Physics
Instructional Program Review 2011-2012

Spring 2012

Prepared by

Name	Title
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Physics Program Review Committee Members

Name	Title
Hao, Lan	Office of Institutional Research
Malmgren, Irene	V.P. Academic Affairs
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PROGRAM REVIEW – Physics

The final summary of the program review process for Physics is attached to this page.

I affirm that this program has been reviewed according to the accepted District procedures for program review and that the final summary accurately reflects the consensus of the members of the review committee.

Eric Rabitoy, Dean of Natural and Physical Sciences	date
Michelle Plug, Articulation Officer	date
Carolyn Perry, Chair of Curriculum Committee	date
Irene Malmgren, Vice President of Academic Affairs	date
Nicki Shaw, Academic Senate President	date
Geraldine M. Perri, Superintendent/President	date

It will be the department's responsibility to communicate review recommendations with additional offices and services.

Table of Contents

1. Executive Summary

A. Program History/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. The physics program meets the needs of students in three distinct categories: (1) technical majors in science and engineering, (2) teacher preparation, and (3) general education. Changes occurring with the program in the past several years include the following:

*PHYS 111 and PHYS 112 were re-designed as Physics for Life Science majors courses.
*PHYS 105 was deactivated.
*There was a decrease in PHYS 110 offerings due to budget cuts.
*PS 121 was remodeled and now provides an excellent space for discussion sessions.
*Lab equipment was updated.

Courses in physics are offered in the day and evening.

B. Strengths/Effective Practices

*Preparing students for science, technology, engineering and mathematics careers.
*Good student-faculty ratio in lab and discussion.
*Modern lab equipment.
*Hands-on projects and group discussions.
*Hands-on demonstrations and animations used in lectures to demonstrate concepts.

C. Weaknesses/Lessons Learned

*Inability to do groupwork and discussion in lecture.
*Inability to do "studio-style" lecture and lab combined work.

D. Recommendations/Next Steps

We recommend the following curriculum-related changes:
(1) modify course outlines with revised pre-requisites and content;
(2) establish the physics transfer degree;
(3) establish special topics research seminar course; and
(4) reactivate and redesign PHYS 105.
(5) host women in engineering career awareness workshops
(6) investigate the feasibility of offering PHYS 203 in the summer.

2. Faculty

Full-Time Faculty	Adjunct Faculty
Ramos, Gloria	Carter, Brian
Riderer, Lucia	Gonzalez, Gonzolo
Scott, Chris	McClain, James
	Miller, Kent
	Soldatenko, Adrian

3. 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. The Physics Program meets the needs of students in three distinct categories: (1) technical majors in science and engineering, (2) teacher preparation, and (3) general education.

4. Program Goals and Objectives

The goals and objectives of the Physics Program are:

a) Provide general education science courses required for students to complete an Associate's Degree and/or for transfer credit to four-year colleges and universities.

b) Meet the student learning outcomes and core competencies delineated by Citrus College.

c) Provide students with the knowledge and skills necessary to develop an understanding of the conceptual structure of physics.

d) Provide students with the knowledge and skills necessary to develop an understanding of interactions in the physical world.

e) Provide students with the knowledge and skills to express their understanding and interpret information in multiple forms (including verbal, pictorial, graphical, and mathematical).

f) Provide knowledge and skills for students to develop problem-solving skills applicable in various life and career paths.

5. List and Review of Degrees, Certificates, and Awards

The Physics department does not provide a degree in physics. However, the curriculum in the discipline is a part of the Biological and Physical Sciences (and Mathematics) Associates Degree. Courses in the Biological and Physical Sciences (and Mathematics) major examine the physical universe, its life forms, and its natural phenomena. They assist in developing an appreciation and understanding of the scientific method and encourage an understanding of the relationships between science and other human activities. This category includes introductory or integrative courses in astronomy, biology, chemistry, geology, physics, physical geography, and other scientific disciplines.

This degree requires meeting the Citrus College General Education and proficiency requirements combined with successful completion (grades of "C" and above) of the following major requirements:

18 Units from the courses listed below:

Course	Title	Units
ASTRONOMY		
ASTR 115	Planetary Astronomy	3
ASTR 115H	Planetary Astronomy - Honors	3
ASTR 116	Stellar Astronomy	4
ASTR 117	Life In The Universe	3
BIOLOGY		
BIOL 100	Introductory Biology	3
BIOL 102	Human Genetics	3
BIOL 104	Biology: Contemporary Topics	3
BIOL 105	General Biology	4
BIOL 109	Biology for Educators	4
BIOL 116	HIV and AIDS: Insights and Implications	3
BIOL 124	Principles of Biology I	5
BIOL 125	Principles of Biology II	5
BIOL 145	Environmental Science	3
BIOL 200	Human Anatomy	4
BIOL 201	Human Physiology	4
BIOL 220	Microbiology	5
CHEMISTRY		
CHEM 103	College Chemistry	5
CHEM 104	College Chemistry	5
CHEM 106	Physical Science for Educators	4
CHEM 110	Beginning General Chemistry	5
CHEM 111	General Chemistry	5
CHEM 112	General Chemistry	5
CHEM 210	Organic Chemistry	3
CHEM 211L	Organic Chemistry Laboratory	1
CHEM 220	Organic Chemistry	3
CHEM 221L	Organic Chemistry Laboratory	1

