PROGRAM REVIEW UPDATE 2016-2017

Program: Physics & Astronomy

Division: MCEPS

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Audience: *Deans, Vice Presidents of Student Services and Academic Services, All Planning and Allocation Committees. This document will be available to the public.*

Purpose: *To document significant program accomplishments, plans and needs between Triennial Program Reviews. This update should provide a snapshot of your program.*

Uses: *This update will be used to inform the campus and community about your program. It will also be used in the processes of creating Dean's Summaries, determining College Planning Priorities and allocating resources.*

Time Frame: *This update should reflect on program status during the 2015-16 academic year. It should describe plans starting now and continuing through 2017-18.*

Topics: *The first section of this Program Review Update focuses on general program reflection and planning. The second, third and fourth sections focus on reflection and planning regarding Student Learning Outcomes. Only instructional programs need to complete Sections 2, 3, and 4.*

Scope: *While this Program Review Update does ask for some analysis of data, detailed data reports in the form of appendices should be reserved for the Triennial Program Review.*

Instructions:

1) *Please fill in the following information as completely as possible.*
2) *If the requested information does not apply to your program, please write "Not Applicable."*
3) *Optional: Meet with your dean to review this document before October 10, 2016.*
4) *Send an electronic copy of this form to the Program Review Committee Chair and your Dean by October 10, 2016.*

Part One: Program Snapshot

A. Have there been any significant changes to your program, your program's data or your program's needs since the previous Program Planning Update?

If there are any changes, describe the relevant information and its significance in the space below.

These changes might have originated from within the program or because of an external source (the institution or the state, for example). Possible sources of relevant information might include, but are not limited to, the following:

- Data generated by your program
- Data from the Office of Institutional Research (http://goo.gl/Ssfik2)
- CEMC Data
- Retirements
- State Mandates
- Labor Market Data
- SLO/SAO Data (http://goo.gl/jU2ylZ)

We have added more sections of Physics 8A, 8B, and 8C (based on increased enrollment and demand), and Physics 2A (due to the advent of the Engineering tech program). These extra sections have been facilitated by the addition of a second full-time instructor and a new adjunct instructor (Travis White). In Fall 2015 we had both headcount and enrollment of 173 students, up from 130 students in Fall 2014. In Spring 2016 we had 195 student enrolled, up slightly from 2015

enrollment of 189, and up significantly from spring 2014 enrollment of 120! Demographics have remained relatively constant with the exception of Latino students, where numbers have jumped from 22 in spring 2014, to 32 in 2015, to 41 in spring of 2016.

In spite of the larger enrollments, our course success rate has continued to climb, from 73% in spring 2014, to 80% in spring of 2015, to 82% in spring of 2016. Fall data did not necessarily reflect this same trend however, with success rates of 70% ,75%, and 69% Due to the relatively small sample size and differences between courses taught by full time and adjunct instructors.

Productivity has also been increasing in Physics with steady gains in both WSCH and WSCH/FTEF. for Fall those WSCH/FTEF rates are: 2013--441.8, 2014-- 474.2 and 2015- 532.1. For spring those rates are: 2014-372.6 2015-380.3 and 2016-407.8

In Astronomy courses no consistent trends have been observed. Enrollment and WSCH/FTEF have held relatively steady with WSCH/FTEF numbers between 500 and 600 varying significantly from one semester t to the next.

B. What objectives, initiatives, or plans from the 2015 Program Review Update have been achieved and how? PRUs from 2015 are available here: http://goo.gl/9iF3m9

Equipment from our Fall 2015 Instructional Equipment Request has arrived and has helped facilitate smaller lab group sizes and more hands-on student interaction during physics labs. Additionally, with this grant we were able to purchase a smaller and more portable telescope for astronomy classes that we can more easily move to various dark-sky locations.

We have continued our efforts to develop new labs for the Physics 8 series. Specifically, several inquiry-style labs have been developed and implemented for Physics 8A and 8B over the past year. The purpose of these labs is to give students more control over their learning in the lab classroom and provide them with first-hand experience using the scientific method to design, implement, and assess their own physics experiments.

