

2021-2022 Program Review



CAN Program Review (Instructional) - Astronomy & Physics (Fall 2021)

STEP 1: Program Review Narratives

2021-2022

Instructional Program Review (IPR)

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Program Context

1. Mission: The Physics & Astronomy Department endeavors to prepare students for successful transfer to four-year institutions, to provide the prerequisite foundation in physical sciences for further work in engineering and the sciences, as well as radiologist technologists, to foster critical thinking and active learning, and to fulfill the needs and interests of students by having a well-rounded curriculum of lecture and laboratories.

2. Articulation: No known changes.

3. Community & Labor Needs: No known changes.

Looking Back

4. Curricular Changes: All physics and astronomy courses were adapted to be fully online capable as of Fall 2020. All course modifications have been approved. Some courses are offered in a synchronous format and others in an asynchronous format. Starting in the Fall 2021, some courses are offered in an online-in-person optional format. This is an on-going development for the spring 2022.

5A. Progress Report - IPC Feedback: On both the Physics and the Astronomy side our prior program review, our last feedback asked us to focus on our goal of increased female retention. Due to the crisis introduced by COVID since then, our primary efforts were on student retention in general. Our analysis of the net result, as well as our plan to refocus on the female retention are described below.

5B. Progress Report - Prior Program Goals: The primary goal is to increase participation/representation and retention of women and minorities in physics. The onset of Covid 19 disrupted much of that effort. The on-line learning environment was new to many of our students. We attempted to mitigate that by maintaining a regular presence on-line so that our students would not feel isolated. Through the fall of 20 and spring of 21, the students seemed to adapt to the on-line instruction. The data on which students have adapted and which have withdrawn is not yet conclusive. Thus the student population is in flux and it is difficult to make comparisons with pre-Covid 19 data. Therefore the goal of increased participation/representation and retention of women and minorities in physics will continue to need attention.

6A. Impact of Resource Applications: As of October, 2021 Physics has been approved to relocate from rooms 16-106 and 16-108 to rooms 16-204 and 16-212. This move clears the way for Engineering as well, who are looking to restructure the first-floor labs. We will be using the two labs to run our multiple classes (e.g. 250, 260, and 270) with student-need based scheduling and better coordinated equipment setups with less conflict.

For physics equipment, some of our resource requests have yet to be fulfilled, most crucially the PASCO technological update, since the old equipment no longer has any support/replacement availability. We are asking for expedited approval and procurement.

On the Astronomy side, the new Observatory (BLDG 23) commenced operational status in October of 2019. Some fixes had to be made (the flooding issue was not remedied for over a year).

This use was largely interrupted by the pandemic. We resumed operations in the Fall of 2021, and are looking forward to expanding access beyond our own classes.

6B. Impact of Staffing Changes: Not applicable.

Current State of the Program

7A. Enrollment Trends: In our analysis of the pandemic impact, and recovery efforts between 2019-2020 and 2020-2021 for

Physics-Astronomy the enrollment ratio in our department of female-to-total class declined (from 45% to 42%). This was due to a slight decline in female student enrollment versus a considerable increase in male students.

In the same time period course retention increased for females from 80 to 82% and for males from 82 to 87%.

Course success rate increased for females from 71 to 74% and for males 70 to 75%.

For program course enrollments averaged over the last six years, the rate of changes are as follows:

All: -3.95% per year (All College -4.33%)

Female: -7.42% per year (All College -4.66%)

Male: -1.20% per year (All College -3.86%)

Latinx: -1.17% per year (All College -6.33%)

All except White and Asian: -0.57% per year (All College -4.52%)

White: -10.18% per year (All College -5.92%)

Asian: +1.58% per year (All College +0.63%)

The significant drops in White and Female groups occurred mainly in the time frame 15-16 to 18-19 and have been relatively stable the last few years.

White Female: -10.45% per year (All College -5.94%)

The above data suggest that program enrollments are similar to that college as a whole and for the male population.

The program has had a significant decrease in the female student population relative to the college. The program has also had significantly less of decrease in the Latinx population relative to the college as a whole.

7B. Significant Changes in Your Program: In terms of student demand there are no changes expected outside of expected enrollment. There was some drop in enrollment in some courses due to the suddenness of change in modality back to offering in-person classes from Spring to Fall 2021. We are not expecting this to be an issue moving forward.

In terms of course mode, online, in-person, in-person-optional, we are studying what works best for the students. We are working with a schedule to make available multiple options for students at this point.