Course	Title	Units
COMPUTER SCIENCE & INFORMATION SYSTEMS		
CSIS 105	Introduction to Windows and Personal Computers	2
CSIS 107	Fundamentals of Information Technology	4
CSIS 111	Introduction to Programming Concepts and Design	4
CSIS 119	Introduction to Web Programming	3
CSIS 130	Microcomputer Applications I	4
CSIS 141	Java Script	4
CSIS 150	Web Development with Dreamweaver	3
CSIS 154	Web Development with Fireworks	2
CSIS 156	Web Development with Flash	2
CSIS 162	Electronic Spreadsheets Using Microsoft Excel	3
CSIS 166	Introduction of PowerPoint	2
CSIS 167	Introduction to MS Publisher	2
CSIS 168	Designing Web Sites	3
CSIS 175	Introduction to Access	2
CSIS 181	Introduction to Microsoft Project Management	2
CSIS 190	Introduction to Flash Game Programming	4
CSIS 225	Object Oriented Programming with C++	4
CSIS 230	Microcomputer Applications II	4
EARTH SCIENCE		
ESCI 106	Earth and Space Science for Educators	4
ESCI 118	Physical Geography	3
ESCI 120	Physical Geology	4
ESCI 121	Historical Geology	4
ESCI 122	Geology: Earth History	3
ESCI 124	Environmental Geology	3
ESCI 125	California Geology	4
ESCI 140	The Geology of Death Valley National Park	2
ESCI 141	The Geology of Yosemite National Park	2
ESCI 142	The Geology of Channel Islands National Park	2
ESCI 143	The Geology of Joshua Tree National Park	2
ESCI 145	The Geology of Sequoia National Park	2
ESCI 146	The Geology of Kings Canyon National Park	2
ENGINEERING		
TECH 100	Principles of Technology	3
IT 104	PC Hardware and Maintenance	4
IT 107	Network Technology	4
IT 108	Networking Operating Systems	4
IT 109	Network and Computer Security	4
FORESTRY		
FOR 101	Introduction to Forestry	3
FOR 102	Introduction to Forest Ecology	3
FOR 103	Plant Identification	3
FOR 104	Introduction to Outdoor Recreation	3
FOR 105	Wildland Fire Management	3
FOR 106	Principles of Wildlife Management and Ecology	3

Course	Title	Units
MATHEMATICS		
MATH 148	Intermediate Algebra I	2.5
MATH 149	Intermediate Algebra II	2.5
MATH 150	Intermediate Algebra	5
MATH 151	Plane Trigonometry	4
MATH 160	Survey of Mathematics	4
MATH 162	Introductory Mathematical Analysis	4
MATH 165	Introductory Statistics	4
MATH 165H	Introductory Statistics - Honors	4
MATH 168	Mathematics for Elementary Teachers I	4
MATH 169	Mathematics for Elementary Teachers II	4
MATH 170	College Algebra	3
MATH 175	Pre-Calculus	4
MATH 190	Calculus with Analytic Geometry I	4
MATH 191	Calculus with Analytic Geometry II	4
MATH 210	Calculus with Analytic Geometry III	4
MATH 211	Differential Equations	4
MATH 212	Introduction to Linear Algebra	4
NATURAL HISTORY		
NAT 180A	Natural History Series - Deserts A	2
NAT 180B	Natural History Series - Deserts B	3
NAT 181A	Natural History Series - Coastal Mountains, Coastlines, Tropical Regions and Islands A	2
NAT 181B	Natural History Series - Coastal Mountains, Coastlines, Tropical Regions and Islands B	3
NAT 182A	Natural History Series - Inland Mountains, Valleys and Alaska A	2
NAT 182B	Natural History Series - Inland Mountains, Valleys and Alaska B	3
OCEANOGRAPHY		
ESCI 130	Physical Oceanography	3
PHYSICS		
PHYS 105	Physical Science	3
PHYS 106	Physical Science for Educators	4
PHYS 110	Introduction to College Physics	4
PHYS 111	Physics for Life Sciences I	4
PHYS 112	Physics for Life Sciences II	4
PHYS 201	Physics: Mechanics	5
PHYS 202	Physics: Electromagnetism	5
PHYS 203	Physics: Optics and Thermodynamics	5
Additional acceptable course under A.S. Natural Sciences:		
PHILOSOPHY		
PHIL 110	Philosophy/Logic	3

Degree or Certificate Title	Date last reviewed by Curriculum	Average number of awards each year	Date degree SLOs written	Date degree SLOs Assessed	Date last reviewed by Advisory Council
Biological and Physical Sciences (and Mathematics)	SP 2009	130	SLO's not written	SLO's not assessed	N/A

6. List of Industry-Based Standard Certificates and Licenses

None.

7. Advisory Committee or Council *

* Applies only to programs with CTE courses

N/A

8. Program Student Learning Outcomes

The Physics Program has adopted the Institutional General Education Competencies of Citrus College (as approved by Steering December 8, 2008). General education competencies serve as a common set of core curricular components identified and defined by faculty. Student learning outcomes are behaviors based on these competencies.