C. Discuss at least one example of how students have been impacted by the work of your program since the last program review update (if you did not already answer this in Question B).

See question B above. Student surveys have reported greater satisfaction with the physics lab experience with the inclusion of inquiry based labs. Completion and success rates in the sections where these labs have been implemented have also been correspondingly higher than in past years, particularly in courses formally taught by adjunct instructors and now taught by Dr. Rehagen and Dr. White.

D. What obstacles has your program faced in achieving objectives, initiatives, or plans?

Our laboratory technician has increased demands on his time but no increase in paid hours. The number of sections of physics (and engineering) have nearly doubled since the 10-month laboratory technician position was developed, and our lab tech's time is spread exceedingly thin. We submitted a request that our physics & astronomy laboratory technician's job be changed to a 12-month position, but we were not successful in obtaining this extra time.

We are also continually frustrated with the lack of a suitable permanent location on campus to house our telescope dome and allow students to carry out astronomy laboratory activities. Although a good site on campus has been identified, we are now worried that this last remaining on-campus, dark-sky site will be engulfed by increased campus light pollution caused by new building projects funded by the Measure A bond money.

E. What are your most important plans (either new or continuing) for next year?

- We plan to update all course outlines in the Physics department in the following order: Physics 8A,8B,8C,8D, Physics 2A, 2B, Physics 10 and Physics 10L.
- As part of the course outline update, we plan to address the concern about the current suggested order of the physics 8 series classes. Although students can take classes in either order (Physics 8B and then 8C, or Physics 8C and then 8B) the math requirement for physics 8B is higher than that of 8C (Math 3 rather than Math 2). We plan to resolve this issue by either changing the numbering and lettering of the course (i.e. 8A, B, C, D to 1A,1B,1C, and 1D with 8B mapping to 1C, and 8C mapping to 1B), or by removing the higher math requirement for physics 8B. In either cases, course outlines will be modified as necessary.

- We will update course outlines for all astronomy courses (Astronomy 10, Astronomy 20, and Astronomy 30). As part of our update, we are strongly considering adding one or more prerequisites to astronomy 10 and astronomy 20 to address the increasing number of students who are under prepared for the critical thinking, and mathematical reasoning that astronomy requires. Although only a few sections have captured SLO data, less than 67% of students completed the class with above average performance on the SLO assessment.

- Over the coming year, we plan to continue to develop new labs for our Physics 8 series, with the long-term goal of creating a standardized lab manual for students. Similar versions of these labs will be suitable for the physics 2 series, and look forward to working with adjunct instructors to facilitate their use. We believe that these new labs will help improve student learning in the classroom, and that a standardized, comprehensive manual (with separate implementation instructions for teachers) will help alleviate confusion and frustration felt by instructors and the lab technician that is currently caused by the existence of multiple versions of similar labs. Due to the enormous workload of our lab tech and the lack of spare time for our full time instructors, such as lab manual has been slow to appear; however, we have been making some progress!

- We also have plans to create an online catalog (with pictures and a short description) of all the physics demos and lab equipment available at LPC, organized by physics subject. This would be invaluable to instructors as a resource to get ideas for lecture demonstrations and laboratory activities. We also plan to improve organization of storage areas for physics and astronomy equipment (including shelving and labeling).

- We would also like to improve enrollment continuity between physics classes in the 8ABCD sequence. Of particular significance is the rate of student attrition in some sections of physics 8A (higher than the usual attrition rate) which then propagates as low enrollment for physics courses later in the sequence. Due to seniority rights, adjunct instructors who are more successful at getting students through our physics program have not been consistently offered physics 8 sections. In addition to working with our dean to best fulfill our staffing needs within the bounds of the faculty contract, we (Dr. Rehagen and Mr. Harpell) welcome the opportunity to work with <u>all</u> adjunct instructors to improve student satisfaction and success.

