Departmental and Program Assessment
Annual Assessment Plan Report

Academic Year: 2011-2012

Academic Unit: Physics

Chair: Ann Wright

Student Assessment Plan (SAP) – Basic Check-list – If your answers are "yes" a question in this section, no further explanation is necessary.

1. Is there a current assessment plan for your department, program, or general education component? Current implies that this SAP is used by the department. It does not have to be rewritten unless your assessment plan has changed. It should be on the web at http://www.hendrix.edu/academics/academics.aspx?id=47328.

   ☑ yes ☐ no *If no, provide a timeline that will produce a plan by the end of the next academic year.*

2. Does the current SAP include student learning goals? Departmental/programmatic/general education component student learning goals should be able to stand alone as a list without pages of explanatory commentary.

   ☑ yes ☐ no *If no, provide a timeline that will produce student learning goals by the end of the next academic year.*

3. Does your SAP include a list of assessment data collected yearly? Assessment data lists should be able to stand alone without pages of explanatory commentary. Additionally, collected data should be of enough value to the department that it is read yearly. If not, it is probably not of sufficient use to collect.

   ☑ yes ☐ no *If no, provide a timeline that will produce an assessment data list by the end of the next academic year.*

4. Are student learning goals available to students on the web on the departmental/programmatic page(s)?

   ☑ yes ☐ no *If no, provide a timeline that will produce student access to the learning goals by the end of the next academic year.*

5. Are student learning goals, appropriate for each course, included in the course syllabi in your department or program?

   ☑ yes ☐ no *If no, provide a timeline that will produce student learning goals by the end of the next academic year.*

6. Does your SAP include direct assessments? "Direct" refers to evaluated student work.

   ☑ yes ☐ no *If no, provide a timeline that will produce a direct student assessment tool by the end of the next academic year.*

7. Describe which indirect assessments in your assessment plan have been collected for the year and which have not. "Indirect" refers to student surveys, interviews, or opinions.

   ☑ yes ☐ no *If no, provide a timeline that will produce an indirect student assessment tool by the end of the next academic year.*

- **samples of final examinations, laboratory reports, and student papers**
- **grades assigned to students,**
- **student evaluations of course content and value,**
- **senior comprehensive examination,**
- **student presentations at national meetings,**
- **Exit interviews**
- **success of graduates in obtaining graduate school acceptances, assistantships, or employment.**
- **student performance on standardized tests such as MCATs and GRE Physics Test**

Student Assessment Plan Development - Departments and programs who have a complete and current SAP should consider the next step in SAP development. *This could easily be the annual action item for your department or program (next section #5).*

1. As a next step in SAP development, departments/programs are encouraged begin working on an assessment audit to determine how student learning goals fit across the courses in the major. This could be as complicated as a full grid of student learning goals, or a single learning goal, across the courses in the major. (This has not been required of departments, but it is a recommended next step when the SAP is up to date.)

   ☑ yes □ no *If yes, please provide the results in either in prose or as a table.*

Learning Goals for Physics Curriculum

1) To provide science and non-science students with an introduction to both the methodology of the physical sciences and the major models of reality developed in the physical sciences.
   a) To provide all students with opportunities to understand and practice the methodology of the physical sciences.
   b) To provide students with a grasp of the historical development of models of the physical world, the experimental basis of these models, and how these models have impacted how humanity views reality.
2) To provide Biology, Chemistry, Physical Chemistry, Biochemistry/Molecular Biology and Mathematics students with the background in theoretical and applied physics necessary for their chosen field of academic specialization.
   a) Biologists and Chemists need to understand the physical laws of mechanics, electrodynamics, thermodynamics, and atomic physics that are crucial to their disciplines.
   b) Mathematicians need to see how mathematics is applied to the description of natural phenomena.
3) To provide physics majors with an in-depth study in the field of physics.
   a) A clear understanding of the experimental basis of all fundamental physical theories. They should understand the major theories and be able to explain how they follow from experimental results.
   b) A panoramic view of the field of physics with enough detail to enable them to easily make connections with new information in physics, and thereby more readily assimilate new information.

c) Undergraduate research. We feel that students don't really understand the nature of the field of physics until they have practiced it, reported their results at a meeting involving students from other institutions, and compared the quality of their work with that of students at other institutions. Since we consider ourselves a national liberal arts college, this comparison should be at the national level.

