**Sinclair Community College**

**Continuous Improvement Annual Update 2013-14**

**Please submit to your dean and the Provost’s Office no later than Oct. 1, 2013**

**Department:** 0359 – Physics

Year of Last Program Review: FY 2011-2012

Year of Next Program Review: FY 2016-2017

**Section I: Department Trend Data, Interpretation, and Analysis**

**Degree and Certificate Completion Trend Data – OVERALL SUMMARY**

Please provide an interpretation and analysis of the Degree and Certificate Completion Trend Data (Raw Data is located in Appendix A*): i.e. What trends do you see in the above data? Are there internal or external factors that account for these trends? What are the implications for the department? What actions have the department taken that have influenced these trends? What strategies will the department implement as a result of this data?*

The mean, median, and mode of degree completers over the period from Fall 2007 to Spring 2013 was 1.7, 1.5, and 3, respectively. It is difficult to interpret trends from this data because the number of completers is very small. However, since the data spans six years it is likely that the department will continue to see no more than 3 degree completers in any given year. By contrast, in 2010 Dayton’s four physics credentialing programs graduated 41 students. The Air Force Institute of Technology-Graduate School of Engineering & Management graduated 21 physics students. Our department graduated 1 student with credentials in physics in the same year. It will be very difficult for our department to compete with colleges of science and engineering at four year colleges and universities. The department did offer a program with Physics emphasis in the past but this was deactivated due to low enrollment. We are reconsidering this decision and intend to revive the program this academic year.

**Course Success Trend Data – OVERALL SUMMARY**

Please provide an interpretation and analysis of the Course Success Trend Data (Raw Data is located in Appendix A). Looking at the success rate data provided in the Appendix for each course, please discuss trends for high enrollment courses, courses used extensively by other departments, and courses where there have been substantial changes in success.

The overall department success rates have been slightly above the overall SME division success rates and the college wide success rates. This speaks to the dedication of the Physics faculty to our students since Physics is considered a very difficult subject by most students and they experience a lot of anxiety at just the thought of having to take a Physics course. Having said that, the department success rate is down a little bit when compared to the previous five years. We attribute this small downward trend to the semester conversion. We noticed more absences and difficulty on the part of students to stay committed to some courses. There are preliminary indications that this situation has improved this academic year. The department is working on strategies to keep students engaged throughout the semester and these have been topics of discussion during our Department Learning Days.

There is a drop in the success rates of AST 1112 when compared to the success rates of AST 113 which is the quarter version of the astronomy course that most closely resembles AST 1112. We suspect that this drop is due to a change in the prerequisite requirements. In the past, under the quarter system, AST 111 (which dealt with the conceptual foundation necessary to understand Astronomy) was a stand-alone course and was a prerequisite for AST 113. Typically students who took AST 113 also took AST 111 and AST 112. Our enrollment in AST 113 was significantly lower than enrollment in AST 111. However, these were students who were genuinely interested in Astronomy, had the necessary prerequisites and performed very well. In the semester version, we converted the sequence into two stand-alone courses and students can enter either one. The necessary conceptual material is presented in both courses along with other material. Furthermore, AST 1112 (and AST 113) is more Math intensive than AST 1111. We moved to this model since it is adopted by a number of 4-year institutions across the country. But perhaps this is not a model suitable for our students. We are in the process of reconsidering the model. We would like to continue to evaluate success rates for the current academic year and make necessary changes based on the data.

Please provide any additional data and analysis that illustrates what is going on in the department (examples might include accreditation data, program data, benchmark data from national exams, course sequence completion, retention, demographic data, data on placement of graduates, graduate survey data, etc.)

The Force Concept Inventory, a multiple choice test to gauge student understanding of forces and related kinematics, was administered to students across all sections of PHY 2201 during Spring 2013. This data will inform us of how our students measure against national trends in student understanding of these concepts. Preliminary results indicate that our students are performing at the same level as students nationwide in a lecture class. However, we administered the post-test at the end of the semester as opposed to immediately after instruction of Newtonian Theory. We are collecting more data again this semester and will continue to do so throughout the year. We will have more to report in the next update.

