Physics
PROGRAM REVIEW REPORT
2014 - 2015

Faculty and Staff (List all)

Full Time	Adjunct	Support Staff
Ramos, Gloria	Cheung, Kwun	
Riderer, Lucia	Theiling, Mark	

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I. Executive Summary

Program Description:

Physics, a natural science, is the scientific study of matter and energy and of the interaction between the two. It provides students with an understanding of the physical world both conceptually and in the language of mathematics. Courses in physics satisfy general education requirements for the associate degree and lower division transfer and can fulfill some of the major requirements for the associate degree in Biological and Physical Sciences and Mathematics. Courses in physics are offered in the day and evening.

Strengths/Effective Practices:

Faculty engage in thoughtful reflection on student success and course curriculum. The program also benefits from the department commitment to research opportunities which include local outreach that increases interest and enrollment in our program for students from our local feeder school districts. Research opportunities include: rocket team, balloon team and the car team (with students from automotive). Outreach activities by our students and/or faculty include: Physics Festival (PHYS 201/202/203 students every Fall and Spring semester), the Secrets of Science Summer Camp, and outreach associated with the RISE teams. Our faculty is also involved in the Summer Research Experience for Undergraduates Program, which places Citrus students at nearby 4-year institutions and companies to conduct research. The faculty has also participated in pedagogy groups with other NPS faculty such as Faculty Inquiry Groups (FIGs) and the informal “brown bag lunch” discussions; these groups promote discussion and innovation in teaching and learning techniques.

Faculty continually review labs and assigned projects/curriculum to enhance student understanding and engagement:

a. Students in PHYS 110 were required to design and build a mousetrap car to capture their interest and create enthusiasm for physics and its applications.
b. PHYS 110 labs were re-written to be more engaging for non-science students using “real life” scenarios such as accident investigations.)
c. PHYS 201 students designed and built mechanical toys/games following proposal submission procedures and to meet minimum industry standards. In addition to applying physics concepts from class to a real world application, the students also gained experience in writing and submitting research proposals, meeting deadlines, and presenting their work to peers and the community.

d. PHYS 202 students designed and built fully functional electrical buildings/structures; the students also gained experience in presenting their work to peers and the community.
e. PHYS 203 students participated in research and application of physics concepts from class which were then presented in professional-style posters. They gained experience in presenting their work to peers and the community.
f. PHYS 220A students participated in year-long team-based engineering projects that culminated with partcipation in national and international intercollegiate competitions.

Weaknesses/Lessons Learned:

The physics course offerings for non-science major/general education students are currently limited to only PHYS 110 (a lab-based survey of physics course); this course has issues in meeting student needs. Additionally, there are no general education physics classes offered without a lab and no classes with an honors section.

Classroom space for studio-style (combined lecture and lab) physics instruction and/or for group work during lecture as required by good physics education pedagogy is currently not available.

Recommendations/Next Steps:

If budgeting allows, reactivating PHYS 105 (Physics of Film) or creating an alternative such as Physics & the Arts could fill the gap in course offerings for non-science majors.

Further discussion with other stakeholders is necessary to address the concerns about PHYS 106 and PHYS 110, especially in regards to the feasibility of a new course for STEM majors. PHYS 106 has been deactivated and will not be offered in the foreseeable future. A new PHYS 110-level physics course is not practical given the STEM degree requirements.

Classroom space for studio-style (combined lecture and lab) physics instruction and/or for group work during lecture would require a remodel of current lab space or a remodel of a classroom such as PS 106.

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II. Curriculum

Course Number and Title (Courses must be reviewed every six years to remain active)	Date of last Curriculum Committee Review	2013-2014 Course offerings By Term and # of Sections				SLOs Assessed (Semester / year)
		Summer	Fall	Winter	Spring	
PHYS106 Physical Science for Educators	**S11**	0	0	0	0	**n/a**
PHYS110 Intr to Coll Physics	**F10**	3	6	3	6	**Spring 2014**
PHYS111 Physics for Life Sciences I	**F09**	0	0	0	0	**n/a**
PHYS111C Physics for Life Sciences I Calculus Supplement	**S11**	0	0	0	0	**n/a**
PHYS112 General Physics	**S11**	0	0	0	0	**n/a**
PHYS201 Physics: Mechanics	**F11**	0	3	0	3	**Spring 2014**
PHYS202 Physics: Electromagnetism	**S12**	0	0	0	2	**Spring 2014**
PHYS203 Physics: Optics & Thermo	**F11**	0	2	0	0	**Fall 2013**
PHYS 220A Introduction to Research in Physics					1	**Spring 2014**