Learning Goal Matrix

	1a	1b	2a	2b	3a	3b	3c
PHYS 135 Robotics	✓	✓		✓	✓		
PHYS 160 Astronomy	✓	✓	✓		✓	✓	
PHYS 210 General Physics I	✓	✓	✓	✓	✓	✓	
PHYS 220 General Physics II	✓	✓	✓	✓	✓	✓	
PHYS 230 General Physics I (calc-based)	✓	✓	✓	✓	✓	✓	
PHYS 240 General Physics II (calc-based)	✓	✓	✓	✓	✓	✓	
PHYS 305 Waves & Vibrations	✓	✓	✓	✓	✓	✓	
PHYS 315 Modern Physics	✓	✓	✓	✓	✓	✓	✓
PHYS 320 Electrodynamics	✓	✓	✓	✓	✓	✓	
PHYS 330 Quantum Mechanics	✓	✓	✓	✓	✓	✓	
PHYS 340 Electronics	✓	✓			✓	✓	
PHYS 370 Thermal Physics	✓	✓	✓	✓	✓	✓	
PHYS 380 Classical Mechanics	✓	✓		✓	✓	✓	
PHYS 450 Directed Research	✓			✓	✓		✓
MATH 130 Calculus I	✓	✓		✓			
MATH 140 Calculus II	✓	✓		✓			
MATH 260 Differential Equations	✓	✓		✓	✓		
CHEM 110 General Chemistry I	✓	✓	✓		✓		
CHEM 120 General Chemistry II	✓	✓	✓				

Yearly Assessment Report – each department or program is expected to have assessment discussions for at least two hours each academic year. If necessary, help is available from David Sutherland, just call.

1. What was your planned action item identified in your last report?

   - re-evaluate the learning goals.
   - re-evaluate the Physics Major requirements

2. Briefly summarize the topics discussed in your annual assessment meeting. (If you have not met this year, why not and when do you plan to meet?)

The annual assessment meeting met on September 14, 2011 and January 27, 2012. Assessments topics included:

- Exit interviews
- Plans to add an Earth Science course based on the needs of the Education department and other students who need a Physics NS-L course for graduation requirement.
- Revisions to Physics major requirements
- Capstone
- Phased retirement plans for Bob Dunn

- Update letter for fifth department member request
- Changing the physics Honors awards
- Add topics course in General Relativity

3. What was the conclusion of your assessment discussion and how did the collected assessment data inform your conclusion? Specifically describe any curricular or programmatic changes that have been made that were based, at least in part, on the data in your SAP.

- We will continue to conduct and interpret exit interviews with graduating seniors in order to get feedback on the students' experiences in their major.
- We reviewed the learning goals for the major. We developed an alternative list of courses for the major that included electives such as Multivariable Calculus. We voted to keep the existing major.
- Bob Dunn will apply for phased retirement starting in Fall 2013 and continuing for three years.
- Bob Dunn will develop a course in Earth Sciences that satisfies the NS-L learning domain. He will teach the course for the first time in Fall 2013.
- We will update our letter to request a fifth department member.
- We will request a tenure-track position to replace Bob Dunn.
- We now strongly encourage all physics majors to take the GRE subject test as their capstone experience. We will offer a written exam to any student who wishes to improve their capstone grade based on the GRE results. We based this decision on exit interviews and GRE score data.
- We will change the Joe G Robbins Award to "excellence in the second year of physics courses" instead of "performance in sophomore physics classes".
- We will investigate the possibility of adding a new award for excellence in Undergraduate Physics Research in honor of Richard Rolleigh.
- Richard Rolleigh agreed to teach a topics course in General Relativity starting Spring 2012, with the next offering in two years.

4. What are the plans for improving student learning in your unit?

- Request a fifth department member for the department.
- Request a tenure-track replacement for Bob Dunn.
- Add an Honors Day award for Excellence in Undergraduate Research in honor of Richard Rolleigh.
- Add a new Earth Sciences course that satisfies the NS-L requirement.

5. Define at least one new action item for your unit that will be a goal of your assessment discussions next year?
(This action item could be to work on the SAP or on the assessment audit to correlate student learning goals with specific courses, described above.)

- Plan for adequate coverage of courses for the majors and the service courses over the next five years as Damon Spayde and Todd Tinsley prepare for sabbaticals and Bob Dunn prepares for phased retirement.
- Assess the algebra-based General Physics courses to make sure they are meeting the needs of students preparing for the new MCAT test format.