**Section II: Progress Since the Most Recent Review**

Below are the goals from Section IV part E of your last Program Review Self-Study. Describe progress or changes made toward meeting each goal over the last year.

|  |  |  |
| --- | --- | --- |
| **GOALS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| A few years ago, a part timer who had a strong background in space weather and meteorology worked with a full time faculty member to develop a Weather and Climate course. Because this part timer left abruptly this effort was never completed. The department is still of the opinion this course would provide a fantastic opportunity for students needing a general education laboratory based science course at the conceptual level. Once this course has completed two to three successful offerings, it would be a perfect candidate for the online delivery format. The department’s rationale is simple. There is a vast amount of online resources for the course as well as the laboratory is the world around us. | In progress [ ] Completed [ ] No longer applicable [x]  | Since OBR has changed the general education requirements for non-science majors, we no longer have the audience for this course. The department already offers four laboratory-based science courses that fulfill general education requirements and two of them are offered in the online as well as face-to-face formats with a third one being developed for online delivery. The department is of the opinion that focusing our efforts towards increasing enrollment, engagement and success rates of the current courses will be more beneficial to our students. |
| The department intends to expand and improve its integrated lecture and laboratory offerings. This will include further imbedding laptop based computer activities into the courses as well as a new technology called the Vernier LabQuest. The department has purchased 24 of these units because they provide a less complicated and less intimidating platform than the laptops. That makes them a worthy technology to further improve the quality of the conceptual physics offerings. | In progress [ ] Completed [ ] No longer applicable [x]  | Though the department does not have any current plans to expand its integrated lecture and laboratory offerings, we are in the process of revising labs for PHY 1110, PHY 114X and PHY 220X sequences. This is an ongoing effort and the LabQuests can be used in all these courses. |
| The conversion of the Introduction to Physics course will begin in the Fall 2012. This effort is very large but will serve as another model for the delivery of laboratory based science in the online format. | In progress [x] Completed [ ] No longer applicable [ ]  | This effort is underway. Progress has been made with the lab development. Work on the course development has been temporarily halted due to schedule constraints. It will resume in Jan. of 2014. But his also provides the chance to focus more fully and devote more time to the lab development. This offering is scheduled to go live in Fall 2014. |
| It is the department’s plan to create an online format for the Problem Solving in Physics with Matlab. This course has a strong enrollment and is held with high regard with students. The department hopes to use this course to possibly rekindle interest in the other Computational Science courses. | In progress [ ] Completed [ ] No longer applicable [x]  | The plan to convert this course into an online offering has been postponed for the time being. Art Ross was the instructor of record for this course since its initiation and was going to work on the conversion.  |

Below are the Recommendations for Action made by the review team. Describe the progress or changes made toward meeting each recommendation over the last year.