Any student transferring, completing a degree or certificate from Citrus College, must demonstrate effectively assessed awareness, understanding, knowledge, skills, and abilities in the selected competencies.
Students completing courses in the Physics Program will have acquired the following competencies:

1) Communication (personal expression and information acquisition)
Physics students will use proper vocabulary and notation when describing physics concepts. They will be able to communicate these concepts to others both verbally and in written form (including verbal, pictorial, graphical, and mathematical).

They will be able to critically analyze scientific information found in print, visual, or online media such as scientific and non-scientific books, journals, articles, web pages, television, and film.

2) Computation
Physics students will apply physics concepts in mathematical form using the appropriate computational skills for the course. This may include numeric calculation using algebra, graphical analysis, and/or the evaluation of calculus expressions.

3) Creative, Critical, and Analytical Thinking, and Information Competency
Physics students will demonstrate an understanding of the fundamental principles of physics.

Students will develop problem-solving, decision-making, and critical thinking skills and will apply them to develop an understanding of interactions in the physical world.

Students will distinguish between scientific and non-scientific questions and methods and understand science as a process.

4) Community/Global Consciousness and Responsibility
Students will think logically and coherently about technical/scientific issues in order to understand the complex problems involved in science and engineering and to gain an appreciation for the global social and political impact of scientific endeavors.

By working together in lab and/or on projects, students develop interpersonal skills and respect for others.

5) Technology
Physics students will be adept at using computers for word processing, data analysis, tutorials, simulations, and/or web-based research as appropriate for each course.

For laboratory courses, students will demonstrate fundamental aptitudes in the proper use of mechanical, electrical, and/or other appropriate devices.

6) Discipline / (Subject Area Specific Content Material)
N/A [Previous SLO in this section was moved to more appropriate competencies.]

9. Curriculum Review and Student Learning Outcomes Assessment

PHYS 105*	Physical Science (currently deactivated in CurricUnet)
PHYS 106	Physical Science for Educators (previously Physics and Chemistry for Educators
PHYS 110	Introduction to College Physics
PHYS 111	Physics for Life Sciences I (previously General Physics)
PHYS 112	Physics for Life Sciences II (previously General Physics)
PHYS 201	Physics: Mechanics (previously Physics)
PHYS 202	Physics: Electromagnetism (previously Physics)
PHYS 203	Physics: Optics and Thermodynamics (previously Physics)

Curriculum/ SLO Assessment Map: Physics

CC 1(A): Use proper vocabulary and notation	**CC 3(C): Distinguish between science & non-science.**
CC 1(B): Critically analyze scientific information	**CC 4(A): Understand the impact of science/physics.**
CC 2: Use appropriate computational skills	**CC 4(B): Develop interpersonal skills in group work.**
CC 3(A): Understand fundamental physics	**CC 5(A): Use of computers for research/analysis**
CC 3(B): Develop critical thinking skills	**CC 5 (B): Use of lab specific equipment.**
Course Applicability Key: T=Transfer, D= Degree, C= Certificate, S= Skill Award SLO Key: I= Introduced, D=Developed, M=Mastered	
Date of Assessment= FA10, SP12, CA=(Ongoing, Continuing Assessment), or N/O=(not offered in foreseeable future)	

	CC 1(A)	CC 1(B)	CC 2	CC 3(A)	CC 3(B)	CC 3(C)	CC 4(A)	CC 4(B)	CC 5(A)	CC 5(B)	Date of Assessment
PHYS 106 – Physical Science For Educators (4 Units), Applicability-D Last Offered: 2/11, Last Curriculum Date: 4/7/11, Curriculum Revision Date: 4/7/17											
SLO 1A	I	I	I	I	I	I			I	I	FA12
SLO 1B		I	I	ID	ID		I		I		FA12
SLO 1C		I	I	ID	ID		I		I		FA12
SLO 1D		I		I	I	I			I	I	SP14
SLO 2A		I		I	I	ID	I				SP14
SLO 3A								ID			SP14
PHYS 110 – Introduction to College Physics (4 Units), Applicability-D Last Offered: 8/11, Last Curriculum Date: 12/9/10, Curriculum Revision Date: 12/9/16											
SLO 1A	I	I	I	I	I	I			I	I	SP12
SLO 1B		I	I	ID	ID		I		I		FA12
SLO 1C		I		I	I	I			I	I	SP13
SLO 2A		I		I	I	ID	I				FA13
SLO 2B				I	I	I	I		I		SP14
SLO 3A								ID			FA14

