BASIC PROGRAM INFORMATION

Program Review is about documenting the discussions and plans you have for improving student success in your program and sharing that information with the college community. It is also about linking your plans to decisions about resource allocations. With that in mind, please answer the following questions.

Program/Department Name: Physics/Engineering

Division Name: PSME

Please list all team members who participated in this Program Review:

Name	Department	Position
Frank Cascarano	Physics	Instructor
Annie Chase	Physics	Instructor
David Marasco	Physics	Instructor
Sarah Parikh	Physics & Engineering	Instructor
Sue Wang	Physics & Engineering	Instructor

Number of Full Time Faculty: Physics has 5, 2 with joint appointments in Engineering

Number of Part Time Faculty: Physics has 7 and Engineering has 10

Please list all existing Classified positions: *Example: Administrative Assistant I*

Lab Manager Jenny Liang

SECTION 1: PROGRAM REFLECTION

1A. Program Update: Based on the program review data, please tell us how your program did last year. We are particularly interested in your proudest moments or achievements related to student success and outcomes.

Physics had a surge in WSCH, seeing a 7% increase over the previous year, and 14% over four years. This was accompanied by a 6.7% increase in productivity (4.5% over five years). While the productivity at 442 was below the college's target, this is in part due to class-size caps set by lab sizes. During the day schedule this can be addressed by offering double-section lectures, this is often not an option when we serve our night population. We had a 72% success rate, which is strong for a lab science. Given the many issues of women in Physics, our numbers have shown no gender gap in success. Our students have shown gains well over national norms in standardized tests such as the Force Concept Inventory and Conceptual Survey of Electricity and Magnetism.

WSCH in Engineering held steady with a slight decrease of 5.5% from the previous year, yet is still up 112% when compared to 2012-2013. Productivity saw no year-to-year change, and is up 3.4% from 2012-2013. Engineering's productivity is at 314 and may be explained by offering an increased variety of new courses that are still unknown to many students. Overall the success rate in Engineering is high at 82% and this year saw no gap in success rate by gender.

This past year we collaborated with a Physics Education Research group at Stanford led by Carl Wieman (Nobel Prize, 2001). With the guidance of one his post-docs we recast our Physics 4A labs in a model that moved away from cook-book labs towards an iterative student-led cycle of experiments. We are refining these labs, but consider the model a success and are exploring how to implement the same in our 4B labs.

The Physics Show had over 20 performances. We have now reached almost 80,000 attendees, including thousands we have bused in from Title 1 schools for a show, a tour of our campus and a free Foothill College Physics Show shirt. These students are from Foothill's targeted populations, and an overwhelming majority would be first-in-family. Our summer shows generated good press with multiple articles the San Jose Mercury News.

Our departments are very collegial, and continue to meet weekly to discuss our teaching and how we can better support our students and collegues. The FT faculty are also active in the following efforts: The STEM newsletter now has a subscription base of 3,145 and informs our students of opportunities on our campus and beyond. We have a thriving Science and Engineering Club. We have STEM Day in the Fall, and the Physics Olympics in the Spring. We offer the F=ma contest for local Physics high school students and we took the lead on the American Mathematics Association of Two Year Colleges's annual contest. We offer a departmental scholarship program that will award $2000 this year. We take leadership in the local (statewide) professional association for our field (which includes organizing and running two conferences a year), and also work with the organization at the national level. In addition, department faculty serve on a number of shared governance committees, including involvement in the Title IX structure, Academic Senate, BEST, HRAC, and faculty chair of the Scholarships committee. This is in addtition to involvement in multiple hiring and tenure committees.

1B. Program Improvement: What areas or activities are you working on this year to improve your program? Please respond to any feedback from the supervising administrator from last year's program review.

The most pressing issue from last year's Program Review was the lack of depth in our PT pool. The addition of a new FT faculty member has greatly eased our scheduling concerns. Making sure that our new instructor transitions well to Foothill is one of our top priorities. In Physics, we had achiement gaps for Filipinos of 14% and Latinx of 13%. To put these numbers in context, the gaps for tansfer-level Math classes for these populations are 19% and 16%. This year we are debuting an open-resource text for the 2 sequence and may do the same for the 4 sequence in the near future. This will remove some serious financial barriers to entry. Additionally, David Marasco has accepted a three-year appointment to the American Assocation of Physics Teacher's Diversity in Physics Committeee. Our succes rate in Physics 4A was 61% last year and has averaged around 64% over the past four years. Improving success in 4A would remedy a serious point of exit in the careers of many STEM students. And, as always, we seek to continually improve the quality of our instructional labs. While in the past we have concentrated on improvement via upgrading lab equipment, this year we wish to investigate the written aspect of lab reports and will request document scanners so we can build a digital archive to help us better understand issues about how to improve student writing.

The Engineering department continues to focus on the enrollment gap by gender. This last year the percentage of women in engineering courses held steady at 21% which is up from 14% in 2012-2013. Based on the action plan created in the IWITTS workshop during Summer 2015, we are increasing our advertising and outreach to students in courses that are prerequisites to engineering courses and before

many of the women in the courses have chosen to leave the engineering pathway. A flyer for the engineering department was created and the engineering page of Foothill's website was updated. It is unclear how effective our efforts will be this year, but we will learn from what works and build on it for next year.

1C. Measures of Success: What data or information will you use to measure your success (e.g. student success rates, changes in student or program learning outcomes)?

We look forward to the continued positive development of our new faculty member, one figure of merit might be the number of different classes she teaches. We look to making progress on closing the achievement gap. Our main immediate effort is streamiling the adoption of an opensource text for the 2 series, and possibly the 4 series. Our previous texts cost hundreds of dollars each, and while we encourage students to use cheaper alterantives, it is always best if our students share one book in common. This should more heavily impact targeted groups as these student often face high financial barriers than the general student population. A quick and fast metric is observation of whether or not students are all on the same page (literally), if they are, then we hope to see a rise in completion and success rates. Also, whether or not a community-college perspective can be injected into national discussions on equity in physics education would be a way of measuring success. A simple examination of student success in 4A will measure our results in that arena. Improvements in lab writing will be harder to measure, but will be the focus of departmental discussions. The enrollment rate by gender will be a metric of success for both the engineering and physics departments. While there may not be immediate gains based on our efforts this coming year, what we learn from the process of reaching out to a more diverse community should pay off through enrollment rates that are closer to parity than they are now. The key to this success will really be finding advertising methods and messages that are effective and implementing them well at a sustainable level.

1D. EMP Goal: The 2015-2020 Educational Master Plan (EMP) includes the following goal:
"Create a culture of equity that promotes student success, particularly for underserved students."

Based on the program review data, tell us some of the things your program will be doing this year to support this goal. You will be asked to report on any accomplishments on your next comprehensive program review.

Several efforts noted above are directly targeted towards equity. We have eliminated textbook costs for one of our sequences by going over to an open source text, and will investigate options for our other sequence. Upon learning that one of our books was the second-most expensive one in the bookstore, we talked to the publisher and put together packages that represented significant savings to the students; our goal is to continue along this pathway. A cohort of the faculty in the department have committed to do the work necessary to do this.

While women in our classes enjoy the same success rates as men, we suffer from the same gender ratios that most physics departments see in our country. We will need to develop better outreach efforts. In addition to moving to an open-source text, we will look for additional ways to address the achivement gap seen by some of the targeted groups. David Marasco will work with and learn from the AAPT diversity committee, bringing back practices from the national level.

In Engineering, the lack of diversity in the classroom is a major concern. Our enrollment rate of 21% women is just above the 2012 national average for the percent of women receiving a bachelor's degree

in engineering (about 20%). However, because the dropout rate is not the same for women and men on an engineering pathway, this enrollment rate is nothing to be celebrated. Many 4-year universities have started programs to increase the participation and retention of women in engineering. We hope to learn from their successes.

Based on a thorough review of the literature on retention of women in engineering, it has become clear that there are several approaches that we should take. One approach has to do with getting the right information about engineering to potential students. We hope the improvements to the engineering website help to address this. A second approach has to do with the messaging surrounding engineering. Perpetuating the story that engineering is very difficult is not helping to encourage new students to try it. Instead, our messages should focus on how engineering makes a difference in people's lives and how it is a fulfilling career. I expect we will need to make several iterations of changes to our website, flyers, and email messages before we find an effective set of messages for our audience.

