Physics Department Six Year Report

I Answers to Key Questions and Follow-up on PRC's Recommendations:

The most important question for the physics department is how will it transition with the loss of the entire faculty over the next few years. Since 1994 the department consisted of Drs. Warren Rogers, Michael Sommermann and Kenneth Kihlstrom. In addition, a part time lab instructor (in the most recent years filled by Dr. Tom Whittemore) filled out the teaching faculty. While there were times of instability (Dr. Rogers served as interim Provost for a time, Dr. Kihlstrom did occasional Europe Semesters as well as there being various Sabbaticals), this 20 year period represented a time of stable leadership and a cohesive vision of the department. But with all teaching faculty reaching their 60's it was clear a new era was coming to the department. This began with the departure of Dr. Rogers to take an endowed chair at Indiana Wesleyan in the fall of 2016. The hire to replace Dr. Rogers was therefore critical as this new person would have a large voice, as the first of the new faculty, who would likely give leadership and direction going forward. With the hire a Jonathan Mitchell, a Westmont alum and previously a tenured professor from UCLA we had someone with the experience and depth to give that leadership. Almost immediately the issues of the future of the department began to arise and be addressed. Should the department develop a more focused engineering program? Should there be a substantial astronomy component to the program building on the Keck Observatory on campus? Would this in combination of the existing pure physics and engineering/physics programs begin to spread the department too thin? What new resources be needed? New faculty positions? Substantial discussions took place in the department. But at the end of the 2016-2017 academic year, this was upended with the decision of Dr. Mitchell to return to his position at UCLA. Once again, we would be in a hiring mode in the 2017-2018 Academic year (this year) and the decisions of the future of the department necessarily are put on hold. As it turned out, we were unsuccessful in the hiring process (more below) leaving us in the same position. The key immediate question becomes who do we hire to provide that leadership going forward. If this makes it seem like we are side-stepping the question of what is our vision of the department direction going forward, it is because we largely are. The vision for the department must come from those who will carry it out not those who will soon be retired. So, what are the key questions we do need to face? Obviously the first is what was just mentioned:

A. <u>Who are we looking for in the initial hire</u>? In a normal hiring cycle, we would be looking for a young person, preferably with a post-doc on his/her resume who could teach the courses needed in the department as well as engage undergraduate students in physics research. But at this stage in our department history we also need someone who would have the abilities and desire to lead the department in the coming years. The same teaching/research requirements would still be there but vision, maturity and drive for leadership are also necessary. Much of our focus this year has been to find that person. As it turned out despite having two seemingly viable candidates we ended up with neither and enter another year of the search. I should note. A strong candidate, Kyle Watters (an alum and Stanford PhD) was not available for this fall but likely would for a year from fall. We'll do a full nterview in the fall

B. What directions could the department take?: The new person(s) does not come to a program with a blank slate. The existing program has been successful over the years. The combination of a pure physics program with an enviable record of placing students into Ph.D. programs along with an engineering/physics program that has attracted a steady stream of majors has worked well. The addition of the Observatory with the Keck 24 inch telescope has created opportunities for outreach and research. Adding a new faculty person with observational astronomy background would make fuller use of the telescope and expand research opportunities. Also, there appears to be possibilities of adding a full engineering program (which would require substantial fundraising). This initiative comes from the President but our department would have responsibility to implement the program. These choices should really be made by the new faculty who would need to implement them but with fundraising it may more depend on whether/when opportunities arise and if they arose sooner rather than later, the decision would need to be made by the existing faculty. Recently the President has suggested starting the full engineering program for incoming freshmen in the 2019-20 academic year.

C. What resources do the incoming faculty have to work with?: Typically a new faculty comes in with the question "How much will I receive in the form of start-up funds?" to determine how likely it is to establish a research lab. Our new hires in the next few years will ask that question. But they also need to know the financial resources of the department in general. What is the budget for equipment, for student wages (both grading and summer research)? Is there a realistic possibility for an extra faculty position (or two) that would allow an expansion into a full engineering program (or an astronomy emphasis). The Westmont Chemistry Department, for example, received a Stauffer Foundation Grant than has allowed the creation of ultimately a $1 million endowment to support summer research. In physics, the result of the Tea Fire's destruction of the old physics building allowed the replacement/upgrade of all of our old equipment. In addition, there was roughly $350,000 left over from the insurance payout (for equipment we chose not to replace). This allowed us to effectively create a $350K endowment to support the department (it's a bit more complicated as the college absorbed the money but increased our budget by $17.5K/year—the output of such and endowment with the promise to eventually create a true endowment of that amount). Meanwhile, unused money from that account has been rolled over into a true endowment which currently has reached $125K (see Appendix U). Other restricted accounts (listed in Appendix U) have also given us the ability to supplement any startup funds available from the Provost Office with departmental funds. It has also allowed us to support summer research students.