	CC 1(A)	CC 1(B)	CC 2	CC 3(A)	CC 3(B)	CC 3(C)	CC 4(A)	CC 4(B)	CC 5(A)	CC 5(B)	Date of Assessment
PHYS 111 – Physics for Life Sciences I (4 Units), Applicability-D Last Offered- 8/10, Last Curriculum Date: 2/25/10, Curriculum Revision Date: 2/25/16											
SLO 1A	ID	I	I	ID	ID				I	ID	N/O
SLO 1B	ID		ID	ID	I				I	I	N/O
SLO 1C	ID		ID	ID	ID	I	I		I	ID	N/O
SLO 2A								ID			N/O
PHYS 111C – Physics for Life Sciences I Calculus Supplement (1 Units), Applicability-D Last Offered- NA, Last Curriculum Date: 2/25/10, Curriculum Revision Date: 2/25/16											
SLO 1A	ID		ID	D	I						N/O
PHYS 112 – Physics for Life Sciences II (4 Units), Applicability-D Last Offered- 1/01, Last Curriculum Date: 6-9-11, Curriculum Revision Date: 6-9-17											
SLO 1A	ID	I	I	ID	ID				I	ID	N/O
SLO 1B	ID		ID	ID	I				I	I	N/O
SLO 1C	ID	D	ID	ID	ID	I	I		I	ID	N/O
SLO 2A								ID			N/O
PHYS 201 – Physics: Mechanics (5 Units), Applicability-D Last Offered: 8/11, Last Curriculum Date: 12/10/09, Curriculum Revision Date: 12/10/15											
SLO 1A	IDM	I	DM	IDM	ID				ID	ID	SP12
SLO 1B	IDM		IDM	IDM	ID		I		ID	I	FA12
SLO 1C	ID		ID	ID	ID	I	I		IDM	ID	SP13
SLO 2A								ID			FA13
PHYS 202 – P Physics: Thermodynamics & Electromagnetism (5 Units), Applicability-D Last Offered: 2/11, Last Curriculum Date: 12/10/09, Curriculum Revision Date: 12/10/15											
SLO 1A	IDM	DM	DM	IDM	ID				ID	D	SP12
SLO 1B	IDM		IDM	IDM	ID		D		ID	ID	SP12
SLO 1C	D		ID	ID	DM	I	D		IDM	DM	SP13
SLO 2A								DM			SP13

	CC 1(A)	CC 1(B)	CC 2	CC 3(A)	CC 3(B)	CC 3(C)	CC 4(A)	CC 4(B)	CC 5(A)	CC 5(B)	Date of Assessment
PHYS 203 – Physics: Optics & Modern Physics (5 Units), Applicability-D Last Offered: 8/11, Last Curriculum Date: 12/10/09, Curriculum Revision Date: 12/10/15											
SLO 1A	IDM	DM	DM	IDM	ID				ID	D	FA12
SLO 1B	IDM		IDM	IDM	ID		M		ID	ID	FA12
SLO 1C	ID		ID	ID	DM	I	M		IDM	DM	FA13
SLO 2A								DM			FA13

10. Review of previous recommendations

Mission:

a. Complete the revision of all physics course outlines to better reflect student learning outcomes according to the timeline.
Response: All course outlines were revised except for PHYS 105, because it was deactivated, and PHYS 202/203 which will be revised by the end of Fall 2011.

b. Faculty should continue to research industrial needs for education in emerging technologies (e.g. nanotechnologies) and consider courses to address new career paths.
Response: This recommendation no longer meets our needs.

c. Consider offering Physics 105 Summer ’08.
Response: Due to budget cuts, this course was not offered; it is currently deactivated.

d. Faculty should increase participation in activities with local high schools to stimulate physics enrollment.
Response: The physics faculty has worked with Monrovia high school to provide College Prep and Advanced Placement physics workshops.

e. The department should consider developing a new honors course, possibly for Physics 110.
Response: A PHYS110 honors course is not feasible at this time due to budget limitations. We can review the need for such a course in the future.

f. The physics courses are populated by a large number of Asians relative to the general ethnic background of Citrus College students. The Department should consider investigating similar trends in nearby community colleges.
Response: According to the most recent Citrus College data available, this demographic gap has been reduced.

Need:

a. Expose students to science and engineering employment opportunities.
Response: Students were exposed to science and engineering employment opportunities through several internships at Cal State Fullerton, UC-Riverside, and the University of LaVerne. Physics students were encouraged to attend career awareness seminars organized by Citrus College.

b. Continue to develop web pages for the program, classes, and specific instructors.
Response: Faculty use Blackboard, the Pearson Science Portal, and/or the Mastering Physics website to meet this need.

c. Offer the new Physics 110 hybrid distance education course in fall '07.
Response: Due to faculty changes and budget restrictions, this was not possible and does not seem feasible in the future.

d. Consider additional Distance Education offerings. Explore the feasibility of developing a DE course for Physics 111 and 112.
Response: These courses have been re-designed as major prep courses for life science majors and, therefore, the physics faculty feel they are not suitable for DE.

e. Evaluate the need to re-design Physics 111 and 112 as a physics for biology majors course with or without calculus.
Response: These courses have been re-designed as major prep courses for life science majors. Two optional one-unit courses were developed for life science majors who are required to take calculus-based physics for their programs.

Quality:

a. Complete the revision of physics course outlines to better reflect student learning outcomes according to plan.
Response: All physics course outlines were revised, except for PHYS 105 which was deactivated.

b. Labs should continue to maintain state-of-the-art equipment.
Response: Lab equipment and software have been purchased for use in labs and classrooms.

c. Faculty should continue regular contact with peers at other institutions.
Response: Faculty regularly attend local conferences and workshops related to physics pedagogy.