A third approach has to do with the subtle biases that we hold and how we express them. We, as instructors at Foothill College, may be unintentionally sending subtle messages to our students that make it harder for some students as compared to others. I have been discussing the possibility of a NAPE (National Alliance for Partnerships in Equity) Professional Development workshop for this coming summer and I have suggested it to the Equity Committee as something that they might be interested in funding.

SECTION 2: PROGRAM OBJECTIVES & RESOURCE REQUESTS

2A. New Program Objectives: Please list any new objectives (do not list your resource requests).

Program Objective	Implementation Timeline	Progress Measures
Example: Offer 2 New Courses to Meet Demand	*Winter 2016 Term*	*Course Enrollment*
Support development of new FT faculty member	2017-18	Continued improvement in instrstuction.
Continual improvement of instructional labs, via careful investigation of written lab reports.	Over the span of 2016-17	Quality of written lab reports, as judged by instructors

2B. Resource Requests: Using the table below, summarize your program's unfunded resource requests. Refer to the Operations Planning Committee (OPC) website for current guiding principles, rubrics and resource allocation information.

Resource Request	$	Program Objective (Section 2A)	Type of Resource Request			
			Full-Time Faculty/Staff Position	One-Time B-Budget Augmentation	Ongoing B-Budget Augmentation	Facilities and Equipment
Funds for a new	$800	New FT	☐	☒	☐	☐

teacher workshop above and beyond normal travel amout						
Document scanners for labs.	$1500	Instructional Labs	☐	☒	☐	☐
Arduino kits for another class set plus replacements	$1500	Instructional Labs	☐	☒	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐

2C. Unbudgeted Reassigned Time: Please list and provide rationale for requested reassign time.

While this does not amount to a formal request for reassign time, the Physics department would like to experiment with offering single-section Physics 4A lectures rather than offering double-lab sections whenever possible. While this would represent a significant hit to productivity (420 for a full single, 611 for a full double), we would like to explore its effect on student success.

SECTION 3: LEARNING OUTCOMES ASSESSMENT SUMMARY

3A. Attach 2015-2016 Course-Level Outcomes: Four Column Report for CL-SLO Assessment from TracDat. Please contact the Office of Instruction to assist you with this step if needed.

3B. Attach 2015-2016 Program-Level Outcomes: Four Column Report for PL-SLO Assessment from TracDat. Please contact the Office of Instruction to assist you with this step if needed.

SECTION 4: FEEDBACK AND FOLLOW-UP

This section is for the <u>Dean/Supervising Administrator</u> to provide feedback.

4A. Strengths and successes of the program as evidenced by the data and analysis:

The Physics and Engineering departments are power houses. They are creative, hard-working, and highly dedicated to student success. The departments' trends are amazing given the limitation of their lab. Their success rates (Engineering at 82% and Physics at 72%) exceeds the PSME success rate of 66%.

The Physics Show is another strength of the Physics program. Their 20 shows plus preparation time are no small feat. As this was not enough, the faculty in both department are also in leadership roles both within and outside of Foothill College. They are involved in the Faculty Teaching and Learning Academy, STEM Day, Physics Show, STEM Showcase, just to namea few. They are major contributers to their department, division, and college. Their dedication and work ethics should be commended and fully

acknowledged.

4B. Areas of concern, if any:

An area of concern is the gender enrollment (32% female to 68% male for Physics and 21% female and 79% male for Engineering 2015-16) and also ethnicity (42% Asian and 25% White for Physics and 34% Asian and 32% White for Engineering 2015-16)

Another area of concern is full time faculty on professional development leave. As the faculty are qualified to take professional development, the program may suffer due to lower or no full time faculty to champion the program.

A third concern: As the departments grow, more courses are being offered which translate to more classroom/lab room space needed. Alignment of course offerings need to be coordinated for space allocation for both optimization and future expansion.

4C. Recommendations for improvement:

The area of concern in enrollment is a nation wide issue, not just at Foothill College. More campaign effort, with increasing faculty and staff training on images and language, may change these trends in gender and ethnicity. Creating an environment of belonging will take both time and conscious effort from faculty and staff.

To maintain the quality of the program, training of part time faculty may be needed to replace full time faculty on leave.

The physics and engineering departments need to assess what space is needed in the near future and also what would be needed for expansion. The schedule planning must take into account for lab spaces as both department share lab spaces.

4D. Recommended Next Steps:

☒ Proceed as Planned on Program Review Schedule
☐ Further Review / Out-of-Cycle In-Depth Review

Upon completion of Section 4, the Program Review document should be returned to department faculty/staff for review, then submitted to the Office of Instruction and Institutional Research for public posting. Please refer to the Program Review timeline.

Unit Course Assessment Report - Four Column

Foothill College

Department - Engineering (ENGR)