- We plan to finally identify a dark sky location on campus property and move the astronomy dome there and repair the telescope within or resolve to live the situation as is and adjust by improving or replacing existing facilities and equipment.

F. Instructional Programs: Detail your department's plans, if any, for adding DE courses, degrees, and/or certificates. For new DE degrees and/or certificates (those offered completely online), please include a brief rationale as to why the degree/certificate will be offered online.

We do not plan to add any new DE courses, degrees, or certificates.

G. Do plans listed under Question E or Question F connect to this year's planning priorities (listed below)? If so, explain how they connect.

Planning Priorities for 2016-17 iu

Yes, our plans align with this year's planning priorities as identified below:

- ***Establish regular and ongoing processes to implement best practices to meet ACCJC standards***
  We hold regular department meetings to discuss improvements in the physics labs.
- ***Provide necessary institutional support for curriculum development and maintenance***
  We continue our ongoing efforts to organize and catalog the physics equipment to facilitate lecture demonstrations and lab activities.
- ***Develop processes to facilitate ongoing meaningful assessment of SLOs and integrate assessment of SLOs into college processes***
  Our frequent discussions in monthly meetings and while working on program review help us improve the SLO process and make it more meaningful for both instructors and students.
- ***Expand tutoring services to meet demand and support student success in Basic Skills, CTE and Transfer courses.***
  While our plans detailed in Question E do not specifically reference this, we are continuing to make an effort to recommend successful students to apply for physics tutoring positions at the Tutorial Center (which is notoriously understaffed in terms of physics tutors).

H. Instructional programs: Did your program meet its program-set standard for successful course completion? __X__yes _____no

(This data can be found here: http://goo.gl/Ssfik2)

If your program did not meet your program-set standard, discuss possible reasons and how this may affect program planning or resource requests.

Both the physics and astronomy programs met their standard.

I. Units with SAOs: Using SAO data from last year, describe the impacts of SAO practices on student learning, achievement, or institutional effectiveness. Describe the practices which led to the success. (Copy the box below if you would like to discuss multiple examples). SAO data can be found here: http://goo.gl/jU2ylZ

SAO:
Describe the quantitative or qualitative results:
Discuss any actions taken so far (and results, if known):
Discuss your action plan for the future:

Part Two: Course-Level SLO Assessment Schedule

THIS SECTION HAS BEEN REMOVED. PLEASE SKIP TO PART THREE.

Part Three: Assessment Results

(Instructional Programs Only)

1. Describe an example of how your program used **course SLO data (SLOs)** from last year (2015-16) to impact student learning or achievement. (Copy the box below if you would like to discuss multiple examples).

Course: Physics 8A
Course SLO: Analyze physical situations quantitatively by selecting relevant equations and models, modifying them as appropriate, and using them correctly to solve problems.
This data indicates that student results are fairly well distributed across the continuum, with well over 60% of the students succeeding at A or B levels (Mastery and Above average), and less than 10 percent of students at a D level (below average) or below. Note that while these scores correlate well to course grades, this SLO does not take into account performance on laboratory activities and therefore paints a slightly lower than accurate picture of overall student performance.
Discuss any actions taken so far (and results, if known): The laboratory curriculum is being revised to include more inquiry-based labs as mentioned earlier. Research has shown that such laboratories have a positive effect on overall student performance. SAO results will be available in the next program review cycle.
Discuss your action plan for the future: We will likely include an SLO that reflects student success in the physics laboratory. In addition, our SLO for Fall 16 will be incorporated into future planning.

2. Degree/Certificate granting programs only: Describe an example of how your program used **program-level SLO data (PSLOs)** from last year (2015-16) to impact student learning or achievement. (Copy the box below if you would like to discuss multiple examples).

Degree/Certificate: Physics - AS
Program SLO: Analyze physical situations quantitatively by selecting relevant equations and models, modifying them as appropriate, and using them correctly to solve problems.
Describe the quantitative or qualitative results: Already discussed in section “I” of part I. No other changes were proposed as our targets were largely met. Awaiting SAO data for Fall of 16 which will include a much larger population of physics students than in past semesters.
Discuss any actions taken so far (and results, if known): None other than already mentioned.
Discuss your action plan for the future: We will continue to meet regularly to discuss the laboratory environment, continuity between Physics 8 series classes, and methods to introduce innovations from the physics 8 series to the physics 2 series.