Feasibility:

a. Faculty members should research grants funding for program development in emerging technologies such as nanotechnologies.
Response: Grants in emerging technologies did not seem suitable for Citrus at this time. However, physics faculty were active members of STEM grant writing committees on campus.

b. Determine need for equipment in the area of electricity, magnetism, and modern physics that does not deal with circuit theory.
Response: There was need for new lab equipment for these topics and it was purchased.

c. Incorporate self-correcting computer tutorials such as Mastering Physics into the Physics 202 and 203 discussion sections.
Response: Mastering Physics tutorials have been incorporated into lab and lecture assignments, but were found not appropriate for discussion sections.

d. Despite repeated maintenance requests, air balance and temperature are still not maintained adequately in the PS building. PS 101 is sometimes below 60 degrees at class time and PS 113 does not receive adequate ventilation. A/C ducting should be cleaned of soot.
Response: These maintenance issues were addressed.

e. Utilize basement area (behind PS113 and PS107) to store frequently used lecture demonstration equipment.
Response: The basement area was cleaned out in the spring of 2011and regularly-used demonstration equipment was moved there.

f. Determine the best utilization of PS121. Consider renovating for use as a seminar/conference room.
Response: PS121 was converted into a multi-purpose room used for discussion sections, department meetings, tutoring, and lectures with small class-sizes. The new design allows better structured discussion and lecture sessions.

Compliance:

a. Review safety features on natural gas shutoffs in lab rooms.
Response: This safety issue has been addressed; natural gas shutoffs have been identified and faculty/staff trained on their locations.

b. Install first aid kits in lab rooms.
Response: First aid kits were installed in the physics stockroom, PS 107, PS 113, and both physics laboratory rooms (PS 101 and PS 125).

11. Evaluation Criteria – Mission

Current status

Commendations

a. The physics faculty participated in the High School Fine and Performing Arts Spring Open House.
b. The physics faculty developed and conducted four "Physics is Fun!" outreach workshops for GATE and non-GATE students from Azusa and Glendora Middle Schools.
c. Physics faculty and students participated in the AWIS math and science outreach workshop.
d. A team of physics faculty and students prepared a proposal which was submitted and accepted for participation in the NASA Reduced Gravity Student Flight Program. The team designed, built, and tested an experiment in a microgravity environment on NASA's C-9 "Weightless Wonder" aircraft. Once their data was analyzed, a final report was prepared and 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.citruscollege.edu/academics/microgravity/Pages/NASAReducedGravityStudentFlightProgram.aspx
e. Physics faculty and students developed and participated in the creation of the Natural and Physical Sciences outreach video. See this site for the video: http://www.citruscollege.edu/stem/Pages/default.aspx
f. Physics faculty and students attended STEM Center seminars provided by advanced undergraduate and graduate students from CalPoly Pomona and USC.
g. Physics faculty have served on grant writing committees for grants related to improving student success in STEM majors as well as faculty development.
h. Physics faculty have written and submitted several grant proposals to NSF and several private organizations for enhancing the participation of historically under-represented student populations in physics and engineering.

Recommendations

a. Develop and implement a physics transfer degree (SB-1440) to facilitate student transfer to CSUs.
b. Due to very low enrollment of female students in calculus-based physics courses, physics faculty should investigate the feasibility of providing career awareness workshops to this student population to encourage them to pursue careers in physics and engineering.

12. Evaluation Criteria – Need

Current status

Commendations

a. The department has revised curriculum to meet the need of students.

b. Program faculty have participated in outreach to our local elementary, middle and high schools through Open House, GATE science programs, and physics workshops.

Recommendations

a. Due to an increase in enrollment in calculus courses and enrollment trends, there is an increased demand for calculus-based physics. Offerings of PHYS 201 should increase to three sections per semester.

13. Evaluation Criteria – Quality

Current status

Commendations

a. Several physics students competed for and received summer internships in physics departments at UCLA, University of LaVerne, and UNLV.
b. Courses articulate with those at both CSU and UC campuses.
c. Labs have new and updated equipment.
d. Program faculty actively participated in recent STEM grant applications. Funds from the grant will allow the department to provide opportunities for students resulting in successful completion of course material and transfer to 4-year institutions.

Recommendations

a. Evaluate the necessity of MATH 130 as a pre- or co-requisite for PHYS 110 to ensure student success in achieving SLOs.
b. Evaluate the necessity of PHYS 110 and/or high school physics as a prerequisite for PHYS 201 to ensure student success in achieving SLOs.
c. Change the MATH 190 co-requisite to a pre-requisite for PHYS 201. This will increase student success in PHYS 201, make PHYS 201 meet the physics transfer degree requirements, and enhance articulation agreements.
d. Revise PHYS 202 and PHYS 203 course outlines to re-establish the articulation agreement with CalPoly Pomona.
e. Modify course content in PHYS 202 and 203 to move thermodynamics to PHYS 202 so that it is covered right after PHYS 201. These changes would allow modern physics to be covered more in depth and ensure student success in achieving SLOs.
f. Pursue the re-activation and offering of PHYS 105 as an additional general education course because it is the only non-lab physics course to provide options for students. Explore the possibility of offering it as a DE course during intersession.
g. Evaluate the feasibility of a one unit special topics research seminar to better prepare students for careers in engineering and advanced coursework.

14. Evaluation Criteria – Feasibility

Current status

Commendations

a. Physics faculty actively incorporate technology into the instructional program.
b. Funds from the STEM grant have been used to provide research opportunities for students and facilitate their transfer to 4-year institutions.

Recommendations

a. Evaluate the feasibility of offering PHYS 203 as an 8-week summer course so that students can finish the calculus-based physics series in one year.
b. Evaluate the feasibility of remodeling PS 125 and/or PS 106 for studio-style lecture and lab.
c. The physics program needs a dedicated 100% lab technician.

15. Evaluation Criteria – Compliance

Current status

Commendations

a. Defribillator was placed outside physics labrooms.