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Engineering (ENGR) - ENGR 10 - INTRODUCTION TO ENGINEERING - Engineering Commuication - Communicate effectively through written documents and oral presentations (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** Oral presentation to the class on the design project. **Assessment Method Type:** Presentation/Performance **Target for Success:** 90% of the class shows improvement in oral communication skills between the first and last oral presentations.	10/10/2014 - The students who were still in the class by the end of the quarter had much improved oral communication skills by the end of the quarter over the beginning of the quarter including their professionalism and confidence. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		02/10/2012 - There was great improvement in the presentation skills of the students who participated in the two presentations. A few students, who presented at the first presentation with a very high level of communication success, did not show improvement because their presentations remained at a high level. The percentage of students showing improvement is estimated at 90%. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	02/10/2012 - Because some students come into class with a very high level of skill in oral communication, we should consider rewriting the SLO to be more broad.
Department - Engineering (ENGR) - ENGR 10 - INTRODUCTION TO ENGINEERING - Engineering Problem Solving - Identify, formulate and solve problems that have real world constraints (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** Formal report from the design project. **Assessment Method Type:** Class/Lab Project **Target for Success:** 75% of the class will receive a B or better on the design project report.	10/10/2014 - 86% of the class received a B or better on the final design project report. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		05/17/2013 - 81% of the class received a B or better on the design project report. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	05/17/2013 - This SLO is appropriate and the assessment is now aligned with the SLO.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		02/10/2012 - 85% of the students who turned in the project documentation received a B or better on the assignment. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	02/10/2012 - While the students who remained engaged in the class through the end of the quarter performed well in terms of demonstrating their problem solving skills, some students attended only a handful of classes before not continuing to attend class. Documentation is a large part of this course and the students made huge gains in terms of the quality of their work as the course progressed.
Department - Engineering (ENGR) - ENGR 10 - INTRODUCTION TO ENGINEERING - Engineering Process - Work as a contributing member of a functional team (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** Peer survey. Survey completed by team members at the end of the project. **Assessment Method Type:** Survey **Target for Success:** 80% of the class being rated as "Satisfactory" or better by their team members.	10/10/2014 - 86% of the class was rated as Satisfactory or better by their team mates. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		02/10/2012 - 90% of the students present at the end of the course were rated "Satisfactory" or better by their team members. Students who were non-participatory by the end of the course were not included in this assessment. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	02/10/2012 - Tension runs high at the end of the course. In order to better gauge how well students contribute to a team, I will consider changing the assessment method to be an average of all of the surveys that are given.
Department - Engineering (ENGR) - ENGR 102 - BUILDING SCIENCE & PERFORMANCE ENGINEERING - Energy efficiency measures - Articulate to key building stakeholders' current building energy use, appropriate energy efficiency measures, and the potential for energy and economic savings (Created By Department -			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Engineering (ENGR)) **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 11 - PROGRAMMING & PROBLEM SOLVING IN MATLAB - Numerical Methods - Students who successfully complete this course should be able to demonstrate knowledge and skills about numerical methods. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Academic Year **Course-Level SLO Status:** Active	**Assessment Method:** 75% of the students taking the final exam should get a C or better on the final exam. **Assessment Method Type:** Exam - Course Test/Quiz		
Department - Engineering (ENGR) - ENGR 11 - PROGRAMMING & PROBLEM SOLVING IN MATLAB - Matlab programming - Students who successfully complete this course should be able to write programs using Matlab to implement problem solving algorithms. (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** 70% of the students turning in projects should earn a C or better **Assessment Method Type:** Class/Lab Project		
Department - Engineering (ENGR) - ENGR 25 - FRESH WATER PROCESS - basic calculations - Be able to do basic calculations related to water quantity, flow, and energy generation from hydropower (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:**			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Active			
Department - Engineering (ENGR) - ENGR 25 - FRESH WATER PROCESS - policy on water - Have greater insight into how water policy is made and implemented (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 25 - FRESH WATER PROCESS - water sector - Be introduced to cost, financing, and rate-making challenges in the water sector (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 25 - FRESH WATER PROCESS - problem solving - Have practice breaking a complex water problem into important parts, studying the parts, and then reconnecting the parts to better understand the entire problem (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 25 - FRESH WATER PROCESS - water issues - Be knowledgeable about important water issues in California and beyond (Created By Department - Engineering (ENGR))			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Assessment Cycles: End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 28 - AN INTRODUCTION TO BIOENGINEERING - Career Paths - The student will be able to describe the bioengineering industry and identify the available career opportunities applicable to their personal career goals. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** The SLO will be assessed by a written assignment involving a personal career plan **Assessment Method Type:** Essay/Journal **Target for Success:** 80% of students will have identified a potential career path in bioengineering suited to their interests by the end of the course		
Department - Engineering (ENGR) - ENGR 28 - AN INTRODUCTION TO BIOENGINEERING - Biology Foundation - The student will be able to define and describe the fundamentals of molecular biology as they pertain to bioengineering including, but not limited to, nucleic acid and protein structure, the human genome, and cell biology. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** The SLO will be assessed by either an in class exam question(s) or an assignment **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students will achieve a B grade or higher on this assignment/exam.		
Department - Engineering (ENGR) - ENGR 28 - AN INTRODUCTION TO BIOENGINEERING - Physical Systems Foundation - The student will be able to analyze the physical processes associated with common biological systems and emonstrate how conservation laws (including conservation of mass and energy,	**Assessment Method:** The SLO will be assessed by either an inclass exam question(s) or an assignment **Assessment Method Type:** Exam - Course Test/Quiz		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
momentum, and charge) apply to biological and medical systems. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 28 - AN INTRODUCTION TO BIOENGINEERING - Applications - The student will be able to recognize and discuss current applications of bioengineering and the relevant steps of the bioengineering design process in medicine, agriculture, and technology. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** The SLO will be assessed by either an inclass exam question(s) or an assignment. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% of students will achieve a B or better on this assignment/exam		
Department - Engineering (ENGR) - ENGR 35 - STATICS - Particles and Rigid Bodies - The student be able to determine the equilibrium of particles and rigid bodies in two and three dimensions (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** Final exam **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 70% students can use principle of equilibrium to analyze particles and rigid bodies correctly.	10/10/2014 - 76% of students were able to analyze particles and rigid bodies in equilibrium sufficiently well. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 04/11/2013 - 85% of students understand, and successfully applied the equilibrium concept to 3-D structures. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **GE/IL-SLO Reflection:** Understanding the concept and be able to apply it correctly requires critical thinking and Complex problem-solving skills.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		05/22/2012 - 85% students completed equilibrium of 3-dimentional rigid body correctly. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** none	05/22/2012 - 3-dimentional equilibrium of a particle or rigid body is challenging. It takes repetition for student to get it eventually. I found that having students repeat the material over and over really helped student to gain some insight about equilibrium.
		05/22/2012 - 85% students complete this problem correctly. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** none **GE/IL-SLO Reflection:** 3-dimensional equilibrium of a particle or rigid body is challenging for student at the first. It takes repetition for students eventually get the idea. This strategy seems working, and it will be used again.	
Department - Engineering (ENGR) - ENGR 35 - STATICS - Forces, Centroid and Moments of Inertia - The student will be able to analyze the forces, centroid and moments of inertia on structures, such as: - Trusses - Frames - Beams - Cables (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** End of quarter project **Assessment Method Type:** Class/Lab Project **Target for Success:** 90% of students should apply structure analysis to their end of quarter project by building bridge structure that take specified load.	10/10/2014 - 96% of the students applied structural analysis to their project. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	10/10/2014 - The project was changed this quarter to make it more realistic, and the students became aware of some of the challenges faced in reality through this project. While none of the bridges were built to the correct specifications, the students learned a lot from the process. We should keep the SLO as written, so that we are assessing the application of equations as opposed to the success of the bridges.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		04/11/2013 - 95% of students successfully completed their end of quarter project. 100% of their bridges undertook the specified load and over. 5% didn't satisfy the specific dimensions of the bridge which does not reflect on their deficiency on understanding concept involved. It's more due to their lack of precision-building skills. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** small budge for buying materials building the project. **GE/IL-SLO Reflection:** This project demonstrate their communication skills. The students are required to work in groups, and they need to communicate with each other to execute their design. It also require students' judgment and decision making skill, intellectual curiosity, where they investigate the best possible structure which needs the least amount of material but takes the most load. It requires students' problem solving skills through analysis, synthesis and evaluation, creativity.	
		05/22/2012 - 83% students successfully completed truss analysis, and 100% of students who made the final project demonstrated their understanding on truss and frames by making their a bridge undertake more more load than the required minimum. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:**	05/22/2012 - Having students build bridge using strews and put their knowledge into test is very efficient way to evaluate their understanding and give them hand-on experience. It's also fun.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Small fund to help students pay for their bridge material.	
Department - Engineering (ENGR) - ENGR 37 - INTRODUCTION TO CIRCUIT ANALYSIS - Direct and Alternating Current - Students will correctly identify the production, characteristics, applications, and voltage change methods of Direct Current and Alternating Current. (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** comparing student exam from quizzes, exams and final exam to monitor student progress. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of student understand and master the concept.	10/05/2016 - 32 of 36 students (88%) completed the course with cumulative score 70% or higher for the quarter. 70% or higher indicates basic mastery of the concepts. The class contains 8 quizzes, 2 tests and 1 exam. Therefore the SLOs were achieved. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		10/10/2014 - The target is met, and my data showed great improvement over the course. The first midterm average is 75%, and the 2nd went up to 85%, the third and fourth goes up to 87 and 89%. Final grade is lower (82%) which is common since final covers broader range of subjects. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	10/10/2014 - The SLO should be more specific as to which quiz or exam (or what combination) will be used to determine success.
		07/12/2013 - From students midterms and final exams, students made progress through the quarter. Similar problem in midterm and final: Midterm: There are % of student Final: **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Engineering (ENGR) - ENGR 37 - INTRODUCTION TO CIRCUIT ANALYSIS - Quantities of DC and AC Circuits - Students will correctly calculate quantities in DC and AC circuits containing	**Assessment Method:** using exams to monitor student progress and understanding of the concepts mentioned in SLO **Assessment Method Type:**	10/05/2016 - 32 of 36 students (88%) completed the course with cumulative score 70% or higher for the quarter. 70% or higher indicates basic mastery of the concepts. The class contains 8 quizzes, 2 tests and 1 exam. Therefore the SLOs were	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
resistive devices,capacitors, and inductors using Ohm?s and Watt?s Laws, Kirchoff?s Laws, and appropriate circuit analysis methods. (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	Exam - Course Test/Quiz **Target for Success:** 75% of students should master the ideas stated in SLO.	achieved. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		10/10/2014 - The target is met, and all the midterm exam and final exams covers all the subject listed here. The average is well above 75% **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	10/10/2014 - The SLO, assessments, and target should be rewritten to be more specific.
Department - Engineering (ENGR) - ENGR 37L - CIRCUIT ANALYSIS LABORATORY - Circuit Analysis Laboratory - The student will be able to: a) make satisfactory measurements in circuits containing dc, ac and composite signals using equipment commonly found in an electrical engineering laboratory. b) understand the effect of a measuring instrument on a circuit under test. analyze resulting error. (Created By Department - Engineering (ENGR)) **Start Date:** 04/09/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Supervise students' work in lab session and monitor students' progress using equipment and making correct measurement. **Assessment Method Type:** Observation/Critique **Target for Success:** By end of the quarter, 100% of students should be able to know how to use equipment and how to correctly making related measurement.	10/05/2016 - All students passed the W16 Circuits Lab with 70% or higher. The curriculum included a lab practical and exam in addition to 8 labs. Therefore the SLO were achieved. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		10/10/2014 - 100% people passed final project in which they need to demonstrate their skills in using the tools introduced in this quarter and in understanding the basic theory of circuitry. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	10/10/2014 - The assessment method and target should be aligned. Possibly just the final project as the assessment for success.
		09/25/2013 - 100% of the students who completed the quarter were able to use the equipment and had an understanding of the effect of the measurement on the circuit. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	09/25/2013 - The SLOs need to be more specific in the future.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Engineering (ENGR) - ENGR 39 - ENERGY, SOCIETY, & THE ENVIRONMENT - Global Energy Situation - Learn about our global energy situation and relevant economic and environmental issues (Created By Department - Engineering (ENGR)) **Start Date:** 10/01/2012 **End Date:** 12/01/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Written essay and class discussions about how we got into the energy/climate predicament we are in, the types of energy used for types of activities (housing, commerce, industry, and transportation), and the environmental consequences of mining and extraction, processing, and combustion of fossil fuels. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students will be able to articulate well the linkage between economy => energy => climate, energy intensity of various activities, and projections for world energy demand based on population, wealth, and technology based activities.	09/21/2013 - Students were able to articulate and discuss the relationships between economic activity, energy (BTU/$), carbon intensity of energy and associated GHG emissions, and the projected climate impacts of fossil fuel activities. Students used both historic and current trends in energy use to show how we got to the point we are at, and the likely trajectory of both energy and GHG emissions, which are relevant to climate stabilization. Energy intensity was evaluated as the driver for energy efficiency, and the ability to lower carbon intensity and GHG emissions from renewable and low carbon energy sources. Specific assignments described oil sands and unconventional hydrocarbons as both a solution to peak oil production, as well as a potential source of pollution. Hydraulic fracturing (fracking) was also discussed as a solution related to natural gas displacement of coal, as well as a large potential risk for fresh water supplies. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	09/21/2013 - Have students follow GTM (GreenTech Media) or CleanTechnica to better understand clean energy technology and trends. Also read/scan Nature Climate for climate news.
Department - Engineering (ENGR) - ENGR 39 - ENERGY, SOCIETY, & THE ENVIRONMENT - Clean energy technology - Understand clean energy technology, and policies and actions to accelerate positive change (Created By Department - Engineering (ENGR)) **Start Date:** 10/01/2012 **End Date:** 12/31/2012 **Course-Level SLO Status:**	**Assessment Method:** A broad overview question that has two parts, first the understanding of specific clean energy technology (solar, wind, geothermal), electric vehicles and fuel cells, energy efficiency and smart energy management, and policies, actions, and consumer choices (behaviors) and personal energy management to affect positive change. **Assessment Method Type:** Exam - Course Test/Quiz	09/22/2013 - A broad overview question that has two parts, first the understanding of specific clean energy technology (solar, wind, geothermal), electric vehicles and fuel cells, energy efficiency and smart energy management, and policies, actions, and consumer choices (behaviors) to affect positive change. Students will be able to describe the principles and benefits of solar PV energy, how wind energy can displace coal, the critical importance of energy efficiency in lowering energy intensity, the role of smart grid technology	09/21/2013 - Have students follow GTM Research and Cleantechnica for trends in clean energy technology, including global deployments of solar, wind, geothermal, and EV.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Active	**Target for Success:** 90% or more of students should be able to describe the benefits of solar PV technology, wind, geothermal, electric vehicles, fuel cells, energy efficiency, and natural gas as a replacement for coal. 90% or more will be able describe three specific actions (consumer behaviors) and/or policies to accelerate both energy use and GHG emission reduction, such as renewable portfolio standards and low carbon fuel standards. Personal energy management/GHG goals would be a bonus.	for renewable energy, energy storage, and electric vehicle integration, and articulate at least three transportation policies (ride sharing, low carbon fuel standards, and fuel economy standards) to reduce use of liquid petroleum fuel. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	