III. Degrees and Certificates

Title	Type	Date Approved by Chancellor's Office	Number Awarded 2011	Number Awarded 2012	Number Awarded 2013	Number Awarded 2014
Biological and Physical Sciences (and Mathematics)	**AS**	1950	212	224	277	373
Liberal Art: Math and Science	**AA**	2009	23	19	18	93
Physics	**AS-T**	2013			6	15

TYPE: **AA** = Associate in Arts **AS** = Associate in Science Degree **C** = Certificate **S** = Skill Award
AA-T = Associate in Arts for Transfer **AS-T** = Associate in Arts for Transfer

IV. Sections Offered

Review the data sheet for section counts, which includes the following information by course category:

1. Section counts
2. Enrollment by student demographic
3. Success and retention

Provide a brief narrative analysis and describe any trends or concerns you noticed.

Section counts in Physics have remained strong over the last several years despite the reductions in budgetary augmentation and student population across campus. This reflects the need to alleviate a pre-existing bottleneck in GE Science courses that interfered with student transfer and graduation.

Course offerings in the morning, afternoon, and evening sections allows the department to provide coursework for a diversified student body.

V. Student Demographics

Review the data sheet for program enrollment, retention, and success which includes data on these metrics by student demographic

Provide a brief narrative analysis and describe any trends or concerns you noticed.

Observations and comments about course, program and college level data can be made below.
For Winter 2014, the only course offered was PHYS 110 – the student ethnic demographics closely resembled that of the college population. However, in terms of gender the number of male students was about three times as high as female students. This seems to be true for the last few winter sessions, but we don't see this disparity in the summer sessions. Success and retention rates in winter were slightly higher than the college's. Although the retention rate for female students was high (91%), their success rate was only 73% - lower than both male counterparts and the college average.

For the Spring 2014 semester, retention rates were consistent or higher than the college average. Success rates were higher than the college average except for Black students. However, there were only 2 self-declared Black students so their success rate is not comparable. It would be more valuable to have success and retention rates for general education students (PHYS 110) separated from those of the majors students (PHYS 201, 202, and 203). Enrollment seemed consistent in both winter and spring semesters.

The total number Physics AS-T degrees awarded has increased by 150%. There was a significant increase in the number of Physics AS-T degrees awarded to Hispanic students (from 1 to 6). There was a mild increase in the number of Physics AS-T degrees awarded to female students. Across all physics courses, Black student population is significantly under-represented compared to the college population.

VI. Student Accomplishments

Provide current, interesting information about accomplishments of students who have participated in this program.

The physics students participated in outreach activities with middle school students during Science Summer Camp activities. (Summer 2014)

a. The physics students participated in the Physics Festival. (Spring 2014)
b. A team of physics students prepared a proposal which was submitted and accepted for participation in the NASA University Student Launch (SLP). Once their rocket and scietific payload was designed and built, they launched the rocket in Salt Lake City, UT during the SLP Competition. They recovered the rocket and the payload, analyzed the data, and prepared a final report that was submitted by the team to NASA for their review. Throughout the program, the team provided outreach activities to the local communities. See this site for more information: http://www.nasa.gov/offices/education/programs/descriptions/Student_Launch_Projects.html (Spring 2014).
c. A team of physics students prepared a proposal which was submitted and accepted for participation in the Shell Eco-marathon competition. Once their high efficiency vehicle was designed and built, they competed in Houston, TX. Throughout the program, the team provided outreach activities to the local communities. (Spring 2014)
d. Physics students were selected to participate in the Summer Research Experience programs at CalPoly Pomona, Chapman University, JPL, City of Hope Hospital Botanical Gardens in Santa Ana and CalState Fullerton. (Spring 2014)
e. Many Physics students have transferred to both public and private 4-year universities in various STEM majors.
f. Two physics students are participating in the JPLUS program through November 2014.
g. Ten physics students were awared STEM-Edison scholarships in Summer 2014.
h. Three RISE Teams presented at the Chinese Institute of Engineers CIE-Socal STEM Competition; two of the teams placed 1st and 3rd in the Oral Presentations and one of those won the Poster Competition award. (March 2014)
i. One RISE team won the Outstanding Abstract Award at the Honors Transfer Community College Council Conference. (April 2014)
j. Rocket Owls were selected to present at the California Space Science Consortium (April 2014)

VII. Student Learning Outcomes Assessment Reflection

Academic Senate Approved 4/11/12

All SLOs for every course will need to be assessed at least once within the 5-year comprehensive program review cycle. Upon reflection with program colleagues (or self-reflection for programs with only one instructor), please provide a brief narrative to the following (at least one row for one SLO needs to be completed for each course at this time):

Complete SLO assessment and analysis in the table at:
http://intranet/SLO/Pages/default.aspx

DOCUMENT REFLECTION DISCUSSION BELOW (FOR BOTH SUMMER/FALL 2013 AND WINTER/SPRING 2014)

The students in PHYS 110 performed a little below instructor expectations, particularly in synthesizing various concepts as they applied to the project. In the future, the instructor will ensure the instructions are understood.