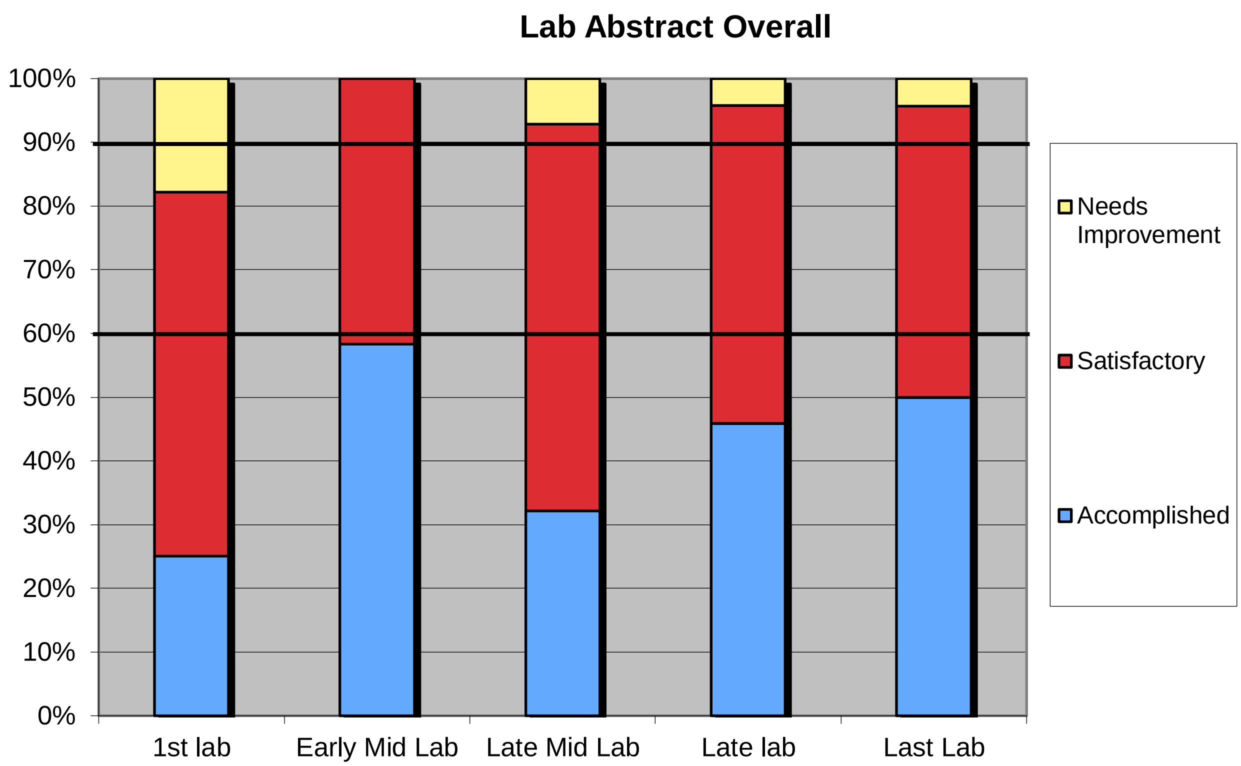
II Findings:

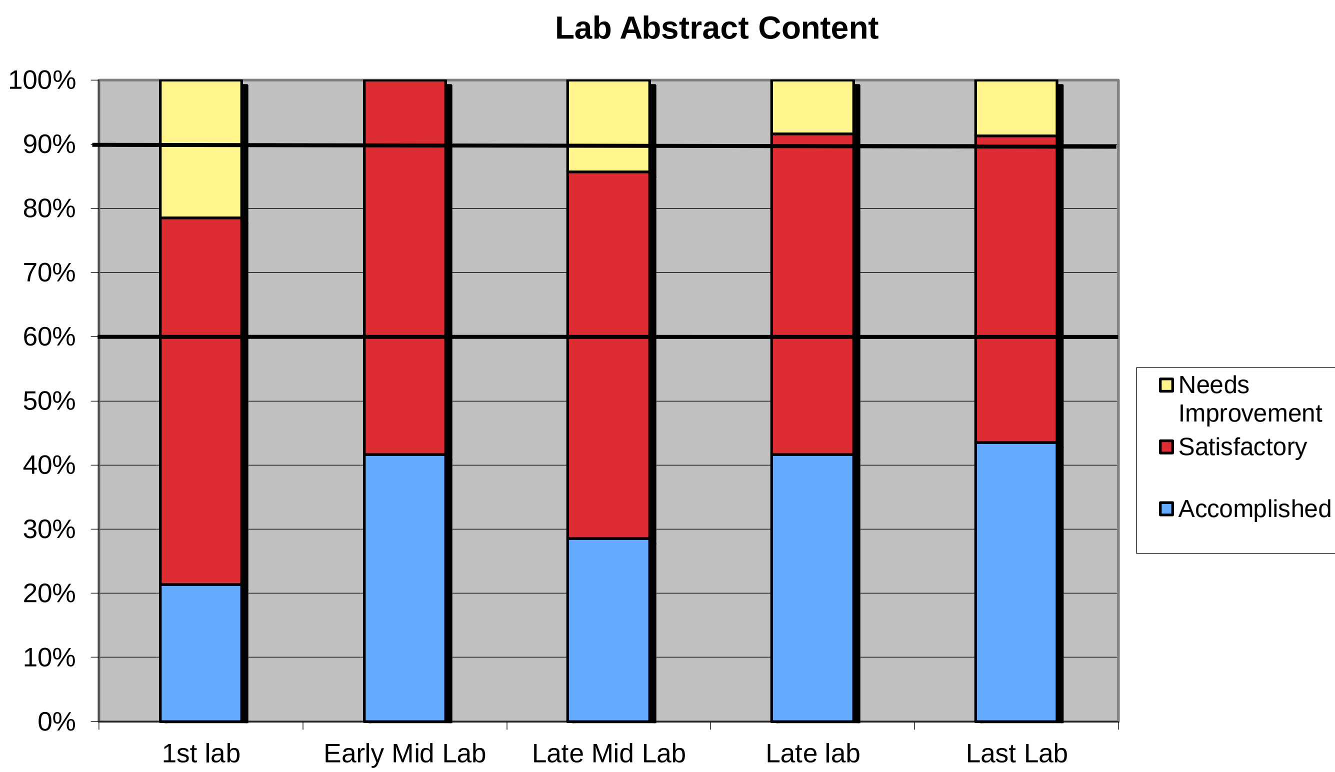
A. Student Learning: We had eight assessment methods to evaluate our student learning outcomes. Looking at each individually we start with the Major Field Test in Physics