Part Four: Program Curriculum Map
(Instructional Programs with Degrees/Certificates Only)

Background: Program-level Student Learning Outcomes

Program-level Student Learning Outcomes (PSLOs) are defined as the knowledge, skills, abilities, or attitudes that students have at the completion of a degree or certificate. Faculty within a discipline should meet to discuss the expected learning outcomes for students who complete a particular series of courses, such as those required for a certificate or a degree. PSLOs should be the big things you want students to get out of a degree or certificate. PSLOs should be developed throughout the program and in multiple courses. Discussions might also involve colleagues in other programs regarding prerequisites and transfer courses or community stakeholders regarding job expectations.

It is recommended that each program have 3-6 PSLOs. Discipline faculty members might need to have a more comprehensive list based on the requirements of external stakeholders (employers, state requirements, etc.). For most programs, PSLOs are only assessed through linked course-level SLOs. You might assess PSLOs in a capstone project or capstone course that many students complete when earning a certificate or degree. Alternatively, you could assess development of a set of skills as students advance through different courses in your program (ENG 1A -> ENG 4 or 7).

Program-level outcomes should

1. **describe** what students are able to do after completing a degree or certificate;
2. be **limited** in number (3-6 outcomes);
3. be **clear** so that students and colleagues can understand them;
4. be **observable** skills (career-specific or transferable), knowledge, attitudes, and/or values;
5. be **relevant** to meet the needs of students, employers, and transfer institutions;
6. be **rigorous** yet realistic outcomes achievable by students

Curriculum Map Directions

Note: If you have multiple degrees/certificates, choose one to map. If you have already submitted mapping to the SLO committee and do not wish to make changes, you may copy that mapping into this chart or attach the map you already created.

1. In the boxes across the top row, review all the non-GE courses required for your degree/certificate. (including those that aren't in your discipline). Make any desired changes to those courses. (Electives do not need to be included, though they may).
2. In the left column, write the program learning outcomes you have drafted for your program.
3. In the boxes in the center of the page, mark the course SLO that maps to the program SLO you have identified. Each program SLO should map to multiple courses in your program.

Example: English Associate's Degree for Transfer						
Program Learning Outcomes	**Required Courses in Degree/Certificate**					
	Eng 4	Eng 7	Eng 35	Eng 41	Electives* (Eng 20, 32, 45, 44)	MSCM 1*
1. Identify and evaluate implied arguments in college-level literary texts.	x					
2. Write an academic essay synthesizing multiple texts and using logic to support a thesis.	x	x				
3. Write a research paper using credible sources and correct documentation.	x	x				x
4. Analyze an author's use of literary techniques to develop a theme.			x	x	x	

*Including electives is optional.

Your Program's Map

Physics AS Degree						
Program Learning Outcomes (3-5 recommended)	**Required Courses in Degree/Certificate**					
	Phys 8A	Phys 8B	Phys 8C	Phys 8D		
1. Analyze physical situations quantitatively by selecting relevant equations and models, modifying them as appropriate, and using them correctly to solve problems.	x	x	x	x		

1. Did you make any changes to your existing mapping? (circle one)

Yes (No) This degree/certificate did not have previous mapping

2. If you answered "yes" to Question 1, explain what changes you made.

3. Reflection Questions: The following questions are for the consideration of your program as you look at your completed chart. You do not need to record your responses here. If you discuss these questions with others (for example, at a department meeting), you may want to take minutes documenting your discussion.

a. How many courses help students achieve each program outcome? Do students have enough opportunities to achieve the outcome?
b. In which course(s) are students likely to demonstrate satisfactory achievement of each program outcome? In other words, which courses(s) might be an official or unofficial capstone requirement?