Department - Engineering (ENGR) - ENGR 39 - ENERGY, SOCIETY, & THE ENVIRONMENT - Measure and analyze energy use - Learn how to measure and analyze energy use in buildings, transportation, and apply tools and other behavioral changes to achieve goals in personal energy use and GHG emissions (Created By Department - Engineering (ENGR)) **Start Date:** 10/01/2012 **End Date:** 12/31/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Students will use Kill-a-watt meters, smart meter (online meter data management), utility bills, and commercial interval data (if available) to estimate energy use in buildings, and calculate building energy intensity. Students will track their mileage driving as well as gasoline intake to estimate petroleum emissions. Some students will use personal energy tools (including wattzon etc) to measure and manage their energy use and create personal climate action plans. **Assessment Method Type:** Class/Lab Project **Target for Success:** 75% or more of students will calculate accurate energy intensity of residence based on utility bills, and conduct a home energy audit of major appliances, correlated to smart meter (or other interval meter data). 75% will accurately know, or reasonable estimate, their use of petroleum and associated GHG emissions. Most students will articulate a personal energy management plan.	09/21/2013 - Students will use Kill-a-watt meters, smart meter (online meter data management), utility bills, and commercial interval data (if available) to estimate energy use in buildings, and calculate building energy intensity. Students will track their mileage driving as well as gasoline intake to estimate petroleum emissions. Some students will use personal energy tools (including wattzon etc) to measure and manage their energy use and create personal climate action plans. Exceptional assignments will include documentation of outreach activities and participation in student groups (climate corps) etc. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	09/21/2013 - Involve students in the new One Million Killawatt-Hour Campus Challenge and more detailed investigation of energy use on campus.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Engineering (ENGR) - ENGR 40 - INTRODUCTION TO CLEAN ENERGY TECHNOLOGY - Understand Modern Energy Systems - Students will develop a qualitative and quantitative understanding of modern energy systems, how energy technology has evolved over the last 150 years, and how it meets the needs of residential, commercial, industrial, and transportation. (Created By Department - Engineering (ENGR)) **Start Date:** 10/01/2011 **End Date:** 12/31/2011 **Course-Level SLO Status:** Active	**Assessment Method:** Through weekly questions students will show evidence of understanding of each topic, including descriptions of technology, numerical use of energy data, diagrams of energy technology, and use of figures to help explain energy concepts. **Assessment Method Type:** Departmental Questions **Target for Success:** The majority of students will show sufficient mastery of a topic to explain core ideas and concepts to peers, and use calculations, diagrams, etc. as a method of demonstrating engineering skills for each topic. Some weekly questions will build on previous work in the course, demonstrating cummulative learning about energy.	10/05/2016 - Students continue to do well with developing a foundational understanding of modern energy systems, including how they work, standard output, benefits and disadvantages, including environmental and economic, especially related to fuel (cost) and carbon emissions. This includes resource issues (conflict, mining, etc.) **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 **Resource Request:** N/A **GE/IL-SLO Reflection:** N/A 06/30/2015 - All students were able to master basic (and systems) level energy infrastructure, including analysis of local electrical power grid. Being able to explain the concepts (as well as make accurate diagrams) to others is part of our energy champions effort. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** N/A 04/01/2014 - 80% of students demonstrated cumulative learning about energy, including units, and were able to make estimates of energy use, including analysis of their personal energy. Students were not always able to create good diagrams of energy systems. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** N/A	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		GE/IL-SLO Reflection: N/A	
		04/01/2014 - Students did very well with this assignment if they stayed up with the reading, and worked diligently on the homework. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** N/A **GE/IL-SLO Reflection:** Some students were a bit overwhelmed with the assignments, as they had not spent enough time reading, reflecting on the lectures, and working in groups to prepare notes for the assignment. Over the quarter, most students eventually mastered the discipline required to stay up with the assignments.	
		04/01/2014 - 80% of students showed mastery of core energy technology concepts, including the relationship between energy and economy, and energy and environment, and the various low carbon and renewable (non-emission) sources of energy to replace fossil fuels. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** N/A **GE/IL-SLO Reflection:** N/A	
Department - Engineering (ENGR) - ENGR 40 - INTRODUCTION TO CLEAN ENERGY TECHNOLOGY - Understand economic - energy - environmental connection (IPAT) - Students will develop a quantitative	**Assessment Method:** This is a midterm assignment where students will use a combination of the first SLO, understanding of modern energy systems, with IPAT, which combines	10/05/2016 - While the class size was small, the assignments contained good qualitative and quantitative examples of growth of energy demand, energy generation, and estimates of	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
understanding of the connection (correlation) between population, income, energy use, and environmental impact (IPAT). Students will apply IPAT by global/region, level of economic development, and extrapolate to 2030, and understand the imperitive for developing clean energy technology (Created By Department - Engineering (ENGR)) **Start Date:** 10/01/2011 **End Date:** 12/31/2011 **Course-Level SLO Status:** Active	knowledge of how economies are built on energy, and how economic growth leads to increased consumption through energy intensive activities. A key assessment finding is projection of economic growth through 2030, and how fossil fuels driving that growth will lead to unacceptable levels of greenhouse gas emissions. **Assessment Method Type:** Research Paper **Target for Success:** Compete assignments will show good numerical models for GHG emissions, tied to each sector of energy use, and regionally by economic development. The majority of students will leave with a profound understanding of our dependence on fossil fuels, and a quantitative idea about how much clean energy technology needs to be developed by 2030.	future impacts (carbon emissions, etc.) In spring 2016, we did a number of breakout calculations, e.g., modeling of impact of high RPS (solar/wind) as well as impact of EV charging. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 **Resource Request:** N/A **GE/IL-SLO Reflection:** N/A	
		06/30/2015 - Students used the I=PAT equation effectively throughout the class, as this is the key reason we are in the current energy predicament we're in. There are numerical calculations around I=PAT that students have mastered as well (strategic planning). **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	
		09/23/2013 - 80% of students completed the course with a profound understanding of US dependence on fossil fuels, and a quantitative idea about how much clean energy technology needs to be developed by 2030. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
		02/15/2012 - Students struggled with this, but over half had a fairly good understanding of the relationship between energy, economic growth, consumption, and environmental impact of energy use. However, most did not understand the rate at which clean energy technology needs to be adopted to avoid unaccpetable levels of GHG **Result:** Target Not Met **Year This Assessment Occurred:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		2011-2012 **GE/IL-SLO Reflection:** This assignment needs some structured handholding, including handouts that walk students trough specific examples of energy and GHG emissions for electricity, buildings, transportation etc., and perhaps showing scenarios where we did or did not meet 2030 targets for GHG emissions (specifically staying under 450 ppm)	
Department - Engineering (ENGR) - ENGR 40 - INTRODUCTION TO CLEAN ENERGY TECHNOLOGY - Application of Clean Energy Technology - Students will learn about clean energy technology for energy generation, distribution, commerce, industry, buildings, and transportation, and apply a specific technology to applications in each of these energy applications (Created By Department - Engineering (ENGR)) **Start Date:** 10/01/2011 **End Date:** 12/31/2011 **Course-Level SLO Status:** Active	**Assessment Method:** Through a combination of a class lab project with an accompaning research paper, students will apply a number of clean energy technologies to a specific application of energy use, such as energy generation, distribution, buildings, transportation, using compelling engineering descriptions in text, using calculations, diagrams and figures, and persuasive oral presentation. **Assessment Method Type:** Class/Lab Project **Target for Success:** The majority of students will find good applications of clean energy for needs in commerce, industry, buildings, and transportation.	10/05/2016 - Student projects showed a very good integration of knowledge and sills into modeling of clean energy, energy storage, high efficiency buildings, EV charging etc. The biggest impact on the outcome of this and other SLOs continues to be the caliber of the students. Younger students with good math and engineering preparation do well, as well as students who have matriculated with a science or engineering degree. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 **Resource Request:** N/A **GE/IL-SLO Reflection:** N/A	
		06/30/2015 - This is a complicated SLO as it includes most of the energy infrastructure involving renewable energy, smart grid/energy, high performance buildings, electric vehicles and transportation, advanced biofuels, etc. In a class that meets twice a week there's more time to cover the systems integration of these technologies. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		N/A	
		04/01/2014 - Students were able to show and explain how alternative energy systems provide both higher energy efficiency as well as reduced carbon emissions, and in many cases, how this can be done for less capital and operational cost than current fossil fuel based technology. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** N/A **GE/IL-SLO Reflection:** N/A	
		09/23/2013 - 80% of students received A- or better on their final projects on personal energy audits and recommending ways of improving their energy footprints and/or substituting it with using clean energy. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
		02/15/2012 - The majority of students easily found an application fo clean energy technology that they could articulate a compelling story, indlcuing detail of teh technology, how it worked, and why it was important. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **GE/IL-SLO Reflection:** Students struggled with this initially, as it was a final assignment and procrastination led them to delay starting the assignment, but they genuinly enjoyed this assignment, and were very prouf of what they had accomplished.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Engineering (ENGR) - ENGR 45 - PROPERTIES OF MATERIALS - Classess of Materials - To ensure that our students are knowledgeable about all classes of materials and their structure, properties, processing, applications and performance; (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** Students performance will be scored by answering questions on the final exam. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% of the students taking the exam getting a B or better.	10/10/2014 - Students were assessed for their performance on a comprehensive final exam that covered a broad range of content covered in the course. Topics included classes of materials; structural, mechanical, electrical and chemical properties or materials; phase and transitional diagrams, manufacturing process and material applications. Overall, 80.6% of the class scored a B or better on the final exam in Spring 2014. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		07/12/2013 - Before the final exam scores were curved, 28% of the students taking the final exam achieved a B or better. After the final exams scores were curved, 82% of the students received a B or better. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	07/12/2013 - Using the final exam scores may not be the best measure because the difficulty of the final exam may vary from year to year. Possibly change this to the course grade (without the lab component).
		10/01/2012 - 81.25% of the students completing the final exam scored a B or better. One student began the final exam but was unable to complete it during the exam time and was excluded from the analysis. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	10/01/2012 - This SLO seems appropriate and a good measure of student success. It should be kept for the next time the course is taught.
Department - Engineering (ENGR) - ENGR 45 - PROPERTIES OF MATERIALS - Real Materials engineering Problems - To ensure that our students can properly relate their hands-on laboratory experiences to solving real materials engineering problems	**Assessment Method:** Students will be assessed by their average performance on laboratory projects for the quarter. **Assessment Method Type:** Class/Lab Project	10/10/2014 - Students were individually assessed for their performance on a series of laboratory projects in terms of their preparation for each laboratory, active participation in the laboratory experiment and the quality of their laboratory report. Overall, 91% of the class scored a B or	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
(Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Target for Success:** 70% of the class scoring a B or better will be considered success.	better for their laboratory grade in Spring 2014. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		07/12/2013 - 100% of the students who completed the course scored a B or better in the laboratory assignments and projects. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
		10/01/2012 - 83% of the students receiving grades for the course scored an average of a B or better on the laboratory projects. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	10/01/2012 - This SLO should probably be rewritten. It is a little vague, and the assessment method is not well aligned with the desired outcome.
Department - Engineering (ENGR) - ENGR 46 - STRENGTH OF MATERIALS - Conceptual Understanding - Students who successfully complete this course should be able to demonstrate a conceptual understanding of the stresses and strains within materials and the ways in which they fail. (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** Students should be able to discuss the behavior of materials in a class presentation. **Assessment Method Type:** Class/Lab Project **Target for Success:** 70% of the class should give a successful presentation.		
Department - Engineering (ENGR) - ENGR 46 - STRENGTH OF MATERIALS - Application - Students who successfully complete this course should be able to carry out calculations regarding stresses and strains within materials. (Created By Department - Engineering (ENGR))	**Assessment Method:** 70% of the students taking the final exam should earn a grade of C or better. **Assessment Method Type:** Exam - Course Test/Quiz		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Course-Level SLO Status: Active			
Department - Engineering (ENGR) - ENGR 47 - DYNAMICS - Computation - Students should be able to analyze kinematics of rigid bodies in three dimensions. (Created By Department - Engineering (ENGR)) **Start Date:** 09/22/2014 **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 47 - DYNAMICS - Modeling - Students should be able to model the relationship between forces and acceleration and energy and momentum. (Created By Department - Engineering (ENGR)) **Start Date:** 09/22/2014 **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 49 - ENGINEERING PROFESSION - Self Analysis and Career Research - Identify one's interest in a engineer field(s) via self analysis and career research. (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** 2-10 page essay on career plan or poster on benefits of a particular engineering field or career **Assessment Method Type:** Class/Lab Project **Target for Success:** 85% of students receive a grade of B or better.	10/05/2016 - 71% of the students enrolled in the course turned in a final essay. 100% of the students turning in projects received a B or better on the assignment. **Result:** Target Not Met **Year This Assessment Occurred:** 2015-2016 09/23/2013 - Fall 2012: Personal Statement Assignment, 92% of students received a grade of A- or better. Winter 2013: Personal Statement Assignment, 88% or students received a grade of A or better. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	10/05/2016 - I will follow-up with students more often to encourage participation on the course and not allow students to stop engaging in the course without an opportunity to reenter a path for passing.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		02/24/2012 - All of the students taking the course received a B or better on the essay assignment. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	02/24/2012 - While the target seems to have been easily met this quarter, I think that the SLO and the assessment method are both on target for what we hope students will gain from the course. I will not be making changes to the SLO or assessment method for next year.
Department - Engineering (ENGR) - ENGR 49 - ENGINEERING PROFESSION - Engineering Responsibilities - An understanding of professional, ethical, legal, security, and social issues and responsibilities (Created By Department - Engineering (ENGR)) **Course-Level SLO Status:** Active	**Assessment Method:** Class discussion on responsibilities in engineering. **Assessment Method Type:** Discussion/Participation **Target for Success:** 95% of the registered students contributing to the discussion.	10/05/2016 - 100 % of the attending students contributed to the discussion. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		10/10/2014 - The students in the course actively participated in the discussions about the professional responsibilities in engineering through attending and asking questions throughout the quarter. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	10/10/2014 - This SLO should be rewritten to reflect the nature of the course and how the discussions are spread out over several weeks in the quarter.
		09/23/2013 - For the discussion on responsibilities in engineering, majority of the students contributed to the discussion by asking various speakers about their responsibilities and daily activities. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
		02/24/2012 - For the discussion on ethics, 100% of the class happened to be in attendance that day (which is pretty lucky). Each student participated in the discussion, although some students needed to be encouraged to speak.	09/23/2013 - For the discussion on responsibilities in engineering, majority of the students contributed to the discussion by asking various speakers about their responsibilities