1. Major Field Test in Physics: (Knowledge/Critical Thinking SLO) This is a nationally administered exam given in the senior year to physics majors. In fairness to the engineering/physics majors it should be noted with the focus on engineering, these students miss the quantum mechanics sequence so likely would not do as well on the advanced section. But we believe it still gives useful information. There is also the issue of how seriously some students take the exam that might lead to some aberrations. We have seen some students do exceptionally poorly (both in terms of their ability and in absolute terms). The big advantage of the exam for assessment purposes is the national percentile ratings. Our goal was to have 70% of our students to be above the 50^{th} percentile. Appendix B has the excel spreadsheet with the raw scores and percentiles year by year. In the years 2012-2018 we had 36 take the exam. Overall, we had 15/36 (42%) exceed the 50^{th} percentile in the total score. Breaking this down to the intro section we had 17/36 (47%) exceed 50%; advanced section, 12/36 (33%) exceed the 50th percentile. So we clearly did not meet our threshold. What does this mean? Looking at the data, with the exception of a few aberrations (as mentioned above) we see our good students do well and poor students do worse. But in recent years we have had more poorer students and fewer good students.

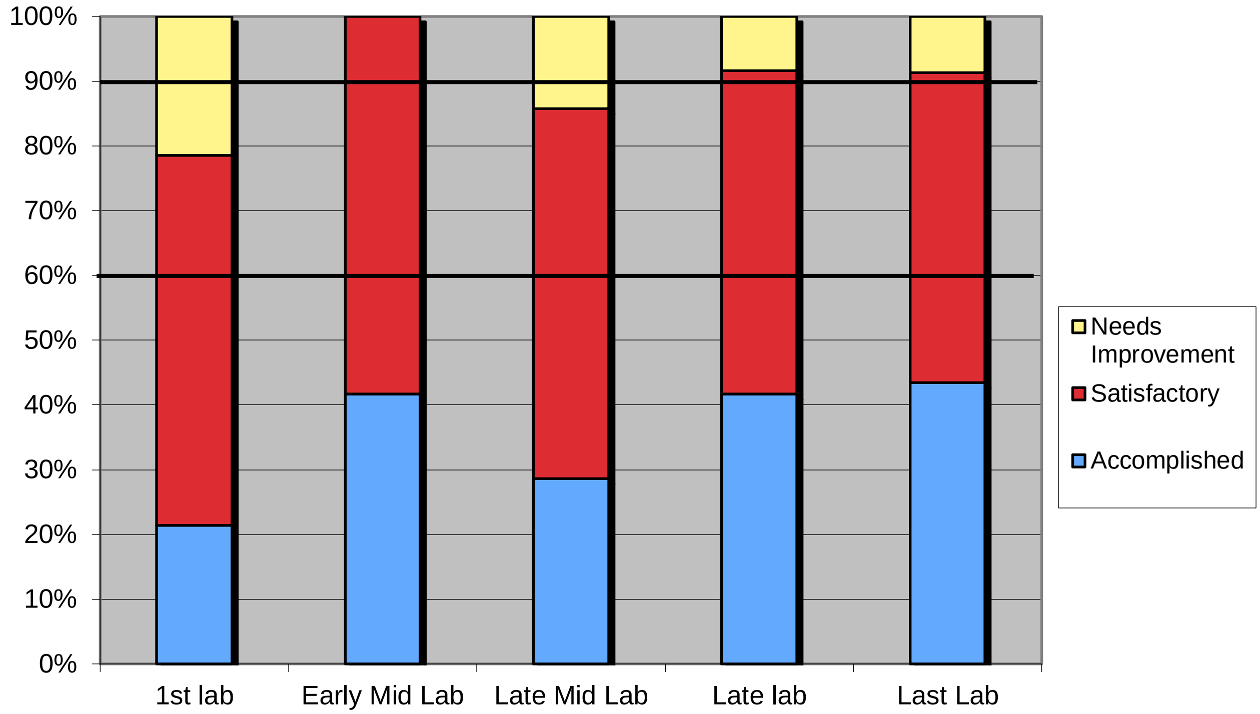
2. Evaluation of Lab Abstracts: (Skills SLO) In this section we evaluated lab abstracts in our general physics lab sections according to the rubric in Appendix C. The spreadsheet with the raw information (as well as graphs) is in Appendix D. The results are graphed below: The good news is that our established benchmarks of 60% accomplished and 90% accomplished or satisfactory were met for all three labs (early, mid, last) in all three categories (content, format &style and overall) with the one exception of the content on the last lab. They, in general write well and are able to translate experiments in the lab to clear, complete abstracts of their work. The surprise (and not a good one) was that performance tailed off as the semester went on. Both in content and overall there was a steady decline in their performance. Perhaps it reflected the particular labs (the first was probably the most straightforward to write up) but it would have been nice to see improvement rather than regression. That said, looking at the results from all the

labs, the best performance overall came in one of the later labs and the worst happened to be the very last lab (the one we included in the graph).





Lab Abstract Content



3. Listing of Student Papers/Presentations/Internship Evals: (Skills SLO but also Knowledge). Appendix E has a listing of Research output (presentations and papers with student authors). Ten students had their names included on peer reviewed publications and there were 21 presentations that included 18 distinct authors (many with multiple presentations). Appendix F: Gives sample internship evaluations. Here we were looking for two things: participation and excellence. The first will come in the next category. In addition, our students average at least 4 out of 5 on the internship forms in the various categories. On the latter, 74% of the scores were 5/5; 21% were 4/5 with only 5% a 3/5. The students easily exceeded the threshold.

