics curriculum are studying to be engineers or scientists, and they were assessed on their problem solving skills, which is the most difficult component of the curriculum for students. Without these skills, the student will not likely succeed in the sciences nor the engineering fields. We are satisfied with these results, but our concerned that the Discussion sessions that directly aid the student in developing life-long problem solving skills is being dropped as a mandatory component of the curriculum.

The second ILO with sufficient cross-over to the instructional program is the third one, listing skills of cooperation and collaboration as key assessment points. We used our laboratory scores as a measuring device, as without proper group work the student does not succeed in the laboratory portion of the course. A 95% success rate was measured; we are satisfied with these results.

*Information and Technology Literacy*

This category of ILO has three measurable points; all three were assessed. *Effectively access information and critically evaluate information* was assessed with a 96% success rate. *Analyze, synthesize, and apply information* was measured with a 72% success rate, and *Identify, Utilize, and Evaluate a variety of technologies* was met with a 78% success rate. Evaluation and analysis are higher learning skills; therefore, we are pleased with the results.

1. Your department and the college should be making improvements based on student learning outcomes assessment, and we need to continue to document and share the improvements and progress you have already made. Did you make any changes in your CLO statements or analysis during the last 4-year cycle? Did you receive funding for resources requests that were aimed to improve assessment results? Did you make any improvements in the areas of teaching and instruction processes, your courses, or your program? *Please explain your accomplishments and provide details about your efforts.*

With the changing definition of a CLO there have been a number of CLO’s rewritten, and have yet to be assessed. We believe the new CLO’s better reflect the current definition and will provide valuable information on the next assessment cycle.

We did try on-line homework for a two year trial, as problem solving is the most difficult skill for students in which to be proficient. The on-line homework promised the ability to give students immediate feedback and hints during their analysis. We found, however, that very few students took the on-line assignments seriously, as measured by the time spent on the weekly homework assignments. Some students spent less than 20 hours per semester on the homework, which is unacceptable, and yet received nearly 100% scores. This clearly indicates that solutions to the on-line assignments are available to the students, and they were then able to side-step and the most important problem-solving experience. We are now writing our own homework sets to see if this helps engage the students with the necessary time on-task of problem solving.

We have not requested nor received any additional funding for the program.

1. **Action Plan.** Based on the assessments and analysis you have provided, please consider what changes or improvements you would like to make, which might include updating your CLO statements, modifying course outlines, rethinking instruction efforts, using different assessment instruments, asking for additional resources to improve assessment results, etc. ***Based on the analysis, provide an action plan for improvement that draws on your assessment results and efforts.***

Our assessments clearly indicate the most difficult skill with which the student to become proficient with is problem solving, and yet it is the very heart of the physics curriculum. We have two concerns. The Discussion Hour, which has been a mandatory component of the physics curriculum, is solely for the purpose to help students with the problem solving aspect of the course. However, the discussion hour will no longer be mandatory. The only reasonable expectation is for assessment scores to lower.

Our second concern is that the modern student has developed means to find solutions to homework assignments from a text or on-line problem sets. The best course of action is to take the necessary time to write new homework assignments, which cannot be found on-line nor in the text. The only meaningful manner to develop problem-solving skills is to spend time problem solving. We hope that new and original problem sets will necessarily engage students to work with the physical concepts and mathematical procedure required for success in the sciences, which is the primary focus of the program at the instru**c**tional level.