

Program Assessment Report 2017-2018

Program Name: Physics

Program Learning Outcome: **4) Design and conduct experiments, analyze and interpret data, and formulate conclusions.**

1. Identify the artifact(s) (i.e. student work or outputs) that you used to assess the PLO. [Projects, papers, presentations, portfolios, exam questions, specific assignments, capstone work]

Artifacts:

PHYS140: Lab reports.

PHYS141: Lab reports.

PHYS270L: Lab reports and data/analysis spreadsheets.

PHYS448L: Lab reports and radios.

PHYS473L: Lab reports and data/analysis spreadsheets.

Other artifact(s)

PHYS140: N/A

PHYS141: N/A

PHYS270L: N/A

PHYS448L: N/A

PHYS473L: N/A

2. Identify the instruments (e.g. rubrics, surveys, spreadsheets, statistical software) used to assess the artifact(s) (i.e. the way in which student output are analyzed).

Instruments:

PHYS140: Course Exit Survey data was collected by ALL majors taking introductory physics lab in the fall of 2017. Benchmark was that at least 85% of students would "Agree" or "Strongly Agree" with the stated learned ability.

PHYS141: Introductory Physics Laboratory Report rubric data was collected and analyzed for ALL majors taking introductory physics lab in the Spring 2018. This assessment is of the third (final) laboratory report in the introductory physics lab sequence. This assignment represents the

summative assessment of the students' ability to write a lab report. Benchmark was that at least 85% of students would score in the "Good" or "Excellent" category in each rubric criteria.

PHYS270L: The reports and data/analysis spreadsheets are read by the instructor.

PHYS448L: The reports the radios, and exit interview of the class by the instructor.

PHYS473L: The reports and exit interview of the class by the instructor

Other instruments Used

PHYS140: N/A

PHYS141: N/A

PHYS270L: N/A

PHYS448L: N/A

PHYS473L: N/A

3. Describe program collaboration to plan, implement and use the results of assessment.

PHYS140: N/A

PHYS141: N/A

PHYS270L: There has been extensive work over the last 4 years to improve this lab, and I think we have it down.

PHYS448L: The lab will be tweaked again based on the exit interview. See below.

PHYS473L: This is a new lab, and the experiments were being fine-tuned and tested as we went along. Sometimes we didn't write a report for the lab, because it didn't work. Sometimes the write-ups were rewritten in response to real-time student experience.

Explain the results of the assessment activities.

PHYS140: N/A

PHYS141: N/A

PHYS270L: The students have been writing decent papers and getting meaningful numbers in the lab.

PHYS448L: See below.

PHYS473L: The students learned a lot about optics and taking measurements. The lab itself was a first draft.

4. Where applicable, outline the steps you will take to make improvements to the program based on the results of assessment activities identified in #3.

PHYS140: N/A

PHYS141: N/A

PHYS270L: We will not be changing the lab. We think it is where we want it.

PHYS448L: See below

PHYS473L: We will rewrite procedures and tweak the instruments. We have new equipment we will use next time also.

SUMMARY OF FINAL RESULTS & ANALYSIS

PHYS 140L & 141L

Fall 2017 Results

Additional questions (all linked to PLO4 and PLO5) added to the course evaluations asking how the students agreed or disagreed that they gained the ability to do the following in the introductory physics lab course, PHYS 140L:

1. I gained the ability to design and then conduct experiments
2. I gained the ability to analyze and interpret data
3. I gained the ability to formulate conclusions
4. I gained the ability to calculate, estimate, and assess experimental uncertainty
5. I gained the ability to compare experimental outcomes to theoretical predictions

Results:

1. 94.5% Agree or Strongly Agree
2. 95.0% Agree or Strongly Agree
3. 95.5% Agree or Strongly Agree
4. 94.5% Agree or Strongly Agree
5. 93.0% Agree or Strongly Agree

Closing the Loop on Assessment -> All benchmarks are met, we will continue to monitor assessment results of the introductory physics lab reports

Spring 2018 Results

The following three rubric criteria of the introductory physics lab report (rubric attached) with results are linked to these PLOs:

“Experimental Design” – 98% of the lab reports scored either “Good” or “Excellent” for this Criterion

“Data and Results” - 98% of the lab reports scored either “Good” or “Excellent” for this Criterion

“Discussion and Error Analysis” - 95% of the lab reports scored either “Good” or “Excellent” for this Criterion

Closing the Loop on Assessment -> All benchmarks are met, we will continue to monitor assessment results of the introductory physics lab reports

***More detailed results can be found in the AQUA results PDFs attached with this Summary.

PHYS 448L

This is a summary of the group "exit interview" we had in the last PHYS448 lab meeting, on May 1.

Summary-Lab

The students loved making the radio, and using the signal-hound equipment. They valued connections between class and lab. They were frustrated by logistics (parts, mess etc) Lab has been restructured with them in mind.

Summary-Class

Students want mini-lectures followed by worked examples. Also class demonstrations with actual numerical analysis.

I agree with their suggestions and have made appropriate changes.
Declan

What actually happened was that we met in the lab and had a detailed and ranging conversation about the lab and lecture course. We covered PHYS448 and PHYS448L. Here's the scoop.

First the lab.

Lab drawbacks

- the lab was too messy.
- some of you spent a frustrating amount of time looking for parts for the radio circuit.

Lab high points

- making a radio was cool
- making a transmitter was cool
- signal-hound equipment was great
- the RLC stuff was good to see in real life, after seeing it in class
- the atmosphere was good.
- simple write-ups was a major plus.

Suggested lab improvements

- some labs would be best as in class demos
- leave 10 minutes tidy up time at the end of class, and tie it to the grade

Improvements I actually will make

- the signal-hound scalar network analyzer and the spectrum analyzer will be used to characterize their radio resonator circuits and their transmitters. There will not be a lab devoted to it
- first six weeks is a sequence of common labs, with 5 or 6 setups. This solves the messy problem
- this sequence will be followed by a set of choose your own labs, each 2 weeks
- interested parties can have 4 weeks on the Fourier Methods setup.

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Explain the results of the assessment activities.

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