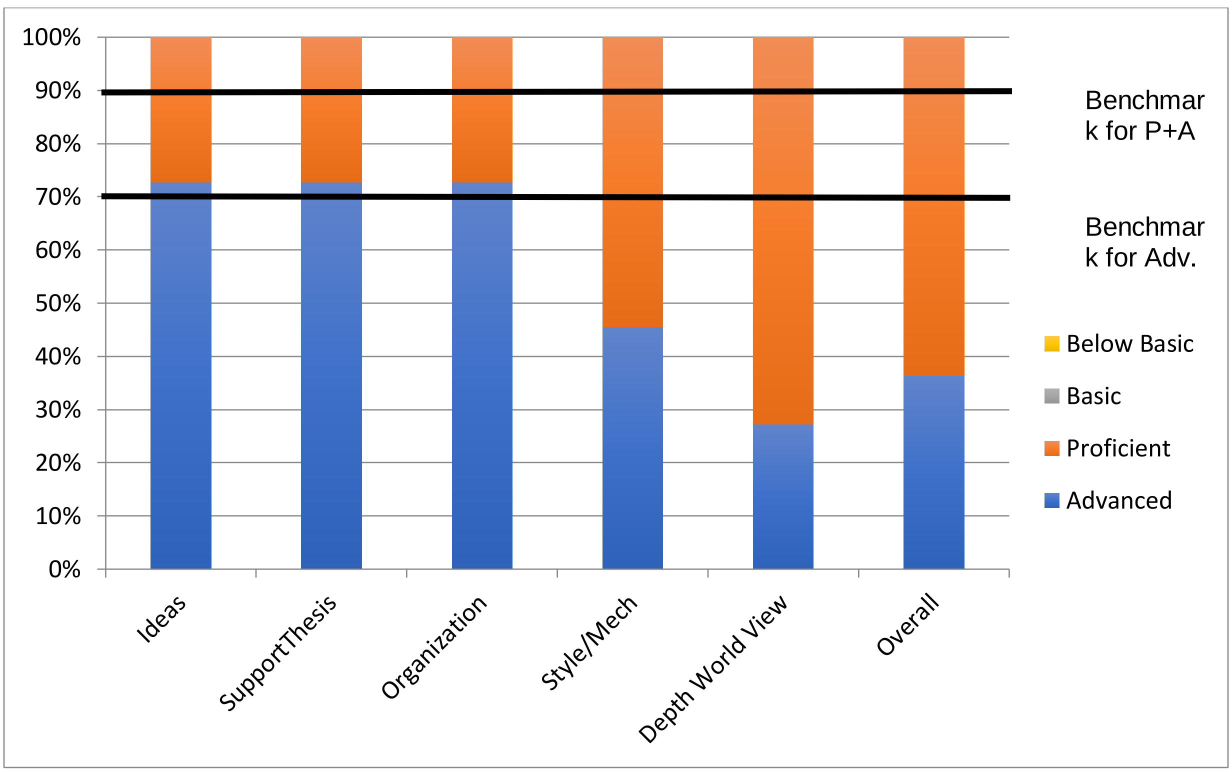
4. Percentage of Physics Grads doing research and Engineering Grads doing internships: (Skills & Knowledge SLO's)We wanted most of our physics majors to participate in research (60%) and our engineering/physics students to do internships (again 60%). The raw data is on a spreadsheet in Appendix G. Since the graduating class of 2012, 75 percent (12/16) of our physics majors have participated in physics research which exceeds our threshold largely due to the work of Warren Rogers who has won national awards for involving undergraduates in research. On the engineering/physics side we calculate the percentage of non-3:2 students (the 3:2 students typically would do internships after they left Westmont and we would not have that info). Here 42% (13/31) of our engineering/physics majors have done internships (although another 7 or 23% did research in the department). The percentages are higher in the 2015-

2018 classes where 65% of the engineering/physics majors did internships and an additional 17% did research.

5. Senior Seminar Faith/Learning Essay: (Christian Orientation SLO). Note, the goal was not to have a certain percentage profess the Christian faith. But we do want our students to have a well thought out philosophy of faith and science. The prompt for the assignment was the following:

