Physics Department 2012 Annual Assessment Update
September 15, 2012

I. Mission Statement, Program Goals, Student Learning Outcomes, Curriculum Map, and Multi-Year Assessment Plan:

A. Mission statement:
http://www.westmont.edu/_academics/departments/physics/mission_statement.html

B. Program Learning Outcomes (PLOs):
http://www.westmont.edu/_academics/departments/physics/documents/DepartmentofPhysicsStudentLearningOutcomes.pdf

C. Curriculum Map:
http://www.westmont.edu/_academics/departments/physics/documents/DepartmentofPhysicsCurriculumMap.pdf

D. Multi-Year Assessment Plan:
http://www.westmont.edu/_academics/departments/physics/documents/DepartmentofPhysicsMulti-YearAssessmentPlan.pdf

II. Follow up on Action Items identified in previous reports:

A year after the six year report: The two main foci of this report are the changes we've made in response to the six year report and the assessment work towards the next six year report. The six year report was an intense effort that brought extensive feedback from alumni, data from our graduates' performance and their activities. It showed areas we need to improve on as well as areas we have strength.

A. Closing the Loop: At the end of the six year report was a listing of "closing the loop" activities we had going forward:

Closing the Loop: In the section below we will list area by area when and how the changes will be made as indicated by the assessments done during this cycle. Note some changes cross SLO boundaries (e.g. a change may affect both knowledge/critical think as well as skills). The change will be listed under only one of the areas to be concise.

Knowledge/Critical Thinking: In many ways this is our most important area and gets the most attention. The suggested changes were:

1. Increase percentage of engineering/physics students in internships: here we have already added a graduation requirement. Going forward we will be emphasizing internship in our advising and working with the campus internship office to specify companies most likely to hire our students as interns. Primary responsibility: Kihlstrom
2. Class offerings: We have already modified the Quantum mechanics sequence to include Lagrangians and Hamiltonians but ideally (and if staffing allows) would

like to add a Classical Mechanics course to the curriculum. In addition we will be looking for opportunities to increase our engineering offerings (e.g. adding a Materials course or a machine shop experience). Primary responsibility: Whole department

3. Computer software: in the next two years we will be adding Matlab to our intro lab courses. Primary responsibility: Whittemore/Rogers
4. Research: over the next few years we will try to increase research opportunities (especially for our physics students) as well as increase the number of summer research stipends. Primary responsibility: whole department
5. Senior Seminar research papers: We will be raising expectation for the senior seminar papers starting fall 2011. Primary responsibility: Rogers
6. In the general education courses we will be placing greater emphasis on the nature of scientific theory and the prediction and experimental verification in scientific investigations beginning immediately. Primary responsibility: whole department

Skills: Several of the above changes apply here as well. But in addition:

1. On laboratory abstracts we will immediately begin a focus on the higher level processes (like results and conclusions) rather than the more mechanical areas (like procedure) Primary responsibility: Whittemore
2. In 2012-13 we will develop an oral presentation rubric to develop speaking skill. Primary responsibility: Kihlstrom

Christian Orientation: Here the issues were both the need to more fully develop this area in our courses and also to better define the summative paper in the senior seminar.

1. Add a faith/science module into the modern physics course beginning 2012. Primary responsibility: Rogers

Develop a better defined faith/science paper assignment for the senior seminar by the 2012-2013 cycle. Primary responsibility: Sommermann

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Changes made 2011-2012:

Knowledge/Critical Thinking:

1. Internships: We have increased awareness of internships in our advising. In addition we brought a group of 14 students to the Boeing plant in El Segundo for a tour (one of which did an internship this summer).
2. Class offerings: No changes so far
3. Computer Software: We have had a hard time deciding between using Matlab (which is more costly but had greater applications in industry) versus Mathcad (probably a better tool for educational uses). We should make a final decision this fall.

4. Research: The funding from the leftover equipment money (a bit complicated issues which will be discuss later) allowed support of a research student in a collaboration between Physics (Kihlstrom) and Chemistry (Everest) this summer in addition to the usual physics research students.
5. Senior seminar: A more explicit oral prompt was given for the science paper but next year the written prompt should be revised.
6. General education: lectures have been modified to focus on the scientific method, especially early in the courses.

