

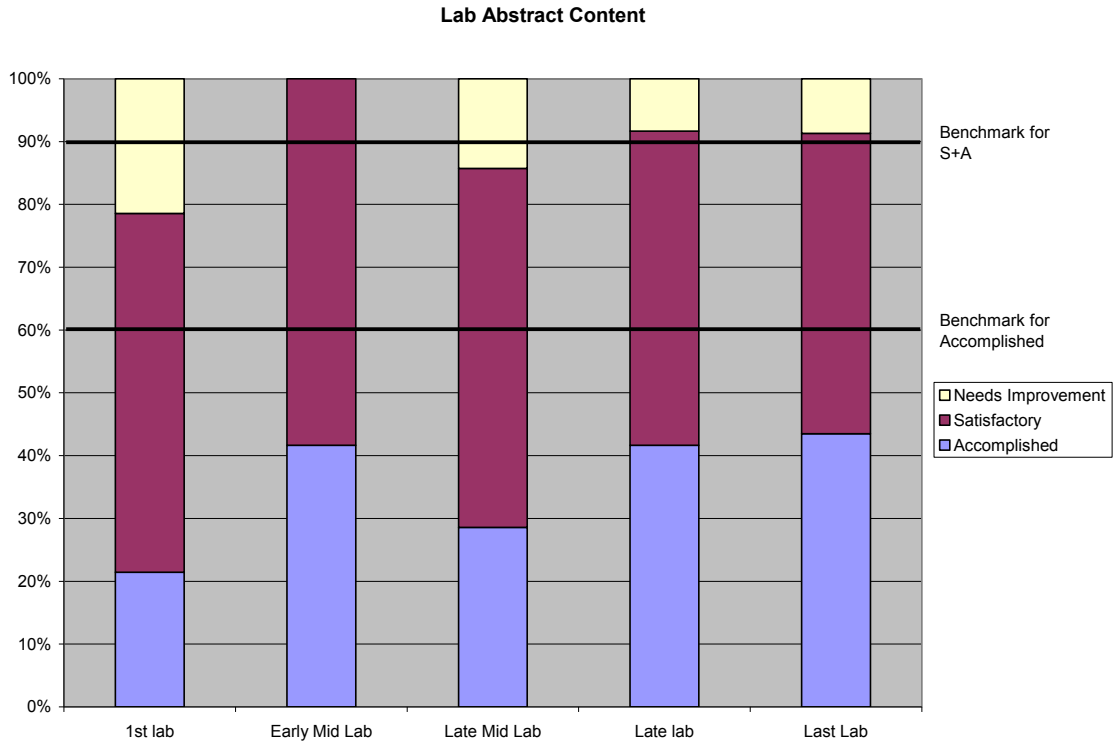
Assessment of Experimental and Theoretical Skills:

Experimental and Theoretical Skill: Students will be able to formulate a scientific question or purpose, design, setup and implement an experiment, then analyze the data and draw results and conclusions.

The assessment of this outcome is done in several different ways. Here we are focusing on two. First we evaluate the writing and content of lab abstracts in our general physics labs as measured by a rubric given below:

	Accomplished	Satisfactory	Needs Improvement
Content Overall (includes next five rows)	<input type="checkbox"/> articulate and concise <u>Includes all of the following:</u>	<input type="checkbox"/> Missing or minor problems with one or two of the following areas:	<input type="checkbox"/> Major omissions/problems of categories <input type="checkbox"/> Does not articulate the point of the experiment
Statement of purpose:	<input type="checkbox"/> In 1-2 sentences clearly explains what the experiment is about	<input type="checkbox"/> Verbose or imprecise	<input type="checkbox"/> Inaccurate or omitted
Procedure:	<input type="checkbox"/> in two or three sentences describes the experiment	<input type="checkbox"/> Verbose or incomplete	<input type="checkbox"/> Inaccurate or omitted
Analysis:	<input type="checkbox"/> states how the raw data was reduced	<input type="checkbox"/> too much detail or equations; <input type="checkbox"/> incomplete or imprecise	<input type="checkbox"/> Misses the point of the experiment or incorrect analysis
Results:	<input type="checkbox"/> States final product (numerical values) including uncertainty	<input type="checkbox"/> Main results present but not clearly stated	<input type="checkbox"/> Main results missing or incorrect
Conclusions:	<input type="checkbox"/> Processes the results-what was revealed what did it mean including explaining errors.	<input type="checkbox"/> Lacks clear understanding in conclusions	<input type="checkbox"/> Incorrect or missing conclusions
Format & Style (overall)	<input type="checkbox"/> Includes all of the following:	<input type="checkbox"/> Minor problems:	<input type="checkbox"/> Major Problems: in multiple categories
Format:	<input type="checkbox"/> includes headers (title, name, lab partner, double spaced, approx. 2/3 page)	<input type="checkbox"/> Incomplete header Improper sequence or format	<input type="checkbox"/> Missing sections, <input type="checkbox"/> abstract runs well over a page
Style:	<input type="checkbox"/> Concise, crisp and complete; <input type="checkbox"/> uses technically appropriate language; <input type="checkbox"/> proper grammar & spelling	<input type="checkbox"/> minor grammar/spelling mistakes, <input type="checkbox"/> verbose	<input type="checkbox"/> Generally sloppy work

Our benchmark of performance is that by the end of the semester 60% of our students reach the “accomplished” level and 90% “satisfactory”. The most recent evaluation was done in 2010 with the results listed below:



We met our goals of 90% satisfactory but not the 60% accomplished goal. One note, this was done in the first semester lab. Going forward we will do the analysis in the second semester lab as our majors do both and would presumably continue to improve.