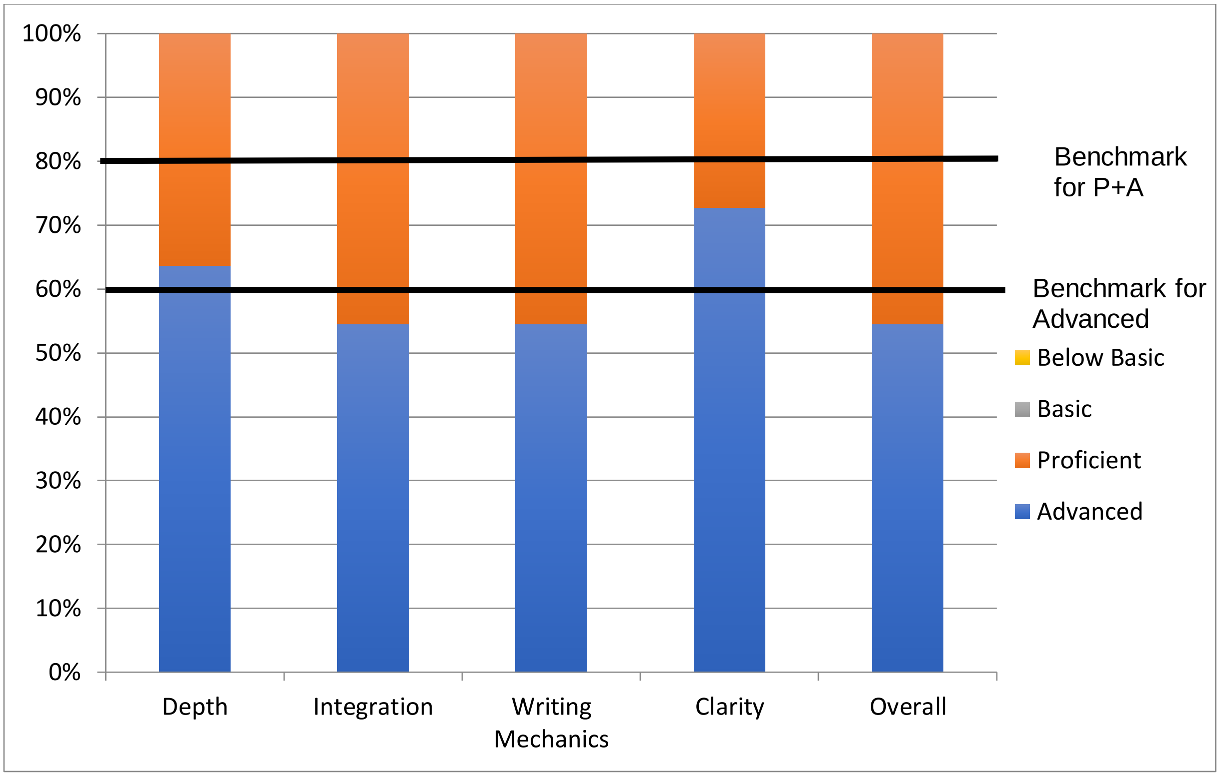
A 2-3 page paper reflecting on how your faith has developed in interaction with your education in physics and more broadly in science during your time at Westmont, Think of this along three lines: 1) How has your faith evolved during your years at Westmont, as a function of your education in physics and engineering, 2) What is your current world view, and how do faith and science contribute to this current view, and 3) name any particular individuals (authors, speakers, mentors ...) who have been influential in your faith development, and describe how.

This we measured in their senior seminar faith/learning essays according to the rubric in Appendix H. Appendix I has the excel spreadsheet with the raw scores but below is a chart of the results:



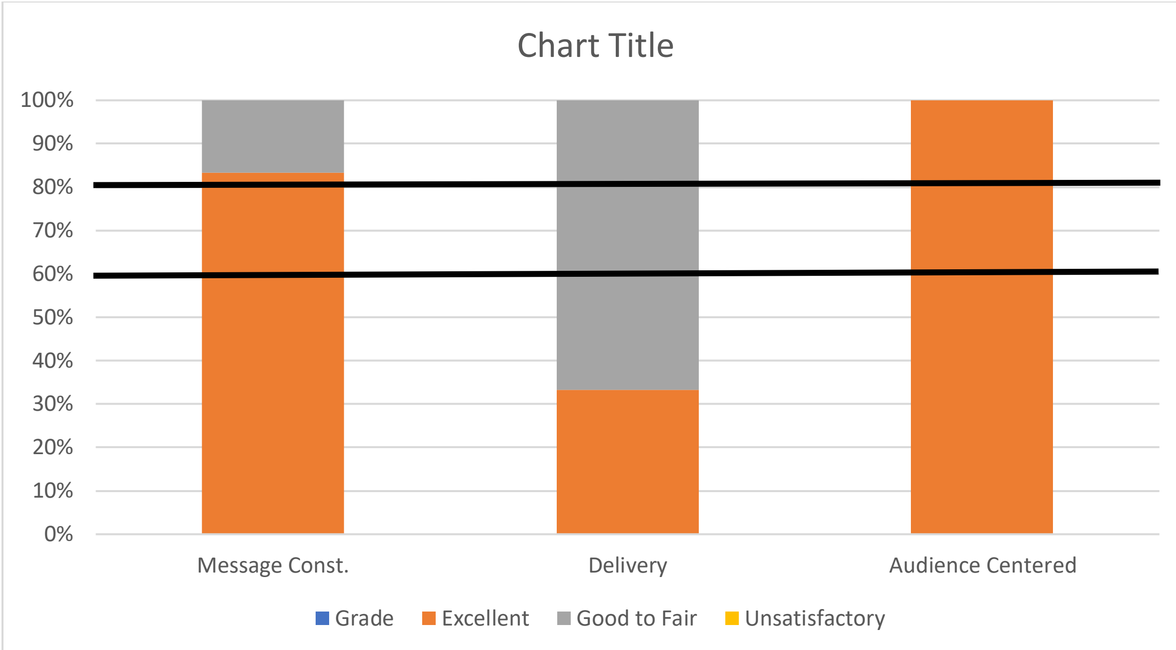
We were looking to have 70% reach the advanced level with 90% at the proficient level or above (our benchmarks). As shown in the bar graph, all reached the proficient level and while in some areas the 70% mark was reached for advanced, it was not true across the board and not true for the overall score. Still, the results were pretty encouraging. Beyond the numbers, however is the sense received from the papers that students think seriously and deeply about the issue of how faith intersects with the academic content they are learning. Fundamentally this is the goal of this learning outcome. In these current papers was laid out depth of thought of how their faith and views of science have evolved over their time at Westmont. They described the faith they came in with as often being a close reflection of their parent's faith and their views of science being heavily influenced by either their parents or their youth groups. But that at Westmont they found themselves thinking through these issues on their own as they were challenged by new ideas in both their religious studies classes as well as their science classes. The end result is they found their own faith, their own worldview. I should note while in most cases their Christian faith deepened and clearly became their own, in some cases students moved away from an orthodox Christian faith. But they expressed this journey well and also expressed appreciation for an atmosphere that was supportive and respectful of them personally and giving them space to make their own decisions.