7C. Planning for Your Program: The changes that we are studying are to the delivery mode in terms of what the students want and what they are successful at. So far it is anecdotally evident that students like the flexibility of the online environment. Additionally, online technologies have helped disabled students access course material, class notes, recordings etc.

We propose to develop a survey instrument (with the office of PRIE) to ascertain what is working for the students and what offering/modalities the students would most likely want to use. At the same time we plan to maintain a flexible mode of education to support the most vulnerable students.

Two significant challenges for the program in the online environment. 1) Labs - The hands on component has been seriously compromised. 2) Exam- Evaluation- The online environment makes it hard to know who is taking an exam and under what circumstances.

Our plan the labs is to utilities and/or develop innovative ways to engage students in on-line labs and provide the students some experience laboratory processes (e.g. use of tools and measurements) and physical phenomena.

The exam problem will take more research to determine the best way to evaluate student learning.

Proctorio seems a bit impractical for Physics and Astronomy purposes (e.g. use of calculator, formula sheets.)

8A. Access & Completion: Overall success and withdrawal rates for the department remained steady. However the particular success rate changes per course were widely varied, due to the sudden change in modality and subsequent changes in withdrawals in the Spring of 2020. The uptick in online success rates was expected as a result of students forced into the modality during the 2020-2021 academic year.

8B. Student Equity: Female students continue to be some of our most vulnerable population, especially in physics. Most of the decline is precipitated by enrollments (which our department has little control over). Our department's increase in retention and success rates for all sexes are comparable, though we are committed to refocus our efforts to boost success rates that may feed back into enrollments. We will continue to work with other departments to increase interest in physics, computer science, and

engineering, but most of our work will be done once delivery modalities are stabilized.

In terms of success, over the past 6 years the student success rates have change as follows:

Females- From 68% to 74%

Males- From 60% to 75%

Latinx – From 61% to 69%

All except White and Asian – from 60% to 70%

White – From 68% to 75%

Asian- From 70% to 85%

The program success rates are similar to the college as a whole.

8C. Completion - Success Online: In the last available data year of 2020-2021 all courses for this department were delivered online/virtual synchronous due to COVID. Comparison with in-person classes is not applicable.

9A. SLO Assessment - Compliance: All PHYS and ASTR courses have all their SLOs assessed (2021).

9B. SLO Assessment - Impact: Due to the dynamic nature of adjusting to online and hybrid educational modalities for both the faculty and student, no significant conclusions can be drawn from SLO assessment. Both delivery methods and assessments (on which our SLO evaluations depend) had to be changed, and hence the numbers cannot be fairly compared against previous SLO results.

Moving forward we will resume a comparative analysis of our SLOs and any responsive actions, once the modalities of delivery and assessment, as well as scheduling have stabilized.

10. PLO Assessment: Due to the dynamic nature of adjusting to online and hybrid educational modalities for both the faculty and student, no significant conclusions can be drawn from PLO assessment.

Program Review Narrative Status: Complete

Goal Description: Update old equipment: 8" telescopes

Old telescopes that are awkward to setup and operate need to be decommissioned/donated, and replaced by more modern, easy to use equipment.

This goal, and its resource request have been approved several years ago, but never completed.

3 replacement telescopes have been requested, and approved, but only 1 has ever been procured.

Goal Status: 2 - Continuing (PR)

Relevant Program Review Cycle: 2019-2020, 2021-2022

Estimated Start Date:

Estimated Completion Date:

Who's Responsible for this Goal?: Attila Elteto

Please select the college goals with which your program goal aligns.: Community Connections - Build and strengthen collaborative relationships and partnerships that support the needs of, reflect, and enrich our diverse and vibrant local community.

Please select the college strategic initiatives with which your program goal aligns.: Improve Student Completion, K-12 & Adult School Partnerships, Hold On-Campus Events

Action Plans

2018-2019 - Acquire and test new Meade LX 200 telescopes. Free up storage from old, outdated 8" Orion telescopes (perhaps donate them to other schools).

There were three Meade 8" LX200 telescopes approved, the first one of which was acquired and tested in the fall of 2018. The remaining two will be acquired and tested by the end of Spring, 2019. (Active)

Who's Responsible for Completing this Action Plan?: Attila Elteto

Estimated Completion Date: End of Spring, 2019.

Resource Requests

Two Meade LX200 ACF telescopes.

<https://www.meade.com/catalog/product/view/id/26/s/lx200-acftm-telescope-8-f-10/category/2/> - In 2018 this request was

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approved for three replacement telescopes for our out-of-date Orion telescopes. Only one was delivered due to delays caused by the increased burden of designing, and testing the new Astronomy Observatory sheds to accommodate their new storage and use. We are re-filing the request now that the sheds and piers are ready for their use.