|  |  |  |
| --- | --- | --- |
| **RECOMMENDATIONS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| It does not appear that the department has fully addressed the recommendations from the last Program Review. Those previous recommendations are listed below. In addition to prioritizing the recommendations from the current Program Review, priority should also be given to taking action on the previous items which are listed below. * + Clarify for the department the steps needed to expand and formalize an assessment plan. Continue development and implementation of the department’s assessment plan, and report on progress annually. Make more extensive use of data to improve assessment.
	+ Consider developing a formal advisory mechanism to provide regular feedback and assistance to the department. Include regular feedback from area universities as well as Sinclair Community College.
	+ Continue work to support the development and performance of part-time faculty.
	+ Review the department’s curriculum and update as needed. Please note:
		- Many of the existing courses, as reflected by Master Syllabi, have not been revised since 1995.
		- The new Curriculum Management Tool will be a useful assist in expanding assessment practices.
		- Evaluate the need for PHY 133, 270 and 295 given the low enrollment in these courses over the past five years; deactivate if appropriate.
		- Incorporate General Education learning outcomes as appropriate.
	+ The department appears to have an opportunity to expand offerings for teacher education, transfer and Allied Health. The department should pursue this opportunity and request resources as needed.
 | In progress [x] Completed [ ] No longer applicable [ ]  | Please see the section on assessment were we have reported the progress made during the last academic year.The semester conversion task was huge and we had to reconsider and regroup our course offerings to meet the students’ needs as well as to fulfill the contractual obligations of our faculty. Hence the task of forming an advisory committee was postponed but is underway as we speak.Part time faculty were invited and attended some pedagogical discussions during Faculty Learning Days. In addition to collecting syllabi, we have instituted a new policy of requiring them to submit exams and grade distributions so feedback and support can be provided as needed. Also, strong mentoring was provided to new adjunct faculty, their classrooms were visited and feedback was provided. We are continuing our efforts in this direction and hope to have more to report next year.The curriculum for most of our courses have been revised and updated and the low enrollment courses have been discontinued.The department has been engaging in conversations with Wright State University to revive our teacher education offerings but so far has not been very successful. The lack of success is partly due to the fact that the Ohio marketplace is flooded with elementary teachers and job prospects are not stellar. WSU is experiencing a drop in enrollment as well. |
| The department should focus on the development of department/program outcomes. While this is a “service department” that will not have any programs in semesters, the department should still focus on developing appropriate, measurable outcomes and then performing assessment to see if those outcomes are being achieved. The department should work closely with its divisional Learning Liaison and the Director of Curriculum and Assessment in developing these department outcomes, which will then become the outcomes that are used in future Annual Updates and Program Reviews. | In progress XCompleted [ ] No longer applicable [ ]  | We started working on this during Fall 2012. Developing a formal plan for assessing individual courses as well as overall departmental outcomes was a huge task. Now that the assessment plan is in place, we intend to turn our attention to completing the formulation of departmental outcomes and developing assessments to measure the same. |
| In conjunction with the development of Department/Program Outcomes, the department should make development of an assessment plan a top priority. A crucial first step in this plan will be development of common measures across all sections of a course. This may take the form of common assignments, common exams, or perhaps some common items on certain exams, but a consistent set of data needs to be collected from all sections of a course that will allow the department to demonstrate student learning in terms of both course outcomes and program/department outcomes. Again, it is recommended that the department work closely with its divisional Learning Liaison and the Director of Curriculum and Assessment in developing this assessment plan. | In progress [x] Completed [ ] No longer applicable [ ]  | Common assessment questions were administered across all sections of PHY 1106 and PHY 1100, Student names and course numbers were removed from the students’ papers and were graded by FT faculty using a rubric. Sample graded papers were exchanged amongst faculty and re-graded to ensure reasonable consistency in grading. 43% of the students had a perfect score, 60% scored 80% or better and 70% scored 60% or better. In addition assessments were administered in PHY 2201. 62% had a perfect score, 76% had 80% or better and 24% scored 60% or below. |
| It would appear that there is room to engage adjuncts more and provide an increased level of oversight. The department should seriously consider development of common syllabi for courses that adjunct faculty can use to ensure they stay within the bounds of the curriculum. The department might explore use of the new Teaching Syllabus Tool to this end. Additional training of adjuncts appears to be in order, especially in improving their readiness to teach an integrated lecture-lab format.  | In progress [x] Completed [ ] No longer applicable [ ]  | Strong mentoring was provided to the new adjuncts that were hired during the 2012 - 2013 academic year, and during the summer of 2013. Classroom visits were made and constructive feedback provided to ensure success of both adjunct faculty and students. All adjuncts were invited to participate in pedagogical discussions during Faculty Learning Days in 2012. |
| In order to fully align with four-year institutions, it must be determined that there is alignment within the department. The conversion to semesters provides a great opportunity to hit the ”reset” button in this area, leading to greater consistency across the department. | In progress [x] Completed [ ] No longer applicable [ ]  | Greater alignment of the curriculum and mode of instruction has been achieved in the PHY 220X sequence and the PHY 1106/1107 course across all sections. The Astronomy courses have been aligned even before semester conversions. We anticipate alignment to occur in the PHY 114X sequence during the current academic year. |
| Relating to the recommendation above, the department should strengthen its relationships with external institutions, seek external input into departmental changes under consideration, and ensure alignment with four-year programs. It is recommended that the department explore the development of an Advisory Committee to assist in this regard, as was suggested in the previous Program Review recommendations. | In progress [x] Completed [ ] No longer applicable [ ]  | We are in the process of forming an Advisory Committee. Invitations have been extended to the chairs of the Physics Departments at WSU and UD, WSU Engineering Dept., and SCC Allied Health. We are considering an industry partner and perhaps a high school administrator. |
| The Physics Resource Laboratory holds great promise in terms of increasing student success, but there is a lack of evidence that the lab does indeed improve student outcomes. The department should begin collecting data to determine the impacts of the lab on learning. This could be a real “flag waving” opportunity for the department that would validate the efforts and resources being devoted there. The department is encouraged to collect full ID numbers and reasons students are visiting as they enter the PRL, and to use that data to document student use and any increases in student success associated with use of the PRL. | In progress [x] Completed [ ] No longer applicable [ ]  | The department developed a survey to gauge the use and effectiveness of the PRL and this survey was administered to students during the 2012 - 2013 academic year. During Fall and Winter semesters students who used the PRL were very satisfied with the quality of help they received. We are in the process of hiring a new coordinator for the PRL and once the position is filled, we expect to enlist his/her help to correlate the usage data to success rates. |
| There is a considerable amount of external research to support the integrated lecture/lab approach. The department may choose to buttress this with internal comparisons between sections that take this approach and those who don’t. If the data indicates that student success is substantially increased by this approach, then the department should scale this approach to encompass all lecture/lab sections it offers. If professional development is required for faculty to appropriately implement this approach, it is recommended that training be done so that all faculty can use it effectively. | In progress [x] Completed [ ] No longer applicable [ ]  | Since 2003, the department has gradually expanded its offerings of calculus-based physics (PHY 20X, PHY 220X) in an integrated lab/lecture format by co-scheduling lab and lecture sections in a back-to-back manner. This process started with one section taught by an adjunct, then all sections taught by tenure track faculty, and now all sections. We have expanded the offerings based on positive student feedback, and better coordination with part-time faculty made possible, in part, through easier sharing of curriculum materials using Angel. A similar “experiment” in our conceptual physics course (PHY 1000, PHY 1100, PHY 1106) has, in our opinion, been less successful, and we have contracted our efforts. An integrated lab/lecture format requires a greater time commitment per class meeting by students, and our audience for these classes (unlike the calculus-based cohort) does not generally see physics as a core requirement. Attendance problems, which tend to fragment lab groups and create the need for more make-up work, was one problem that arose with this cohort. The department felt that offering the course in smaller time blocks with a separate lecture and lab was a better fit for the students. |
| There has been a tremendous emphasis on STEM areas for several years now. The department may want to thoughtfully explore whether an associate degree program should be developed that would allow for smooth transfer into a four-year Physics program. There is every indication that there will be growth in opportunities for those holding baccalaureate degrees in STEM fields, and the department may want to position itself to be part of that pipeline in Physics.  | In progress X[ ] Completed [ ] No longer applicable [ ]  | As mentioned before, we are in the process of formulating a plan to revive the associate degree program with a Physics emphasis. We expect the advisory committee to be a valuable resource and help provide some direction in this effort. We do expect to have this task completed this academic year. |