Senior Seminar Physics Paper and Oral Presentation: (Skills and Knowledge/Critical Thinking SLO's). The students in the senior seminar were also required to write a five-page paper on a topic in science (but especially related to physics or engineering/physics) of their choice. The rubric used to evaluate this paper is given in Appendix J. The topics chosen ranged from the practical (things like solar energy) to the edge of current understanding (e.g. dark matter). What was especially clear was a passion for the topics chosen as students showed great depth (for the most part) in their papers. They combined a pedagogical ability to explain to others with an enthusiasm to learn themselves. The excel spreadsheet in in Appendix K but below is a graph of the results:



The goal (benchmark) was to have 60% be at advanced (or "exemplary") and 80% be proficient or above. As shown in the graphs all papers were at the proficient level or above and close to 60% (or more) reached the advanced/exemplary level. This was roughly what we were hoping for. But more than this, there was the sense of the students embracing the paper writing showing both an enthusiasm for the science and also a breadth of knowledge. The quality of the writing (which impacts the communications PLO) also reflected well on the students. The writing mechanics was at 100% for proficient (or above) and about 55% for advance. Clarity of writing was even higher (100%/73%). In both cases they were close to or above the benchmarks.

For the oral presentation we were looking for at least 80% in the good to fair, and, at least 60% in excellent category. The rubric used to evaluate oral presentations (used college wide for the ILO) is in Appendix L and the results are graphed below:



Everyone achieve the intermediate ranking and for both the message construction and the audience centered categories our targets for excellence were achieved but in the delivery the performance fell short. This suggests more work could be done.

6. <u>Percentage of Physics Graduates going onto graduate school</u>: (Knowledge SLO) Only 20% of our pure physics grads from the last six years have pursued graduate school (our benchmark was 50% and at our last six year review the number was 60%.). This might go up a bit as some will take time off before going to graduate school. This is fewer than we'd like and has been a step back for our program. It might suggest we do more emphasis on counseling for graduate school opportunities. On the alumni questionnaire only 40 % felt the career counseling was adequate so this indicates a gap in our advising.

7. <u>Percentage of Graduates in Technical Fields</u>: (Knowledge SLO) In the alumni survey just over half (53%) had their first job out of college in a physics related field with an additional 19% in technical field other than physics (mostly software related) for a total of 72% (our benchmark was 75%). At our last review this was 80%. So slightly less than our benchmark but also a drop from last time. In addition, just under half (46%) were satisfied with their first job out of college. One thing we have done to encourage career preparedness is to post on our website a document "Preparing for a Career Year by Year". It is available here: https://www.westmont.edu/_academics//departments/physics/year-by-year.html

8. Alumni Satisfaction: (All PLO's) As part of the alumni survey, we asked several questions related to the PLO's (their importance, how well they felt they achieved success in each). This will be addressed in the next section.

Conclusions on student findings:

a. Student learning substance: On most measures we hit the benchmarks we were aiming at. Students are successfully pursuing internships and research, able to articulate learning verbally and in writing, have developed a sophisticated view of faith and science. But on several critical benchmarks the results were poor. Their performance on the MFT exam, was below average and disappointing. Further the best performances were in the earlier years. Fewer graduates are going to grad school or even going into technical fields. Now obviously, the quality of the student makes a big difference apart from their education at Westmont and we have seen in recently years more students who were perhaps not as strong as years past. But we also have a concern that the landscape has changed a bit as well. It used to be assigning homework assignments out of the book presented no issues but with the availability of online sources for solutions to homework problems, the temptation is greater for students to take advantage of these to get through homework quickly but in turn not learn the material as well. This suggests going to online homework services rather than end of chapter problems might be warranted. Another big issue is the loss of Warren Rogers, who took an endowed chair at Indiana Wesleyan. Warren had a very active research program that involved a large number of students in research. The opportunities are now more limited and this needs to be addressed. Certainly, successfully hiring a replacement will help and over the next few years two more hires will take place that should help the situation. But then we get to the top that the most important issues the department faces center on hiring good people going forward.

b. Assessment methodology: By and large we are happy with the methodology we are using (although we are considering dropping the evaluation of student abstracts in the freshman year). But as a whole new department faculty are selected, they will need to evaluate the methods used and perhaps implement changes. As such there is really no point making changes now. At best, during the overlap, we will have departmental discussions on the assessment methods.

B. Alumni Reflections: For this survey we went back ten years' worth of alums. But in doing analysis of responses in some cases we looked back over the 2012-2018 time period (since the last six-year report) for whichever gave the more pertinent information. The survey was sent out to 65 alums and we received back 41 responses (so a bit over 60%). The alumni surveys asks many questions both about alumni satisfaction (how well did the program prepare you…) to outcomes (are you in a technical field, how quickly did you get your first job, etc.). It also gives information directly on their experience at Westmont (did you participate in an internship or research, etc.). Finally, we asked for feedback of what could be improved (courses needed, etc.). At the time of this writing there have been 41 total (32 complete) responses. Not every respondent answered every question. The statistical breakdown and free responses are in Appendix W. Sometimes because they were not applicable. So, when percentages are listed they are out of those who responded. 50% got their first job after graduation/graduate school in 0-2 months. Another 26% got theirs in 3-5 months. 65% were extremely satisfied with Westmont, another 28% satisfied. 84% described teaching as superior or strong, 12.5% average. 62% of majors were Engineering/Physics. Just over half were employed related to their major but an additional 19% are in technical fields (mostly software related). Roughly 60% said they would be very likely to recommend Westmont to a relative. 56% felt their Westmont preparation was much or somewhat better than their peers, while only 6% felt they were not as well prepared. When asked about the importance of our SLO's to their career over 85 % felt the knowledge (91%) and skills (87%) SLO's were important while the Christian Orientation SLO drew 56% importance. As to how well they felt they had achieve the same SLO's, they responded successful or very successful for knowledge 88%, skills 81% and Christian Orientation 66% (almost every other response for all three was "somewhat successful". Virtually everyone thought an engineering program was a good idea with the vast majority suggesting mechanical engineering with a spread beyond this of electrical, civil, chemical.