Recommendations

a. Lighting and seating in PS and LH lecture halls are inadequate; in particular, some seating is unsafe.

16. Recommendations

Rank	Description of recommendation (actions or behaviors to be completed)	Responsible person(s)	Target Date	Personnel	Facilities	Equip. / Software	Supplies
1	100% lab tech personnel	GR, LR & ER	SEP 2012	☒	☐	☐	☐
2	Lighting and seating in PS and LH lecture halls	GR, LR & ER	SEP 2012	☐	☒	☒	☐
3	Create transfer degree	GR & LR	Dec 2011	☐	☐	☐	☐
4	Review course outlines & update course outlines for PHYS 201, 202, 203 and 110	GR & LR	DEC 2011	☐	☐	☐	☐
5	Increase offerings of PHYS 201	LR & ER		☒	☐	☐	☐
6	Evaluate feasibility of offering PHYS 203 as an 8-week summer course	GR, LR & ER	Mar 2012	☐	☐	☐	☐
7	Evaluate feasibility of PS 125/PS 106 remodel for studio-style lecture/lab.	GR, LR & ER	DEC 2013	☐	☒	☐	☐
8	Evaluate feasibility of offering PHYS 105 (possibly as DE)	GR, LR & ER	DEC 2013	☐	☐	☐	☐
9	Evaluate the feasibility of a one unit special topics research seminar	GR, LR & ER	DEC 2012	☐	☐	☐	☐
10	Women in Engineering career awareness workshops	GR, LR & ER	GR, LR & ER	☐	☐	☐	☐

Comments

17. Budget Recommendations

Resources are needed in the following areas:

Certificated Personnel (FNIC)

Position	Discuss impact on goals / SLOs	Impact ◊	Priority ‡

Classified Personnel

Position	Discuss impact on goals / SLOs	Impact ◊	Priority ‡
100% Lab technician	Necessary for meeting all SLOs	Q	B

Facilities

Facilities / repairs or modifications needed	Discuss impact on goals / SLOs	Bldg / Room	Impact ◊	Priority ‡
Remodeling of current lab rooms	studio-style lectures and labs will improve student learning	PS125 PS101	QF	C
Remodeling PS 106 for studio-style lecture and/or lab.	studio-style lectures and labs will improve student learning	PS106	QF	C
Replace seating and lighting in LH and PS	safety issue	LH 101 LH102 LH 103	F	A

Computers / Software (Tecs)

Item	Discuss impact on goals / SLOs	Cost	Impact ◊	Priority ‡

Equipment

Item	Discuss impact on goals / SLOs	Cost	Impact ◊	Priority ‡

Supplies (Division)

Item	Discuss impact on goals / SLOs	Cost	Impact ◊	Priority ‡

Additional information:

◊ **Impact:**
M = Mission: Does program meet the District's mission and established core competencies? Does program reflect the District's diversity?
N = Need: How is program addressing needs based on labor market data, enrollment, articulation, advisory committee, regional agreements, etc.?
Q = Quality: Are lecture/lab unit values appropriate? Have the course outlines been reviewed / updated regularly? Are disciplines appropriate? Is faculty development adequate? Does program support State and District emphasis on critical thinking, problem solving and written expression? Does program meet stated objectives in the form of SLOs? Are course pre-requisites and co-requisites validated?
F = Feasibility: Are facilities, equipment, and library resources adequate? Are evening programs and services adequate? 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: Do course requisites meet Federal, State & District requirements? Do the course outlines meet state, district & federal regulations for content? Do vocational programs have regular advisory meetings?

‡ **Priority: (Note: When discussing priority, consider the following and address in Column 2)**
A. Is this goal mandated by law, rule, or district policy?
B. Is this goal essential to program success?
C. Is this goal necessary to maintain / improve program student learning outcomes?

Attachment A: Key Performance Indicator data pages

	Key Performance Indicators	Fall04	Fall05	Fall06	Fall07	Fall08	Fall09
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Program Access						
1	Majors (total)						
2	New Majors						
3	Courses Offered	3.0	4.0	4.0	4.0	4.0	3.0
4	Sections Offered	20.0	21.0	19.0	16.0	14.0	16.0
5	Morning Sections	12.0	11.0	11.0	7.0	9.0	10.0
6	Afternoon Sections	6.0	8.0	6.0	7.0	3.0	3.0
7	Evening Sections	2.0	2.0	2.0	2.0	2.0	3.0
8	Arranged Sections						
9	Weekend Sections						
10	Short Term Sections	0.0	0.0	0.0	0.0	0.0	0.0
11	DistanceEd Full-Term Sections	0.0	0.0	0.0	0.0	0.0	0.0
12	DistanceEd Short-Term Sections						
13	Enrollment	147	160	153	123	133	178
14	Weekly Student Contact hours (WSCH)	3164.6	2755.4	2558.8	887.0	1117.1	1478.1
15	Full-Time Equivalent Students (FTES)	108.5	94.5	87.7	27.4	34.5	45.6
	Program Resources						
16	Full-Time Equivalent Faculty (FTEF)	7.6	7.9	7.1	2.6	3.1	3.1
17	Credit Reimbursement Rate	**$2,922.30**	**$3,259.71**	**$3,476.34**	**$3,668.28**	**$3,834.46**	**$3,834.46**
	Program Operation						
18	WSCH/FTEF	418.6	349.2	358.9	343.8	361.5	470.7
19	FTES/FTEF	14.4	12.0	12.3	10.6	11.2	14.5
20	Fill Rate at Census	17.5	16.8	19.5	62.6	85.6	101.9
	Program Success						
21	Course Retention	89.1	93.1	92.8	93.5	91.0	90.4
22	Course Success	71.4	73.8	75.2	78.9	69.9	77.0