**Section III: Assessment of General Education & Degree Program Outcomes**

The Program Outcomes for the degrees are listed below. **All program outcomes must be assessed at least once during the 5 year Program Review cycle, and assessment of program outcomes must occur each year**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **General Education Outcomes** | To which degree(s) is this program outcome related? | Year assessed or to be assessed. | Assessment MethodsUsed | What were the assessment results? (Please provide brief summary data) |
| Critical Thinking/Problem Solving | All programs | **2012-2013** | Common assessment questions were administered across all sections of PHY 1106 and PHY 1100, Student names and course numbers were removed from the students’ papers and they were graded by FT faculty using a rubric. Sample graded papers were exchanged amongst faculty and regarded to ensure reasonable consistency in grading.  | About 70% of the students scored 60% or better, 60% scored 80% or better and 43% had a perfect score on the assessment. |
| Values/Citizenship/Community | All programs | **2013-2014** |  |  |
| Computer Literacy | All programs | **2014-2015** |  |  |
| Information Literacy | All programs | **2015-2016** |  |  |
| Oral Communication | All programs | **2016-2017** |  |  |
| Written Communication | All programs | **2016-2017** |  |  |
|  |  |  |  |  |
| **Program Outcomes** | To which course(s) is this program outcome related? | Year assessed or to be assessed. | Assessment MethodsUsed | What were the assessment results? (Please provide brief summary data) |
| UNDER DEVELOPMENT(Have these been developed? If so, please let us know and we can add them to the form) |  | N/A | N/A | N/A |

**General Education Outcomes**

1. Are changes planned as a result of the assessment of general education outcomes? If so, what are those changes?

The assessment data that was gathered during 2012- 2013 academic year (see above) indicates that our students are mastering the necessary critical thinking and problem solving skills as it pertains to Newton’s Laws. We will continue to administer this assessment and gather more data and perhaps expand the scope of the assessment to include other topics. So, no changes are planned as a result of the assessments administered thus far.