PHYS 201 performed below instructor expectations in the formal lab reports – mostly due to incomplete conclusions. Tips on writing formal lab reports used in PHYS 203 will be shared by both PHYS 201 and PHYS 203 instructors providing a consistent experience for the students.

The students in PHYS 202 did not meet the requirements for the research poster, even with given guidelines. In the future, the instructor will emphasize the professional science poster expectations for this project.

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VIII. Progress toward previous goals

During 2013-2014, we accomplished:

	Previous Goals	Progress/ Persons Responsible	Status	Institutional Goal
Goal 1 2011 2012	100% lab tech personnel	Person Responsible: Eric Rabitoy We currently have Kateri McKinney for 50%	I	3.1.4
Goal 6 2011 2012	Evaluate feasibility of offering PHYS 203 as an 8-week summer course	Gloria Ramos has surveyed 202 students to determine demand for the course; current budget may not allow offering this in the summer. Person Responsible: Gloria Ramos	P	1.1.1
Goal 7 2011 2012	Evaluate feasibility of PS 125/PS 106 remodel for studio-style lecture/lab.	Persons responsible: Eric Rabitoy, Gloria Ramos and Lucia Riderer	P	1.2.4, 3.1.4
Goal 4 2012	Increase the number of Physics Transfer degrees awarded	Promote the Physics Transfer degree and its requirements (DEC 2013)	C	
Goal 5 2012	Increase the number of female students interested in physics/engineering and then taking the Physics 200 series	Increase the number of Women in Physics & Engineering career awareness workshops (JUN 2015) Develop recruitment techniques designed to promote physics and its applications/engineering for female students(JUN 2015)	I	1.1, 1.2, 2.2, 6.1

	Description	Actions / Target Date	Data Index*	Institutional Goal**
Goal 1 2014	Create opportunities for interdisciplinary activities in	Create a Physics-Automotive interdisciplinary team of students that	C	1.1.4, 1.1.5, 2.1.2, 2.3.1,

	which physics students work in collaboration with students from the Automotive Department on research projects.	will design and build a car to participate in the Shell Eco-marathon competition (Fall 2013)		3.2.3, 6.1.1
Goal 2 2014	Create opportunities for interdisciplinary activities in which physics students work in collaboration with students from the Performing Arts Departments on research projects.	Create a Physics-Performing Arts interdisciplinary team of students that will design and build the science payload for a High Altitude Balloon that will be launched in Alaska with the purpose of recording sound in the aurora borealis (Fall, 2015)	I	1.1.4, 1.1.5, 2.1.2, 2.3.1, 3.2.3, 6.1.1
Goal 3 2014	Enhance collaborative learning by creating opportunities for peer-facilitated activities.	Have the Rocket Owls (students who participate in the USLI) facilitate the PHYS 201 lab on rocketry under the instructor's supervision, [Fall 2013]	C	1.1.7
Goal 5 2014	Have students participate in the STEM poster competition sponsored by the Chinese Institute of Engineers		C	6.2.3
Goal 6 2014	Have students participate in the 2014 HTCC Research Conference		C	6.2.3

In addition to previous goals, during 2014-2015, we plan to:

	Description	**Actions / Target Date**	**Institutional Goal****
Goal 1 2015	collaboration with Automotive Department on new interdisciplinary labs for PHYS 201 & 202	Meet with AUTO faculty to review current labs and discuss interdisciplinary activities. [Fall 2014] Rewrite PHYS 202 labs [Winter 2015]	1.1.3, 1.1.4
Goal 2 2015	Have RISE student teams participate in related inter-collegiate competitions and conferences	Recruit students for the RISE teams Offer PHYS 220A, 225, and 226 Assist RISE teams with fund-raising, outreach and project development	1.1.4, 1.1.5, 2.1.2, 2.3.1, 3.2.3, 6.1.1