	Key Performance Indicators				Winter08	Winter09	Winter10
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Program Access						
1	Majors (total)						
2	New Majors						
3	Courses Offered				1.0	1.0	1.0
4	Sections Offered				2.0	2.0	3.0
5	Morning Sections				1.0	1.0	2.0
6	Afternoon Sections				1.0	1.0	1.0
7	Evening Sections						
8	Arranged Sections						
9	Weekend Sections						
10	Short Term Sections				2.0	2.0	3.0
11	DistanceEd Full-Term Sections						
12	DistanceEd Short-Term Sections				0.0	0.0	0.0
13	Enrollment				20	29	37
14	Weekly Student Contact hours (WSCH)				133.2	225.6	311.1
15	Full-Time Equivalent Students (FTES)				4.1	7.0	9.6
	Program Resources						
16	Full-Time Equivalent Faculty (FTEF)				0.4	0.4	0.7
17	Credit Reimbursement Rate				**$3,668.28**	**$3,834.46**	**$3,834.46**
	Program Operation						
18	WSCH/FTEF				360.0	524.5	457.5
19	FTES/FTEF				11.1	16.2	14.1
20	Fill Rate at Census				79.2	112.5	77.1
	Program Success						
21	Course Retention				95.0	93.1	100.0
22	Course Success				75.0	82.8	91.9

	Key Performance Indicators	Spring05	Spring06	Spring07	Spring08	Spring09	Spring10
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Program Access						
1	Majors (total)						
2	New Majors						
3	Courses Offered	3.0	4.0	3.0	4.0	4.0	3.0
4	Sections Offered	20.0	21.0	18.0	14.0	15.0	15.0
5	Morning Sections	12.0	12.0	11.0	8.0	9.0	10.0
6	Afternoon Sections	6.0	7.0	5.0	4.0	3.0	2.0
7	Evening Sections	2.0	2.0	2.0	2.0	3.0	3.0
8	Arranged Sections						
9	Weekend Sections						
10	Short Term Sections	0.0	0.0	0.0	0.0	0.0	0.0
11	DistanceEd Full-Term Sections	0.0	0.0	0.0	0.0	0.0	0.0
12	DistanceEd Short-Term Sections						
13	Enrollment	194	179	142	132	171	190
14	Weekly Student Contact hours (WSCH)	3355.0	2997.5	2422.9	1000.7	1389.6	1510.8
15	Full-Time Equivalent Students (FTES)	115.0	102.8	83.1	30.9	42.9	46.6
	Program Resources						
16	Full-Time Equivalent Faculty (FTEF)	7.6	7.9	6.8	2.8	3.4	4.4
17	Credit Reimbursement Rate	**$2,922.30**	**$3,259.71**	**$3,476.34**	**$3,668.28**	**$3,834.46**	**$3,834.46**
	Program Operation						
18	WSCH/FTEF	443.8	379.9	355.8	358.7	414.8	343.4
19	FTES/FTEF	15.2	13.0	12.2	11.1	12.8	10.6
20	Fill Rate at Census	20.4	19.7	15.3	79.0	91.1	147.4
	Program Success						
21	Course Retention	93.3	96.1	96.5	92.4	94.7	96.3
22	Course Success	67.0	76.0	83.8	74.2	72.5	68.9

	Key Performance Indicators	Summer04	Summer05	Summer06	Summer07	Summer08	Summer09
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Program Access						
1	Majors (total)						
2	New Majors						
3	Courses Offered	1.0	1.0	1.0	1.0	1.0	1.0
4	Sections Offered	1.0	1.0	1.0	1.0	3.0	2.0
5	Morning Sections	1.0	1.0	1.0	1.0	3.0	2.0
6	Afternoon Sections						
7	Evening Sections						
8	Arranged Sections						
9	Weekend Sections						
10	Short Term Sections	1.0	1.0	1.0	1.0	3.0	2.0
11	DistanceEd Full-Term Sections						
12	DistanceEd Short-Term Sections	0.0	0.0	0.0	0.0	0.0	0.0
13	Enrollment	26	25	13	14	41	32
14	Weekly Student Contact hours (WSCH)	177.0	126.0	71.2	82.8	270.6	243.4
15	Full-Time Equivalent Students (FTES)	6.1	4.3	2.4	2.8	8.4	7.5
	Program Resources						
16	Full-Time Equivalent Faculty (FTEF)	0.4	0.2	0.2	0.2	0.5	0.4
17	Credit Reimbursement Rate	**$2,922.30**	**$3,259.71**	**$3,476.34**	**$3,668.28**	**$3,834.46**	**$3,834.46**
	Program Operation						
18	WSCH/FTEF	465.9	572.7	323.5	376.5	501.1	579.5
19	FTES/FTEF	16.0	19.6	11.1	12.9	15.5	17.9
20	Fill Rate at Census	104.2	150.0	66.7	58.3	84.7	129.2
	Program Success						
21	Course Retention	96.2	100.0	100.0	100.0	100.0	96.9
22	Course Success	84.6	64.0	84.6	92.9	82.9	93.8