1. How will you determine whether those changes had an impact?

n/a

**Program Outcomes**

1. Are changes planned as a result of the assessment of program outcomes? If so, what are those changes?

n/a

1. How will you determine whether those changes had an impact?

n/a

**Improvement Efforts**

1. What were the results of changes that were planned in the last Annual Update? Are further changes needed based on these results?

Our major focus was to successfully transition our courses to their semester versions and to develop an assessment plan. We have completed transitioning our courses and have made some strides in the area of assessment. The results are preliminary and at this point do not indicate the need for any major changes. As we expand our assessment plans to include more topics and courses, we will evaluate the assessment process and the results and make changes as necessary.

1. Are there any other improvement efforts that have not been discussed in this Annual Update submission?

The Physics Resource Lab provides academic support services (tutorial assistance and makeup labs in particular) to both students and faculty and helps improve student success and retention rates. Some policy changes have been instituted to ensure better quality of tutorial staff and the process of hiring a new coordinator is underway. The new coordinator is expected to have a significant Physics background and therefore will be able to tutor and oversee the operations of the PRL effectively. Student tutors are also expected to have either a BS in Physics or equivalent educational background to serve as Master Tutors in the PRL. This is a significant change from past policies. Currently we have two tutors that qualify and are working in that capacity in the PRL. In addition to being trained in the use of lab equipment, student tutors are also being coached to tutor more effectively.

**APPENDIX – PROGRAM COMPLETION AND SUCCESS RATE DATA**

**Degree and Certificate Completion**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Division | Department | Department Name | Program | FY 07-08 | FY 08-09 | FY 09-10 | FY 10-11 | FY 11-12 | FY 12-13 |
| SME | 0359 | Physics | CPHYE.AS | . | 1 | 1 | . | . | . |
| SME | 0359 | Physics | PHYE.AS | 1 | 2 | 1 | 1 | . | 3 |