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Result: Target Met **Year This Assessment Occurred:** 2011-2012	and daily activities. 02/24/2012 - Because some students may by absent on the day of the discussion, this SLO should maybe be rewritten to make sure that absent students have thought about engineering ethics as well.
Department - Engineering (ENGR) - ENGR 54H - HONORS INSTITUTE SEMINAR IN ENGINEERING - Technical Communication - Students should be able to discuss the importance of their topic and explain the details of their topic in written form. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Academic Year **Course-Level SLO Status:** Active	**Assessment Method:** Each student should turn in a research paper at the culmination of the course. **Assessment Method Type:** Research Paper **Target for Success:** 75% of students should achieve an A on the research paper.		
Department - Engineering (ENGR) - ENGR 54H - HONORS INSTITUTE SEMINAR IN ENGINEERING - Independent Analysis - Students should be able to demonstrate initiative in pursuing and analyzing the topic of interest. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Academic Year **Course-Level SLO Status:** Active	**Assessment Method:** Students will discuss with the instructor their interests and plans for pursuing the topic of choice. **Assessment Method Type:** Discussion/Participation **Target for Success:** By the end of course, 100% of students demonstrate through discussions their interest and plans for research.		
Department - Engineering (ENGR) - ENGR 62A - INTRODUCTION TO 3D PRINTING & RAPID PROTOTYPE DESIGN - Industry Awareness - Demonstrate knowledge of the			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
3D printing industry and its potential applications. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62A - INTRODUCTION TO 3D PRINTING & RAPID PROTOTYPE DESIGN - Tools of the Trade - Communicate the necessary technical skills and work requirements for the model making and design process. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62A - INTRODUCTION TO 3D PRINTING & RAPID PROTOTYPE DESIGN - Career Possibilities - Analyze personal aptitudes and interests within the industry to identify career pathways and opportunities. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62B - 3D PRINTING: BASIC MODEL MAKING - Drafting skills - Create three-dimensional sketches by drafting simple primitives and applying proper line conventions. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Course-Level SLO Status: Active			
Department - Engineering (ENGR) - ENGR 62B - 3D PRINTING: BASIC MODEL MAKING - Standards, specifications, and safety - Interpret and use industrial specifications and engineering standards for the safe selection and application of appropriate model making techniques and equipment. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62B - 3D PRINTING: BASIC MODEL MAKING - Basic Models - Select proper materials to construct simple models and forms and justify selections. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62C - 3D PRINTING: ADVANCED MODEL MAKING - Equipment Expertise - Demonstrate proficiency with a variety of 2D & 3D modeling equipment using clay, plastic resins, and metal casting. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
62C - 3D PRINTING: ADVANCED MODEL MAKING - Analysis of Models - Effectively create and analyze models and select proper materials and equipment for production. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62D - 3D RAPID MODEL MAKING & PROTOTYPE DEVELOPMENT - Fabrication Skills - Demonstrate proficiency in programming, setting-up, and operating a variety of 3D modeling machines to create complex parts. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62D - 3D RAPID MODEL MAKING & PROTOTYPE DEVELOPMENT - Presentations - Perform comprehensive design solutions presentations. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 62D - 3D RAPID MODEL MAKING & PROTOTYPE DEVELOPMENT - Model analysis - Create and analyze computer generated models using advanced skills, techniques, and materials to produce high-quality parts. (Created By Department -			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 81 - ELECTRIC POWER SYSTEMS - Electrical concepts and measurements - Apply physics of electricity and magnetism to calculate, predict and safely measure basic properties of power systems. (Created By Department - Engineering (ENGR)) **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Examination to require basic calculations in physics of electricity in circuits including motors, generators, large capacitor banks and distribution systems. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students will be successful in 75% of all calculations.	09/21/2013 - Students were mostly successful in calculations involving physics of electricity and very basic power systems, however the content was more difficult (and perhaps more abstract) than students expected or were prepared for, and in some cases even interested in. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	09/21/2013 - Develop a small workbook of calculations to help students work through simple and then more complex power system calculations, as this topic needs support material.
Department - Engineering (ENGR) - ENGR 81 - ELECTRIC POWER SYSTEMS - Modern power systems - Describe and diagram a modern electric utility system, infrastructure, and power systems architecture (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Drawing and written explanation **Target for Success:** 75% of students will be able to describe/draw general components of a power system	09/21/2013 - Students studied and diagramed high level components of a modern utility grid, from generation to transmission to distribution systems, however we did not delve into component level architecture This proved to be sufficient to introduce students to the basic operating systems of a modern utility, and a good foundation to learn advanced topics, such as a smart energy platform **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** N/A	09/21/2013 - Find and use diagrams of electric power / utility systems that students can more readily understand, and especially go back and memorize component names and functions.
Department - Engineering (ENGR) - ENGR 81 - ELECTRIC POWER SYSTEMS - Distributed generation and smart energy systems - Apply power systems knowledge to distributed generation, active distribution,	**Assessment Method:** Students will submit a written assignment describing active distribution of power through a combination of energy storage, flexible energy generation, and addressable	09/21/2013 - This was a goal of the course however it may have been too advanced, or too specific, and perhaps not relevant to today's power grid, but relevant to tomorrow's power grid. **Result:**	09/21/2013 - Need to develop curriculum around distributed generation, active load management, and smart energy systems, possibly using a living