			04-05		05-06		06-07		07-08		08-09		09-10	
			Year1		Year2		Year3		Year4		Year5		Year6	
Gender														
	PHYS	Female	113	33.9%	103	34.9%	88	32.2%	69	28.8%	115	35.1%	114	29.5%
	PHYS	Male	220	66.1%	192	65.1%	185	67.8%	168	70.0%	203	61.9%	263	68.0%
	PHYS	Missing							3	1.3%	10	3.0%	10	2.6%
	PHYS	Total	333	100.0%	295	100.0%	273	100.0%	240	100.0%	328	100.0%	387	100.0%
Age														
	PHYS	19 or younger	95	28.5%	102	34.6%	82	30.0%	57	23.8%	120	36.6%	153	39.5%
	PHYS	20-24	162	48.6%	154	52.2%	153	56.0%	122	50.8%	155	47.3%	183	47.3%
	PHYS	25-29	34	10.2%	26	8.8%	28	10.3%	35	14.6%	29	8.8%	28	7.2%
	PHYS	30-34	14	4.2%	3	1.0%	5	1.8%	12	5.0%	10	3.0%	9	2.3%
	PHYS	35-39	12	3.6%	4	1.4%	2	0.7%	5	2.1%	5	1.5%	6	1.6%
	PHYS	40-49	13	3.9%	3	1.0%	2	0.7%	4	1.7%	7	2.1%	6	1.6%
	PHYS	50 and above	2	0.6%	3	1.0%	1	0.4%	4	1.7%	2	0.6%	2	0.5%
	PHYS	Missing	1	0.3%					1	0.4%				0.0%
	PHYS	Total	333	100.0%	295	100.0%	273	100.0%	240	100.0%	328	100.0%	387	100.0%
Ethnicity														
	PHYS	Asian	110	33.0%	108	36.6%	81	29.7%	74	30.8%	68	20.7%	47	12.1%
	PHYS	Black or African American	13	3.9%	9	3.1%	13	4.8%	3	1.3%	9	2.7%	8	2.1%
	PHYS	Hispanic/Latino	79	23.7%	77	26.1%	77	28.2%	61	25.4%	100	30.5%	116	30.0%
	PHYS	American Indian or Alaska Native							3	1.3%	2	0.6%	1	0.3%
	PHYS	Native Hawaiian or Other Pacific Islander							1	0.4%	3	0.9%		0.0%
	PHYS	White	99	29.7%	80	27.1%	81	29.7%	64	26.7%	82	25.0%	68	17.6%
	PHYS	Two or More Races											3	0.8%
	PHYS	Unknown/Non-Respondent	32	9.6%	21	7.1%	21	7.7%	34	14.2%	64	19.5%	144	37.2%
	PHYS	Total	333	100.0%	295	100.0%	273	100.0%	240	100.0%	328	100.0%	387	100.0%
Educational Goal														
	PHYS	Degree & Transfer	132	39.6%	116	39.3%	115	42.1%	20	8.3%	70	21.3%	146	37.7%
	PHYS	Transfer	127	38.1%	112	38.0%	106	38.8%	13	5.4%	34	10.4%	65	16.8%
	PHYS	AA/AS	11	3.3%	16	5.4%	9	3.3%	7	2.9%	38	11.6%	33	8.5%
	PHYS	License	9	2.7%	11	3.7%	8	2.9%						
	PHYS	Certificate	6	1.8%	5	1.7%	3	1.1%					1	0.3%
	PHYS	Job Skills	9	2.7%	4	1.4%	5	1.8%	7	2.9%	19	5.8%	13	3.4%
	PHYS	Basic Skills							8	3.3%	19	5.8%	2	0.5%
	PHYS	Personal									1	0.3%	19	4.9%
	PHYS	Undecided							23	9.6%	27	8.2%	44	11.4%
	PHYS	Not Reported	39	11.7%	31	10.5%	27	9.9%	162	67.5%	120	36.6%	64	16.5%
	PHYS	Total	333	100.0%	295	100.0%	273	100.0%	240	100.0%	328	100.0%	387	100.0%

	Key Performance Indicators	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
		Year1	Year2	Year3	Year4	Year5	Year6
	Program Resources						
23	Revenue: FTES*Reimbursement Rate	$238,500.90	$275,445.50	$248,141.15	$120,979.87	$165,418.60	$171,898.84
24	Total District Adopted Program Budget	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
25	Support Personnel (wage without benefit, 2200 and 2400 in budget)	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
26	Supplies (4300 in budget)	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
27	Cost	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
28	Total FTES for the year	81.67	84.5	71.38	32.98	43.14	44.83
29							
30	Degree: Biological and Physical Science	111	124	123	108	146	147
31	Certificates						
32	Skill Awards						
33	Licenses (reported by department)						
	Career Technical Education Programs						
34	VTEA Grant						
35	Industry Contributions to Program Resources						
36	Available Jobs						
37	Attach one copy of the three most recent College Core Indicator Information forms for each of the appropriate TOP codes						
38	Please include "Student Satisfaction" and "Employer Satisfaction" in the program review write-up.						
39	Labor market data						