Skills:

1. In the lab courses, we've shown our rubrics for evaluating abstracts with explanations of the importance of analysis and conclusions.
2. Oral Presentation rubric: this coming year

Christian Orientation:

1. Add faith/learning module to Modern Physics Course: to be added fall 2012
2. Rewrite faith/learning paper prompt: to be done this coming year (2012-2013)

B. Goals and Action Items from Six Year Report:

Besides the "closing the loop" section of the report were sections on department goals and actions items to achieve them. Below are those two sections:

7B. Goals for the next six years: Overall our goal is to provide a better, stronger program for our students. To do this we have a number of goals over the next six years:

1. Create an endowment for the physics department: The insurance claim after the Tea Fire has provided an opportunity to create an endowment that would support equipment purchases, undergraduate research and student scholarships. We are hoping to begin the endowment at roughly $350K but build it up to the $500K to $600K in the next six years.
2. Build student enrollment in physics and engineering/physics: Traditionally we have had 10 to 15 (up to 20) incoming freshmen and have graduated typical classes of 5-10. The drop off of majors in the four years is typical at colleges across the nation. Both majors are difficult so some find either they don't have the aptitude, or decide their interest is in another area. But we would like to increase the number of incoming freshmen interested in the major to the 20 to 30 range.
3. Increase the number of women in the program: Physics and Engineering nationwide has tended to be male dominated. Our numbers at Westmont reflect this even though overall at the College women outnumber men 2:1. In our program, fewer than 20% are women. We would like to increase this to the 30-40% range.

4. Increase internship participation to 70% for engineering/physics majors: Practical experience is critical in engineering, so we need to give as many of our students and internship experience.
5. Lay the groundwork for an addition faculty position (probably in Astronomy): Adding faculty positions is very difficult at Westmont since the enrollment is capped at 1200. But compared to other programs nationwide with a similar number of graduates, Westmont has a small number of faculty. In addition, the new Keck Telescope is a wonderful resource that an astronomer could better make use of.
6. Prepare for coming retirements: All three physics faculty are roughly a decade away from retirement. This presents challenges and opportunities. Diversifying the faculty is an important goal but this is best done by laying the groundwork years in advance. Aside from diversity, developing a plan of action for both hiring well and leaving the department in good shape for the future is important.

7C. Action Items to achieve the goals: Goals are meaningless without a plan to achieve the goals. For each of the goals above, there are concrete steps that need to be taken. The required steps will be listed for each of the goals above:

1. Create an endowment for the physics department: As mentioned, the insurance claim should allow us to establish the endowment in the next year. But the existence of the endowment also gives a target for donor giving. We would reach out to alums especially to consider contributing to the endowment. As an endowment, the funds are invested which should also help it grow. We will also look to taking unused funds in a given year and reinvest them into the fund.
2. Build student enrollment in physics and engineering/physics: In part this should be accomplished because of facilities have gone from embarrassing to impressive. But we need to do substantial recruiting. In past years we have made phone calls to some of our applicants. We want to commit to calling all of them. We will use e-mail and new media (e.g. Facebook) to do broad outreach. We will work with admissions along these lines.
3. Increase the number of women in the program: Beyond the steps taken in the previous item, we need to pay special attention to recruiting women students to get a critical mass. It would be helpful to include current women students on the process. Once here at Westmont it is important to provide support mechanisms to encourage women students. Ultimately recruiting women faculty as positions become available will be important.
4. Increase internship participation to 70% for engineering/physics majors: Here it is important first to make contact with local companies to establish (or expand) the list of companies looking for interns. It is important that by end of sophomore year our students have created resumes so when an opportunity arises they are ready to apply quickly. This involves more proactive advising.

5. Lay the groundwork for and addition faculty position (probably in Astronomy): Citing national trends for the size of physics programs is just the first step of the process. We need to increase the number of majors to make a plausible case. Thus goal #2 becomes important. In addition, because of the college goal of diversifying the faculty, we will need to take steps to build bridges to potential minority and women faculty. This would include inviting women and people of color in the physics/astronomy fields to campus to give talks. Making contacts at conferences and talking to colleagues at other institutions who may know grad students who may be interested in faculty positions all can improve the chances of finding someone.
6. Prepare for coming retirements: Some of the actions in #5 apply here as well. But also in the sciences, start-up funds will be critical for each new hire. With at least three new hires in a relatively short span, building up a fund may be important.