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
and smart energy management (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active	loads (active load management) **Assessment Method Type:** Essay/Journal **Target for Success:** 75% of students will score at 75% or better	Target Not Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	laboratory approach.
Department - Engineering (ENGR) - ENGR 82 - PHOTO VOLTAIC & SOLAR CELL DESIGN - Science of Photo Voltaics - Understand the basic science of solar photovoltaic technology and the primary technologies currently available (Created By Department - Engineering (ENGR)) **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Use written explanations, diagrams, and class discussion to determine if the basic concepts of a photovoltaic junction/cell/module are understood, and various types of approaches to fabricating photovoltaic devices. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students will be able to explain the basic operation of a photovoltaic junction, and compare and contrast the approaches, advantages and disadvantages of using silicon, CdTe, CIGS, TiO2, and other materials.	09/22/2013 - Students showed a good understanding of how solar PV operates at both a physics and system level, and additionally the types of material technologies, including silicon (crystalline and amorphous), CdTe, and CIGS, including the advantages (efficiency and cost) and disadvantages (inability to scale, poor efficiency) and the relative proportions of current and future markets for each technology. There was a large range of mastery for this assignment, as many students were familiar with the device level physics, but some were not, and not all students understood the importance of efficiency, defects, and ability to scale. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	09/21/2013 - Students should follow GTM (Greentech Media) to stay involved with the technology trends over time, and greater reliance on GTM industry reports could add to better understanding of market trends and forces.
Department - Engineering (ENGR) - ENGR 82 - PHOTO VOLTAIC & SOLAR CELL DESIGN - Solar installation process - Understand how to assess, design, and construct a solar installation from fabrication to grid incorporation (Created By Department - Engineering (ENGR)) **Start Date:** 04/01/2012	**Assessment Method:** Students will perform analysis of a basic photovoltaic installation including existing load, cost of current electricity, roof orientation, solar index, and available choices for installation (size) choice of panels, inverter, and balance of system. Assignment will include diagrams, spreadsheets, and supporting text. Students	09/21/2013 - Students exhibited a wide variety of understanding and competency for this assignment, with some students with technical sales (pre-engineering sales) backgrounds displaying very good competency, and others not putting quite as much effort into the assignment. This was an effective 'hands-on' activity for many students that had time to explore a number of potential installations. Additionally, the tour of	09/21/2013 - This assignment could be enhanced through additional tours of various sized installations, and ability to look at real technical sales/engineering contracts from solar PV vendors, and potentially a guided tour by a PV technical sales engineer.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
End Date: 06/30/2012 **Course-Level SLO Status:** Active	will describe the process of getting proper permits and interconnect. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students will display proficiency in this assignment, although the level of rigor can vary significantly in an assignment like this. Students may be allowed to work in groups, and also submit this assignment as part of a final project/class presentation.	college campus, with ~1.5 MW of solar PV, provided some students with additional material for an extended assignment. The financial aspects of this assignment did prove challenging for some students. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	
Department - Engineering (ENGR) - ENGR 82 - PHOTO VOLTAIC & SOLAR CELL DESIGN - Drivers and limitations of solar PV adoption - Be able to discuss the political, environmental, and economic motivations and limitations of solar energy use (Created By Department - Engineering (ENGR)) **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Written assignment and possibly a class discussion about political drivers (and resistance) to adoption of large-scale solar, RPS (Renewable Portfolio Standards), environmental drivers (political and other), and economic drivers for solar PV development and deployment. Assignment can include calculations for estimating the amount of solar PV needed to reach carbon reduction targets. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% or more of students will articulate the political, environmental, and economic drivers for solar PV adoption, and be able to explain this to people outside of the class as a means of showing mastery and communicating the need for solar PV.	09/21/2013 - Students displayed a good understanding of political, environmental, and economic drivers for solar development and deployment, however there was a distinct difference in some assignments that were stronger in environmental, focusing on climate change, or resource, focusing on fossil fuel replacement, and the relative merits of policy, such as RPS goals, and utility rebates. Some students attempted a more detailed analysis of the cost of solar compared to the cost of natural gas, and the challenge of cheaper natural gas in making the cost of solar more challenging, even with a plummeting cost of solar panels. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	09/21/2013 - This assignment can be enriched through deeper financial analysis of solar PV compared to natural gas, including the benefit of Building Integrated Photovoltaic (BIPV) to lower peak demand, as well as enhance property values. Additionally, a comparison of US incentives as compared to Germany, which leads in solar adoption.
Department - Engineering (ENGR) - ENGR 83 - SMART ENERGY SYSTEMS - Modernized Grid - Articulate the need for a modernized grid with a ?smart energy? intelligence layer (Created By Department - Engineering (ENGR))	**Assessment Method:** Written description with examples and details of smart energy systems in a modern utility, addressing load and asset management, grid stress, and demand response.	09/21/2013 - Students discussed and articulated the drivers for a smart energy grid, including technology, business, and environment, and specific needs including RE integration, EV adoption, and demand response to alleviate grid stress, and avoid future power system generation	09/21/2013 - Continue development of this part of the course as the technical and business drivers of a modernized grid are foundational to development of smart energy systems.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Assessment Cycles: End of Quarter **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active	**Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students will be able to describe the need and application of smart energy as an intelligence and control layer in a modernized grid structure, including specific examples related to Renewable Energy, EV integration, energy storage, and smart buildings.	development. Students were 80 to 90% effective in this, dependent only on their attendance and effort to understand system wide interactions. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	
Department - Engineering (ENGR) - ENGR 83 - SMART ENERGY SYSTEMS - Smart energy architecture - Describe and diagram the physical and logical architecture of smart energy systems (Created By Department - Engineering (ENGR)) **Start Date:** 04/01/2012 **End Date:** 06/30/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Assignment could be a written essay with diagrams, class presentation, or part of a final exam. Students should combine diagrams with descriptions and explanations of how components of a smart energy system work together to provide insights into energy use (energy analytics) and active load management. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students will be able to describe system architecture of a utility including advanced metering infrastructure, smart meters, meter data management, and elements of energy portals including ENERNOC (etc).	09/21/2013 - This topic wasn't really addressed, as too much time was spent on Internet protocols and ICT details that probably weren't useful in an introductory course. The physical and logical infrastructure of the utility grid was a key topic in ENGR81 (Power Systems) that many ENGR83 students studied concurrently, hence the SLO was achieved but not in this course. Having a shared course with ENGR81 may be a better approach for this SLO. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	09/21/2013 - More time needs to spent on this topic in class, as it is complex and is a common thread in the energy program beginning in power systems (ENGR81). The physical and logical architecture of smart energy systems is also evolving as utilities increase use of advanced metering architecture, add energy storage, integrate EVs, and begin to embrace ZNE (Zero Net Energy) buildings and grid interactions.
Department - Engineering (ENGR) - ENGR 83 - SMART ENERGY SYSTEMS - Smart energy process - Describe and articulate the relations of stakeholders and smart energy process (Created By Department - Engineering (ENGR)) **Start Date:** 04/01/2012 **End Date:**	**Assessment Method:** This is an essay style question that is somewhat open-ended as the the evolution of smart energy process, stakeholders, policy and business process is ongoing and unfolding. This is a reflective exercise that students can **Assessment Method Type:** Exam - Course Test/Quiz	09/21/2013 - While weekly assignments didn't immediately address this, however the final writing assignment stressed the stakeholder interactions in utilities, and how smart energy process would help the evolution today's utility to tomorrows distributed generation and active distribution power system. Students would have learned this better had we spent more 'time on task' on this subject with better assessment, perhaps driven by	09/21/2013 - This is an evolving topic and driver of smart energy as stakeholders including customers, utilities, policy, and business are all components of a modernized grid. Students should use this exercise to focus their reading of current events on this topic, such as covered in Greentech Media (GTM Research)