A second skills measurement is done by analyzing the papers students write for our senior seminar. Again there is a rubric for this listed below:

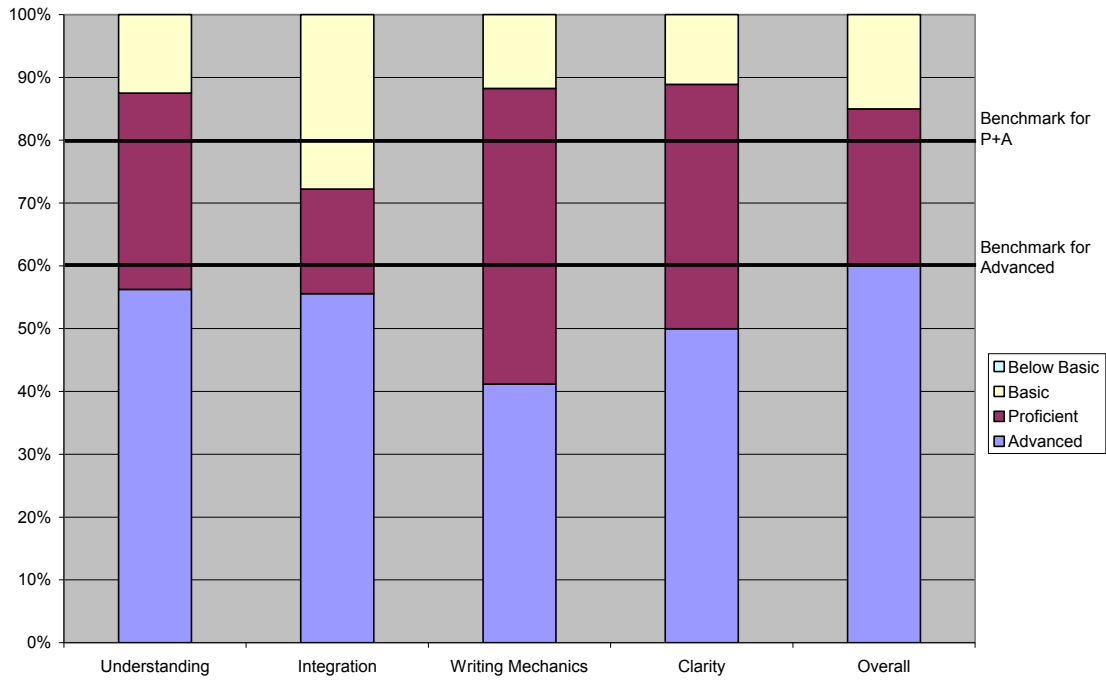
	Below Basic	Basic	Proficient	Exemplary
Depth of Understanding of Physical Principles	<input type="checkbox"/> Contains mistakes of substance, misunderstands concepts	<input type="checkbox"/> Accurately covers concepts on a level for a popular audience but nothing beyond	<input type="checkbox"/> Describes nuances of the concepts and some applications	<input type="checkbox"/> Shows thorough understanding from multiple sources. Provides info beyond the professor’s knowledge

Integration of Various Branches of Physics	<input type="checkbox"/> Makes little effort to draw in the different branches of physics to the topic	<input type="checkbox"/> Shows awareness of the how at least a couple of different areas come into play	<input type="checkbox"/> Demonstrates how the various branches relate to the topic	<input type="checkbox"/> Demonstrates the development of the field from the various sub-areas
Mechanics of writing (Grammar, etc.)	<input type="checkbox"/> Poorly written with numerous mechanical mistakes and problems of grammar	<input type="checkbox"/> Occasional mistakes, writing is readable but doesn't flow very well	<input type="checkbox"/> Few, if any, mistakes. Writing is fairly clear and straightforward	<input type="checkbox"/> Writing shows an elegance of wording that draws the reader along. Enjoyable to read
Clarity of Explanation	<input type="checkbox"/> Not clear the writer understands the topic.	<input type="checkbox"/> There are basic explanations but do little to address obvious questions	<input type="checkbox"/> Explanations are understandable to a reasonable reader. They anticipate questions and answer them	<input type="checkbox"/> Explanations are clear and creative allowing the reader to have a good understanding on a first read
Overall Quality	<input type="checkbox"/> Most categories rated as below basic. <input type="checkbox"/> Clearly not much time and effort put into the paper	<input type="checkbox"/> Categories range from below basic to proficient. <input type="checkbox"/> Writer clearly gained knowledge in writing the paper	<input type="checkbox"/> All areas at least basic with most in the proficient range. <input type="checkbox"/> The knowledge gained by the writer is clearly expressed in the paper	<input type="checkbox"/> All areas at least proficient. <input type="checkbox"/> The paper is enjoyable to read and brings new knowledge to the reader (even a physics professor)

The benchmarks we have set are : 60% reach the top rating, 80% reach the second rating on the paper.

We last assessed this in spring 2011 looking at three years worth of papers. The results are as follows:

Physics Paper Results



Overall we met the benchmarks but just barely.