Goal 3 2015	Offer PHYS 203 as a "flipped" course	Create online-prelecture learning modules Re-assign some homework activities as in-class activities	1.2.1, 1.2.3, 2.3.2
Goal 4 2015	Revise PHYS 203 Labs to be more research-oriented	Revise lab manual. Develop lab activities where students reflect on their research skills (data recording, analysis and lab report write-up).	1.2.3
Goal 2015	Evaluate feasibility of offering a Physics & the Arts Gen Ed class with input from Fine & Performing Arts faculty & begin development of the course if there's interest	Contact Dean and faculty of Fine & Performing Arts to determine the interest in such a course	1.1.1, 1.1.4

**For instutional goals visit link below.*
http://www.citruscollege.edu/admin/planning/Documents/StrategicPlan2011-2016.pdf

***For Educational and Facilities Master Plan, use table below.*

EFMP 1 – ~~Revise the curriculum as needed to create a transfer degree to meet the requirements of new statewide initiatives~~
EFMP 2 – Create additional courses, with specialized emphases, to meet physical science general education requirements and/or coordinate with career technical programs
EFMP 3 – Explore developing cohorts of students taking several related courses, including physics, during the same semester
EFMP 4 – ~~Create special topics courses related to current "hot topic" issues related to physics, such as emerging occupations~~
EFMP 5 – Collaborate with the Vice President of Administrative Services and Finance to renovate classroom and laboratory space to keep pace with pedagogical trends, such as collaborative group work and studio-style/SCALE-UP classrooms.

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IX. Budget Recommendations for 2014-2015

(Add rows or attach additional pages as needed for complete description / discussion)

Certificated Personnel (FNIC)

Position	Discuss impact on goals / SLOs	Impact	Priority

Classified Personnel

Position	Discuss impact on goals / SLOs	Impact	Priority

Staff Development (Division)

Item	Discuss impact on goals / SLOs	Cost	Impact	Priority

Facilities (Facilities)

Describe repairs or modifications needed	Discuss impact on goals / SLOs	Building / Room	Impact	Priority

Computers / Software (Tecs)

Item	Discuss impact on goals / SLOs	Cost	Impact	Priority

Equipment

Item	Discuss impact on goals / SLOs	Cost	Impact	Priority
7 Rspec Video Spectrometers + software (package)	Necessary for spectroscopy experiments in PHYS 203 that are more like modern spectroscopy techniques.	$2800	F	1
20 Arduinos	Necessary for PHYS 220 and PHYS 201 lab	$600	F	3

Supplies (Division)

Item	Discuss impact on goals / SLOs	Cost	Impact	Priority
Helium gas	Necessary for PHYS 220	$400	F	3
Estes Model Rockets	Necessary for PHYS 201 lab	$1000	F	3

General Budget Guidelines

Budget Preparation Tips:

- Include items on the budget form that are needed for program success even if there is no financial need associated with the request (ie training that could be accomplished with on-campus resources, sharing of resources with another discipline or department etc.)
- Whenever possible, obtain actual cost for the items / equipment you wish to purchase. This avoids situations where items are considered for purchase but it is determined that the actual cost greatly exceeds the original estimate.
- Identify unit cost (cost per item) and the number of units desired in requests.
- Indicate if there is a lower level of financial support that would be workable in your educational plan – if you request $30,000 for a classroom set of equipment (one item for each student), if $15,000 were available, would it be possible for two students to share an item? Is the request "All or nothing"?

Determining Budget Impact:

Indicate one or more of the following areas that your request will affect:

M = Mission: Does the request assist the program in meeting the District's mission and established core competencies and / or diversity?
N = Need: Does the request assist the program in addressing needs based on labor market data, enrollment, articulation, advisory committee, regional agreements, etc.?
Q = Quality: Does the request assist the program in continuing or establishing appropriate lecture/lab unit values? Will the request assist in the regular reviewed / updated of course outlines? Is faculty development adequate? Does program need support in addressing the State and District emphasis on critical thinking, problem solving and written expression? Does program need support to meet stated objectives in the form of SLOs? Do course pre-requisites and co-requisites need to be validated?
F = Feasibility: Does the request assist the program maintain adequate facilities, equipment, and library resources? Is there a need for repair or modification of facilities? Is there a need for new equipment or supplies? Are course offerings frequent enough for students to make adequate progress in both day and evening programs? Does the program have adequate communication with & support from Counseling?
C = Compliance: Does the request assist the program in meeting Federal, State & District requirements? (Do the course outlines meet state, district & federal regulations for content? Do vocational programs have regular advisory meetings?)

Budget Priorities:

When establishing priority, consider the following:

Priority 1: This item is mandated by law, rule, or district policy.
Priority 2: This item is essential to program success.
Priority 3: This item is necessary to maintain / improve program student learning outcomes.