Progress toward these goals 2011-2012:

1. Endowment: The funds ($350K) for this endowment were released to the college towards its fund raising for the Phase I campaign but with the following agreements:

1. Add the $17,500 to the current budget (what the proceeds of a $350K endowment would be) and each year going forward.
2. Establish an endowment (quasi-endowment?) initially funded with $30K from the Physics Restricted account (this was done in July 2012).
3. Allow additions to come from money remaining from the $17,500
4. Allow designated alumni gifts to the endowment fund (any alumni donations targeted toward physics or engineering/physics would automatically go towards that fund).
5. Physics accepts that until the $350K becomes available in the future to put into the endowment, we will not see appreciation of the $350K (and thus the $17,500 yearly addition to the department budget). But the actual endowment (quasi-endowment?) that is created can grow with appreciation and contributions as would its outflow.

Long term: In the future the original $350K will be restored. We would wait until after the $20 million loan is paid off (assuming this doesn't go beyond say the end of the next capital campaign). At that point the $17,500/year payout would cease. It would then be replaced by the proceeds of the endowment.

The funds from the $17,500 went to new equipment, a summer research stipend and about $5K was rolled into the new endowment.

2. Increase recruitment: We did substantial recruiting this year including a science focus weekend (in conjunction with mathematics and computer science) in April where students were brought to campus for special classes, talks and science demos). In addition many phone calls were made to applicants showing interest

in engineering or physics. This included calling every applicant who was a minority, female or Presidential Scholar. Also prospective physics and engineering students visiting campus typically got to sit down with a faculty member to have questions answered. This led to an incoming class of 23 total students including 8 women, 5 minorities and five Presidential Scholars plus a Monroe Scholar.

3. See #2
4. See Knowledge/Critical Thinking #1 in section above
5. Our seed grant proposal, submitted in May was for the addition of an Astronomy position. The initial $5K funding was approved to develop the full proposal.
6. Still to be done.

III. 2011-2012 Focus:

Six Year Assessment Plan: Below is the six year assessment plan as listed in the six year report from a year ago:

7D. Assessment plan for the next six years:

Physics Department
MULTI-YEAR PLAN

Outcomes	2011 - 2012	2012 - 2013	2013 - 2014	2014 - 2015	2015 - 2016	2016 - 2017	Means of Assessment, Benchmark	Who is charge
1. Know/Critical Thinking	1C,6C	1C,6C	1C, 2A,6C	1C,6C	1C,6CA, 7-9A, 10A	1C,6C		See belov
2. Skills: Exp/Theoretical	4C	4CA	4C	4C	4C, 7-9A,10A	4C		
3. Skills: Communication	3A, 6C	6C	6C	6C	6C,A, 10A	6C		
4. Christian Orientation	5C	5C	5C	5CA	5C, 10A	5C		
5.								
GE Projects								
6. Insert Department Learning Outcomes in all Syllabi	X							
7. Evaluate the 10 SLO measures overall for continuation/removal	X							
8. Revise all rubrics		X						
9. Develop Oral Pres Rubric		X						
10. Plan for External Review			X					
11. External Review of Physics Program				X				
12. Revise Alumni Survey					X			
13. Prepare six year report						X		

Comments/Reflections: The following are our measures of our SLO's. In the above chart the measure used number of the measure (1 for MFT, 2 for upper level grades, etc. followed by C for collected or A for analyz collected every year but not analyzed until later. When only an A appears, the assumption is the data eitl years. Also the current plan involved all ten measures but note that a GE project is to evaluate the ten me could (and probably will) be made at that time. Also note K=Kenneth Kihlstrom, S=Michael Sommermann

Measure:	Outcome Measured:	Measurement:	Who is respo
1. Major Field Test for physics	Knowledge	Direct	Kihlstrom
2. Upper level Physics grades	Knowledge	Direct	Kihlstrom
3. Evaluation of Lab Abstracts	Skills (esp. comm./writing)	Direct/Authentic	Whittemore
4. Listing of student papers/ Presentations & internship evals.	Skills (esp. Exp. Tech but also writing/oral)	Direct	Rogers
5. Senior seminar Faith/Learning Essay	Christian Orientation	Direct	Sommerma
6. Senior Seminar Physics paper and oral Presentation	Knowledge/Skills (written and oral comm.)	Direct	Rogers
7. Percentage of students in internships	Knowledge/Skills (esp. Exp Tech.)	Direct	Kihlstrom
8. Percentage of graduates: grad. school	Knowledge/Skills (esp. Exp Tech.)	Direct	Rogers
9. Percentage of graduates: technical fields	Knowledge/Skills (esp. Exp Tech.)	Direct	Sommerma
10. Alumni Survey	All	Indirect	Kihlstrom