C. Curriculum Review: In the time since the last six-year report we did an external review (Appendix X) and an alumni survey (Appendix Z). We used the results to revamp the physics major. We also used comparisons to frequency of particular courses being included in physics majors nationwide as determined by the American Physical Society (Appendix Z p 24). In the 2013 annual assessment we listed the recommendations with implications on the curriculum and our proposed responses:

1. Drop optics as a requirement and perhaps require and additional lab. **Response: We'll propose reducing optics from a requirement to an option among several courses.**
2. Offer separate mechanics courses for Physics and engineering (currently only the engineering version is offered). **We will propose offering the physics version in alternate years (alternating with optics). (The engineering version will continue to be offered every year).**
3. Offer separate courses for electricity and magnetism. **Our E&M course PH 150 will be Physics or Engineering depending on who teaches it. It might make sense to give the two versions different course numbers and alternate years.**

4. Add electronics to the physics major (maybe just the lab?). **We will include Circuits and Electronics in the choices (along with optics) for the physics major (it is already required for Engineering/physics).**

5. Add computing packages to our courses**. We are adding Matlab to our Gen. Phys. Lab and Spice to the Circuits lab. In addition, we will replace the CS 10 requirement (which is taught in Scheme, a pretty impractical language) with a computational physics course.**

6. Reduce the chemistry requirement to one semester or a one semester complementary science lab course. **We will propose replacing the two-semester chemistry requirement with a series of science lab choices (Chem 5, 5L, Bio 6,6L, etc.)**

7. Be more aggressive in promoting internships**. We will. Ken will meet with Jennifer Taylor to brainstorm ideas.**
8. Keep updated on modern pedagogical methods. Attend AAPP meetings every other year. **Under advisement.**
9. Hire a woman faculty member:
10. Library improvements. Add books such as textbooks.
11. Add a tenure track position in astronomy**. Our seed grant proposal was for an astronomy position.**

Ultimately, we made several changes to the major. The two-semester chemistry requirement was changed to a single semester of a laboratory science (so a biology class with lab could fulfill the requirement). The requirement of the introductory computer science class was replaced by a computational physics class. The required optics class became an option among several classes. A classical dynamics class started to be offered every other year in place of the mechanics class (which had more of an engineering emphasis) for the pure physics majors. Greater use of Matlab and Python was introduced in regular physics courses. There was greater emphasis on students pursuing internships and research as part of their majors.

But the greater issue (than somewhat minor changes to the physics and engineering/physics majors) is the proposal to add a full engineering major. For over 30 years our department has supported both a physics and an engineering/physics program. The latter is still considered a physics rather than an engineering major but has an engineering emphasis. In addition, we have had a 3:2 dual degree program which has allowed students to go three years at Westmont and two years at an engineering university achieving a true engineering degree. While many start at Westmont, planning to pursue the 3:2 program, most end up staying all four years at Westmont typically doing the engineering/physics major but some pursue the pure physics major. Over the years there has been thoughts of developing a true engineering major but the obstacles to this have been formidable. First, the ABET accreditation (the main accrediting body in engineering) required programs have 80 semester technical units while the most units in a major at Westmont has been under 70 to allow the broad liberal arts program. But second, it would require the addition of at least two full time faculty positions which was always viewed as impractical. But in recent years, the administration has expressed interest in pursuing the raising of two endowed chairs in engineering along with funding for necessary equipment and budget as part of a capital campaign. We have begun to meet as a department to develop a proposal and have sought input both from programs at liberal arts colleges (bringing in the head of the Messiah College engineering program) and local industry in an exploratory effort. The college, as a whole, sees potential to boost enrollment from such an endeavor and it would obviously be an attractive feature for our department.

The first question would be what forms of engineering to pursue. As a practical matter it seems easier to do engineering with a (say) mechanical emphasis than a full BS in mechanical engineering. With this as a starting point, a mechanical engineering emphasis seems most practical as it is, by far, the largest branch of engineering. Appendix AA gives a possible sample schedule for a BS with concentration in Mechanical Engineering. But once you have a mechanical emphasis, adding a second concentration is relatively easier as many of the courses can be shared. We have been looking at the curriculum of several liberal arts colleges (as well as a couple of universities) to see their curriculum to determine what is practical to work here at Westmont. There are two additional complications. One, engineering tends to work more easily in an institution on the quarter system as this allows for more course offerings (though each with less content). Second, Westmont has traditionally had almost all four unit classes (with exceptions of 1 unit labs and the like). But most engineering programs have an array of units for their classes. It would like be practical to pair 2 unit classes in a four unit time slot but 3 and 5 unit classes would be a bit difficult.