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
06/30/2012 **Course-Level SLO Status:** Active	**Target for Success:** 75% or more of the class should be able to describe three key stakeholders in smart energy process, including end-user customers, local utilities, and larger transmission and distribution system operators. Other stakeholders include society (environmental and economic) including resource and GHG management.	discussion. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** N/A	etc
Department - Engineering (ENGR) - ENGR 83A - INTRODUCTION TO BIOMEDICAL ENGINEERING - Biological system components - Students who successfully complete this course should be able to identify basic components of biological systems and their functions. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** Students' performance will be scored by answering questions on the final exam. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% of the students taking the exam getting 80% or better correct on those questions related to biological systems components.	04/29/2016 - 77% of students taking the final exam achieved 80% or better correct on those questions related to biological systems components. This falls short of the 80% target. The instructor will review the course material and delivery to identify areas for improvement; develop an improvement plan; and then revise the course material and delivery for future offerings. At the same time, the Target for Success will be reconsidered given the apparently chronic low enrollment in this class, as the low numbers result in a very coarse quantization of results. **Result:** Target Not Met **Year This Assessment Occurred:** 2015-2016	
Department - Engineering (ENGR) - ENGR 83A - INTRODUCTION TO BIOMEDICAL ENGINEERING - Developmental stages of biomedical product - Students who successfully complete this course should be able to explain how a new biomedical product moves through the following developmental states: prototype, testing, production, and marketing. (Created By Department - Engineering (ENGR))	**Assessment Method:** Students' performance will be scored by answering questions on the final exam. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Target for Success: 80% of the students taking the exam getting a B or better.	04/29/2016 - 69% of students taking the final exam received a B or better on that exam. This falls short of the 80% target. The instructor will review the course material and delivery to identify areas for improvement; develop an improvement plan; and then revise the course offering for future classes. At the same time, the Target for Success will be reconsidered given the apparently chronic low enrollment in this class, as the low numbers result in a very coarse quantization of results. **Result:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Assessment Cycles: End of Quarter **Course-Level SLO Status:** Active		Target Not Met **Year This Assessment Occurred:** 2015-2016	
Department - Engineering (ENGR) - ENGR 83B - DESIGN AND MANUFACTURING IN THE BIOMEDICAL ENGINEERING FIELD - Product requirements - Students who successfully complete this course should be able to define product requirements based on customer needs. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** The final exam questions - focusing on product design considerations and customer requirements - will be used as the assessment. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of the students taking the final exam score 80% or higher. The comprehensive exam shall include questions on defining product requirements based on customer needs.	10/05/2016 - All 12 students passed the course with 70% cumulative average or better. Sterility and product requirements were key components measured in the final exam. 10 of 12 students (83%) passed the exam with 70% or better indicating mastery of the material. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		04/25/2015 - 82% of the students taking the final exam scored B or better (getting 80% of the possible points) for the relevant questions. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	
Department - Engineering (ENGR) - ENGR 83B - DESIGN AND MANUFACTURING IN THE BIOMEDICAL ENGINEERING FIELD - Sterility - Students who successfully complete this course should be able to identify major requirements for sterility in clean rooms. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** Final exam questions on sterility. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of the students taking the final exam score 80% or higher. The comprehensive exam shall include questions on major requirements for sterility in cleanrooms.	10/05/2016 - All 12 students passed the course with 70% cumulative average or better. Sterility and product requirements were key components measured in the final exam. 10 of 12 students (83%) passed the exam with 70% or better indicating mastery of the material. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		04/25/2015 - 100% of the students taking the exam answered half of the questions on sterility correctly AND 65% of the students taking the exam answered all of the questions on sterility correctly. **Result:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Target Met **Year This Assessment Occurred:** 2014-2015	
Department - Engineering (ENGR) - ENGR 83C - INTRODUCTION TO MEDICAL DEVICE REGULATIONS - Device classification - Students who successfully complete this course should be able to classify a medical device based on the level of control needed to assure safety and effectiveness. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** Students' performance will be scored by answering questions on the final exam. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% of the students taking the exam getting 80% or better correct on those questions related to device classification.	04/29/2016 - 84% of the students taking the exam achieved a score of 80% or better correct on those questions relating to device classification. Target for Success will be reconsidered given the apparently chronic low enrollment in this class, as the low numbers result in a very coarse quantization of results. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
Department - Engineering (ENGR) - ENGR 83C - INTRODUCTION TO MEDICAL DEVICE REGULATIONS - Good Manufacturing Processes - Students who successfully complete this course should be able to identify major requirements of Good Manufacturing Processes. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** Students' performance will be scored by answering questions on the final exam. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Target for Success: 80% of the students taking the exam getting a B or better.	04/29/2016 - 80% of the students taking the final exam achieved a B or better on the exam. Target for Success will be reconsidered given the apparently chronic low enrollment in this class, as the low numbers result in a very coarse quantization of results. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
Department - Engineering (ENGR) - ENGR 83D - INTRODUCTION TO QUALITY ASSURANCE - Corrective and preventative actions - Students who successfully complete this course should be able to analyze and propose corrective and preventative actions. (Created By Department - Engineering (ENGR))	**Assessment Method:** Students' performance will be scored by answering questions on the final presentation. **Assessment Method Type:** Presentation/Performance **Target for Success:** Target for Success: 75% of the students taking the exam getting a B or better.	04/29/2016 - 100% of the students received a B or better on their final presentation. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Assessment Cycles: End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 83D - INTRODUCTION TO QUALITY ASSURANCE - FDA regulations - Students who successfully complete this course should be able to summarize FDA regulations in relation to quality assurance requirements. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** Students' performance will be scored by answering questions on the final exam. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of the students taking the exam getting a B or better correct on their final presentation.	04/29/2016 - 79% of students taking the final exam received a B or better on that exam. This falls short of the 80% target. The instructor will review the course material to identify areas for improvement; develop an improvement plan; and then revise the course material for future offerings. At the same time, the Target for Success will be reconsidered given the apparently chronic low enrollment in this class, as the low numbers result in a very coarse quantization of results. **Result:** Target Not Met **Year This Assessment Occurred:** 2014-2015	
Department - Engineering (ENGR) - ENGR 83E - INTRODUCTION TO DOCUMENTATION - Definition of a medical device - Students who successfully complete this course should be able to identify a medical device based on its functions. (Created By Department - Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			
Department - Engineering (ENGR) - ENGR 83E - INTRODUCTION TO DOCUMENTATION - Medical device documents - Students who successfully complete this course should be able to identify major elements of medical device documents. (Created By Department -			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Engineering (ENGR)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active			