1. Adjust the Multi-Year Assessment Plan to your department six-year assessment cycle.
2. Align your program-level assessment with the Institutional-level assessment whenever possible: e.g., if your department has the Effective Communication/Writing outcome among your Program Learning Outcomes, this outcome should be assessed in 2011-2012 academic year unless your department assessed this particular outcome in 2010-2011. If your department has the outcome aligned with the Christian Understanding/ Practices /Affections ILO it should assessed in 2012-2013 academic year, etc.

Progress toward assessment plan:

GE Projects:

1. We have inserted the Departmental Mission statement and student learning outcomes in our major courses.
2. In evaluating our department SLO measures we reluctantly decided to drop the upper level physics grades in response to feedback from the Program Review Committee.

Outcome Assessments:

1. Knowledge/Critical Thinking: We were to collect data from the Major Field test in physics from our graduating seniors as well as senior seminar papers. For the first time we did not get a complete response from the senior class. We provide Amazon gift cards as incentive but still a few did not take the test. There is still a possibility they will but it was surprising and discouraging. We have copies of the senior seminar papers.
2. Skills Experimental/Theoretical: Assembled list of student research output.
3. Skills Communication: We were to collect the senior seminar papers (which as noted above, we did). We were to analyze the abstracts from the General Physics lab course. We didn't do this.
4. Christian Orientation: This year's seminar focused on the science paper and did not assign the faith/learning paper.

IV. Next Steps: The action items in this section come from three sources. The first is from the "closing the loop" section of the 2011 Six Year Report noted in section II. The second is from "Goals for the Department" (also noted in section II). The third is from the "Assessment Plan". Some of these have already been noted in section II but they will be repeated here.

A. Actions Items.

Closing the loop section of the six year report:

1. Internships: Create a list of Internship opportunities for our students. Ken Kihlstrom will work with Jennifer Taylor to generate this list. Students will be given a copy. Timeline: Fall semester.
2. Decide on Matlab vs. Mathcad software. Warren Rogers will have primary responsibility. Timeline: Fall Semester with possibility of implementation in the spring labs.
3. Senior seminar paper prompt: Warren Rogers will revise the written prompts for the senior seminar science paper. Tmeline: Spring Semester
4. Oral Presentation Rubric: Ken Kihlstrom will develop a rubric this year. Timeline: Spring Semester

5. Incorporate a faith/science module in the Modern Physics course. This year Warren Rogers will develop faith/science content. Next year it will be incorporated in the syllabus for the course. Timeline: Fall Semester.
6. Faith/Science senior seminar prompt: Michael Sommermann will develop a better written prompt that clarifies the purpose of the paper. Timeline: Spring semester

Goals of the Department:

1. Build up student enrollment: Do aggressive recruitment of students. Primarily responsibility for Ken Kihlstrom but everyone will help. Timeline: Science focus preview days fall semester, phone calls to students: spring semester.
2. Develop Grant proposal for an Astronomy faculty position. Warren Rogers will develop a full blown grant proposal. Timeline: Fall semester: generate the academic worksheet. Spring semester write the full proposal.

Assessment Plan:

1. Collect and analyze student abstracts from general physics course: Warren Rogers will share the rubric with the students and collect the abstracts. Ken Kihlstrom will apply the rubric to analyze the abstracts. Timeline: Fall semester
2. Collect data from MFT exam: Ken Kihlstrom. Timeline Spring semester
3. Collect listings of student research publications and presentations and analyze. Warren Rogers. Timeline: data assembled by spring semester, analysis during the summer.
4. Collect feedback on internships and analyze. Ken Kihlstrom will be collecting and analyzing: Timeline spring semester.
5. Collect senior seminar papers (science and faith/science). Warren Rogers. Timeline: Spring semester.
6. Plan and carry our external departmental review: Whole department. Timeline: Spring Semester.