D. Curriculum Map and PLO Alignment Chart: Below are the Curriculum Map:

Courses/Activities	Core (C) or Elective (E)	PLO#1	PLO #2a	PLO #2b	PLO #3	PLO #5
21	C	I			I	
22	C	I	I/A	I		
23	C	I				
24	C	I	D	D		
25	C	D			D	
26	C	D	D	D		
40	C	D				
115	C	M				
121	C	M				

122	C	M				
131	C	M				
142	E	M				
143	E	M	M	M		
150	C	M				
151	E	M				
160	C	M				
170	E	M				
190	E	M/A	M/A	M/A		
195	C	M/A		M/A	M/A	
198	E	M/A	M/A	M/A		
I = Introduced, D = Developed, M=Mastered, M/A = Mastered/Assessed						

And PLO Alignment Chart:

Goals (if applicable)			
Program Learning Outcomes	PLO1	PLO2	PLO3
Where are the Learning Outcomes met? **I** Introduced **D** Developed **M** Mastered **A** Assessed	**I**: Ph 21, 23; MA 9, 10; CH 5 **D**: Ph 25,26,40; MA 19 **M**: Ph 115, 121, 122, 130,131, 142, 150,151,160,170,190, 195,198	**I**: Ph 22, **D**: Ph 24, 26 **M**: Ph 170, 195, 198 Research & Internships **A**:	**I**: Ph 21 **M**: Ph 25 **D**: 195 **A**: 195
How are they assessed?	**Direct methods**: MFT; List paper, pres, intern evals; % phys in research & EP in Internships;; % phys grad school; sci paper, oral; % grads in tech, fields **Indirect methods**: **Embedded assessment**: **Authentic assessment**:	**Direct methods**: Lab Abstracts; List paper, pres, intern evals; % phys in research & EP in Internships; sci paper, oral **Indirect methods**: R Embedded assessment: **Authentic assessment**: Lab Abstracts	**Direct methods**: Faith/Learning essay **Indirect methods**: Embedded assessment: Authentic assessment:
Benchmark	70% above 50^{th} percentile (MFT); intern evals ave >4/5; 60% part. In intern or research; >50% phys in grad school; >75% in tech. fields	Lab Abs: >60% top rating, >80% 2^{nd}; intern evals ave >4/5; 60% part. In intern or research; >50%; sci. paper/oral: >60% top, >80% 2^{nd} rating	F/L paper: : >70% top rating, >90% 2^{nd}

Link to the Institutional Learning Outcomes (ILOs)	Critical Thinking	Oral Communication Written Communication	Christian Understanding, Practices and Affections

PLO Alignment Chart

We are content with the current courses offered in terms of achieving the departmental learning outcomes. But clearly with the proposed addition of an engineering program we are looking to make major changes.

E. Program Sustainability: Again, we are looking towards adding a full engineering program to not just sustain the department but to position it to greatly increase the number of students we can serve. If successful it is likely the department in time would divide into physics and engineering departments. The physics department has been successful drawing majors. Our 2013 external reviewers were both amazed by both the number of majors/grads and the number of women and commented Westmont was near or at the top of our comparison schools in number of grads, number of grads per faculty member and number of women grads. But these numbers are not large compared to many majors at Westmont. The 2012-2018 graduating classes averaged 7 majors per year with roughly 1/3 women. In contrast, half of Bachelors only institutions graduate 5 or fewer and nationwide and only 20% of physics bachelor's degree recipients are women. Many of these BS only institutions have four or more full time physics faculty. Nonetheless a full engineering program has the potential to draw four or five times that number of grads. There are certainly challenges to implementing this but that is the biggest challenge going forward.

F. Additional Analysis: We should touch on a number of issues. We have always prided ourselves on each of us developing a general education course. We would hope this continues with new faculty in the future. Some courses (like Intro to Physical Science) will need to continue and be taken over but whatever form it takes, the Physics Department will continue to serve non-science majors. Appendix S had the year by year data for faculty instruction and advising loads. Our advising load per faculty has averaged about the norm for the college as a whole (a bit less in the earlier years, a bit higher in recent years). As for instructional load, a good metric for this is number of student credit hours per class unit offered. By this standard physics typically falls about 11 out of 20 departments (or just below average). Because we are one of the smaller majors, it is the general education load that brings us closer to the average. As for finances, we have created an endowment to supplement the budget. But if an engineering program is to happen it will require a significant investment including at least two endowed chairs. But for physics alone, we are well set financially. In terms of faculty, losing Warren Rogers to an endowed chair at Indiana Wesleyan, was a tremendous loss in terms of research involving students. The new hires will need to establish research programs appropriate for student involvement and this will be a high priority. Our facilities are excellent benefitting from the new Winter science building. We need to maintain and make full use of our observatory.

G.

III. **Looking Forward:** There are really two sections to this. One is changes/modifications to the physics and engineering/physics program. This includes changes already made in response to the external review and alumni survey taken in 2013 as well as changes going forward. But more importantly, the hiring of new physicists to take the place of Warren Rogers and to cover the coming retirements of Drs. Kihlstrom and Sommermann. In some sense the real decisions of the future of the department will be made by those hires and the role of existing faculty to hire well rather than set a course of action in stone that someone else needs to implement. The second main point is the proposed engineering program which, if fundraising is successful, will lead to the hiring of at least a couple of engineering professors. Again the ultimate design of the engineering major would be up to them but here it is important to lay the groundwork and put together a substantial proposal to present to both campus committees to approve and to donors to successfully raise the funds for such a program. Most of the structure of the six year report focuses naturally on the former (most departments are assessing and evaluating the existing program and looking for ways to do a better job). Of course, this applies to the physics department as well and we take that role seriously. But for us it is not the key or most important question. In addition, there is the feeling the future direction is best set by those coming in the door rather than those going out.

With all this in mind, we are happy with our mission statements and assessment plans (although both could be changed by incoming faculty. Since last time we compressed some of the assessment tools into a more compact form leaving seven rather than nine but still having the same information.