**Course Success Rates**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Department** | **Department Name** | **Course** | **FY 07-08** | **FY 08-09** | **FY 09-10** | **FY 10-11** | **FY 11-12** | **FY 12-13** |
| 0359 | Physics | AST-101 | 66.7% | 69.6% | 67.4% | 66.7% | 77.1% | . |
| 0359 | Physics | AST-107 | . | . | . | . | . | . |
| 0359 | Physics | AST-111 | 70.8% | 63.1% | 63.1% | 64.4% | 62.8% | 62.5% |
| 0359 | Physics | AST-1111 | . | . | . | . | . | 58.8% |
| 0359 | Physics | AST-1112 | . | . | . | . | . | 48.4% |
| 0359 | Physics | AST-1117 | . | . | . | . | . | 59.9% |
| 0359 | Physics | AST-1118 | . | . | . | . | . | 58.5% |
| 0359 | Physics | AST-112 | 91.3% | 86.4% | 83.8% | 89.3% | 84.8% | 81.3% |
| 0359 | Physics | AST-113 | 88.1% | 85.9% | 78.1% | 72.5% | 78.8% | 71.4% |
| 0359 | Physics | AST-117 | 71.8% | 62.5% | 64.8% | 64.0% | 64.2% | 64.3% |
| 0359 | Physics | AST-118 | 88.2% | 80.0% | 84.2% | 87.2% | 84.1% | 56.3% |
| 0359 | Physics | AST-119 | 88.1% | 82.2% | 79.8% | 78.6% | 80.4% | 85.0% |
| 0359 | Physics | AST-297 | . | . | . | . | . | . |
| 0359 | Physics | AST-9112 | . | . | . | . | . | 71.4% |
| 0359 | Physics | AST-9113 | . | . | . | . | . | 50.0% |
| 0359 | Physics | AST-9118 | . | . | . | . | . | 57.1% |
| 0359 | Physics | AST-9119 | . | . | . | . | . | 66.7% |
| 0359 | Physics | PHY-100 | 80.6% | 83.8% | 80.2% | 80.9% | 81.1% | 83.9% |
| 0359 | Physics | PHY-104 | 78.6% | 95.5% | 75.8% | 76.7% | 78.6% | . |
| 0359 | Physics | PHY-106 | 77.4% | 83.1% | 61.3% | 80.0% | 82.4% | . |
| 0359 | Physics | PHY-107 | . | . | . | . | . | . |
| 0359 | Physics | PHY-110 | . | . | . | . | . | . |
| 0359 | Physics | PHY-1100 | . | . | . | . | . | 78.0% |
| 0359 | Physics | PHY-1104 | . | . | . | . | . | 81.8% |
| 0359 | Physics | PHY-1106 | . | . | . | . | . | 76.9% |
| 0359 | Physics | PHY-1107 | . | . | . | . | . | . |
| 0359 | Physics | PHY-1110 | . | . | . | . | . | . |
| 0359 | Physics | PHY-1119 | . | . | . | . | . | . |
| 0359 | Physics | PHY-1131 | . | . | . | . | . | 75.6% |
| 0359 | Physics | PHY-1141 | . | . | . | . | . | 87.9% |
| 0359 | Physics | PHY-1142 | . | . | . | . | . | 100.0% |
| 0359 | Physics | PHY-119 | . | . | . | . | . | . |
| 0359 | Physics | PHY-131 | 74.8% | 73.5% | 78.6% | 64.8% | 87.5% | 100.0% |
| 0359 | Physics | PHY-132 | 90.6% | 100.0% | 90.9% | 91.4% | 92.0% | . |
| 0359 | Physics | PHY-141 | 67.6% | 80.2% | 78.3% | 85.0% | 87.4% | 75.0% |
| 0359 | Physics | PHY-142 | 86.0% | 87.7% | 77.8% | 85.5% | 89.9% | . |
| 0359 | Physics | PHY-143 | 84.0% | 90.9% | 86.9% | 86.0% | 91.9% | 100.0% |
| 0359 | Physics | PHY-201 | 72.7% | 72.2% | 81.9% | 78.8% | 83.5% | . |
| 0359 | Physics | PHY-202 | 84.0% | 88.8% | 92.2% | 91.3% | 88.2% | 68.4% |
| 0359 | Physics | PHY-203 | 87.1% | 83.7% | 90.0% | 92.2% | 88.1% | 95.5% |
| 0359 | Physics | PHY-207 | . | . | . | . | . | . |
| 0359 | Physics | PHY-208 | . | . | . | . | . | . |
| 0359 | Physics | PHY-209 | . | . | . | . | . | . |
| 0359 | Physics | PHY-210 | . | 83.3% | 87.1% | 76.5% | 85.7% | . |
| 0359 | Physics | PHY-212 | . | 100.0% | . | . | . | . |
| 0359 | Physics | PHY-220 | 100.0% | 100.0% | . | . | . | . |
| 0359 | Physics | PHY-2201 | . | . | . | . | . | 91.9% |
| 0359 | Physics | PHY-2202 | . | . | . | . | . | 88.1% |
| 0359 | Physics | PHY-2207 | . | . | . | . | . | . |
| 0359 | Physics | PHY-2208 | . | . | . | . | . | . |
| 0359 | Physics | PHY-245 | . | 100.0% | . | . | . | . |
| 0359 | Physics | PHY-297 | 100.0% | 100.0% | 100.0% | . | . | . |
| 0359 | Physics | PHY-9142 | . | . | . | . | . | 42.9% |
| 0359 | Physics | PHY-9202 | . | . | . | . | . | 85.7% |
| 0359 | Physics | PHY-9203 | . | . | . | . | . | 84.0% |
| 0359 | Physics | PHY-9208 | . | . | . | . | . | . |
| 0359 | Physics | PHY-9209 | . | . | . | . | . | . |
| 0359 | Physics | SME-110 | . | . | . | 70.4% | 69.2% | . |