Status: Continued Request - Active

Type of Resource: Equipment (Items Over \$5000)

Cost: 8000

One-Time or Recurring Cost?: One-Time Cost

Critical Question: How does this resource request support closing the equity gap?: Updated equipment increases accessibility and ease of use for class use and community events.

Critical Question: How does this resource request support Latinx and AANAPISI students?: Updated equipment increases accessibility and ease of use for class use and community events.

Resource Priority Ranking: Medium Priority

Goal Description: Increase retention of women and minorities in physics and astronomy

In the past Physics faculty have worked with IWITTS to assess class climate, and test strategies for increased retention of women in physics. The IWITTS program had a long term plan to first assess class climate (level of comfort, participation rate, etc.) as well as the role of the instructor (what strategies increase or decrease these) for students in the classroom. Some of these strategies (awareness, group work, relatability of content, etc.) are already being tested in both physics and astronomy.

Update 2020-2021: in the current dynamic environment we are evaluating the effectiveness of class modalities, as well as assess the needs of our underrepresented populations. We will continue offering multiple modalities of our courses for maximum student choice, while continuing to work with student services to update the support structure for student success.

Goal Status: 1 - New (PR)

Relevant Program Review Cycle: 2019-2020, 2020-2021, 2021-2022

Estimated Start Date:

Estimated Completion Date:

Who's Responsible for this Goal?: Martin Partlan

Please select the college goals with which your program goal aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success.

Please select the college strategic initiatives with which your program goal aligns.: Improve Student Completion, Connect Students with Internships and Mentorships, Implement Guided Pathways, Promote a Climate of Inclusivity

Goal Description: Replace out-dated PASCO equipment for Physics-Astronomy

The PASCO equipment used by Physics-Astronomy is no longer supported by the company and its core, the GLX units are breaking down. We need to update to hardware supported by PASCO. These equipment are used extensively in all our physics classes and some in astronomy.

(update 2021) As our students are returning to campus we are requesting that this procurement be expedited, as our aging equipment is failing more frequently.

The PASCO equipment is used by PHYS 210 and 250 (mechanics equipment, such as force and motion sensors), 220 & 260 (E&M equipment, circuit and magnetic sensors), and 270 (thermal and optics equipment).

Not fulfilling this replacement would result in our college falling behind minimum lab equipment necessities, and widen the equity gap with other, better equipped colleges.

Goal Status: 1 - New (PR)

Relevant Program Review Cycle: 2020-2021, 2021-2022

Estimated Start Date: 01/01/2020

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Estimated Completion Date: 12/31/2021

Who's Responsible for this Goal?: Attila Elteto

Please select the college goals with which your program goal aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success., Organizational Development - Focus institutional resources on the structures, processes, and practices that invest in a diverse student population and prioritize and promote equitable, inclusive, and transformative learning.

Please select the college strategic initiatives with which your program goal aligns.: Improve Student Completion, Hold On-Campus Events, Promote a Climate of Inclusivity, Institutionalize Effective Structures to Reduce Obligation Gaps

Action Plans

2020-2021 - Outsource outdated PASCO equipment that the company no longer supports and replace it with their new core and sensors. (Active)

Who's Responsible for Completing this Action Plan?: Attila Elteto, Martin Partlan

Estimated Completion Date: Summer, 2020

Resource Requests

16 units of

Spark Datalogger

<https://www.pasco.com/products/interfaces-and-dataloggers/ps-3600>

Also 16 units each of:

Sensors: Photo gate, Magnetic field sensor, Motion sensor, Thermometer, Force Acceleration, Voltage, Current, Light - The GLX unit by PASCO at the core of many of our Physics labs (and including some in Astronomy) is being discontinued by the company. We need to update the hardware that supports the new sensors they now produce. It also means we need to acquire the new sensors that are compatible with their new system.

Status: New Request - Active

Type of Resource: Equipment (Items Over \$5000)

Cost: 17000

One-Time or Recurring Cost?: One-Time Cost

Critical Question: How does this resource request support closing the equity gap?: Modernizing our equipment makes our labs more accessible to all students. If we don't replace this equipment we will be out of options for lab equipment use experience for minority students, who have few other options, hence widening the equity gap.

Critical Question: How does this resource request support Latinx and AANAPISI students?: Modernizing our equipment makes our labs more accessible to all students. If we don't replace this equipment we will be out of options for lab equipment use experience for minority students, who have few other options, hence widening the equity gap.

Resource Priority Ranking: High Priority