Unit Assessment Report - Four Column

Foothill College

Program (PSME - ENGR) - Engineering AS

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Program (PSME - ENGR) - Engineering AS - 1 - Formulate logical problem solving approaches, generate solutions, and assess the reasonableness of the solutions for engineering type analysis problems. **SLO Status:** Active	**Assessment Method:** In class Brainstorming and House of Quality activities assessed during Engr 10. Engr 10 is offered every quarter, and will be assessed annually. For 2011-2012, it will be assessed in Winter 2012. **Assessment Method Type:** Class/Lab Project **Target:** 70% of the Engineering 10 class will complete the assignment with a B or better.	03/08/2012 - I found that 70.8% of the students completing Engineering 10 completed the assignment with a B or better. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	03/08/2012 - While the target was met, this might not be the best assessment for the program as this assignment is given at the beginning of the first course in the program sequence.
Program (PSME - ENGR) - Engineering AS - 2 - Design, construct, and produce creative solutions to engineering problems by applying the engineering design process and identifying pertinent design parameters based on the fundamental physics governing a system. **SLO Status:** Active	**Assessment Method:** Large engineering design project in Engineering 10. Engr 10 is offered every quarter, and will be assessed annually. For 2011-2012, it will be assessed in Winter 2012. **Assessment Method Type:** Class/Lab Project **Target:** 80% of the class will get a B or better on the grades associated with the final report, presentation, and demo.	11/20/2012 - 83.3% of the class earned a B for better on the final report, presentation, and demo. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	11/20/2012 - The students are doing great. There is always room for them to be doing better, however.
Program (PSME - ENGR) - Engineering AS - 3 - Demonstrated understanding of the fundamental knowledge necessary for the practice of, or for advanced study in, engineering, including scientific principles, rigorous analysis, and problem solving. **SLO Status:** Active	**Assessment Method:** In class exam score. 20111-2012 Winter for Static class, E35 **Assessment Method Type:** Exam - Course Test/Quiz **Target:** 75% of the students earning a C or higher.	11/22/2012 - The average score of quarter's final exam shows a 79.9% for the winter class. Detailed analysis by breaking down in different subjects shows that student had good grasp on basic application and problem solving skills: 85% in 3D rigid body equilibrium, 83% in Truss analysis, 75% in Beams analysis. Three low score subjects are: friction, 42%, moment of inertia, 63%, and finally, equivalent force system, 52%. Friction is introduced in the very last portion of the	11/22/2012 - 1) more in-class excise focusing on Equivalent force system so students have more guidance on this part of problem solving. 2) more in-class excise on moment of inertia so students have more practice on combining their math with engineering application.

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		quarter. Apparently students didn't have enough time to fully digest the subject. They have basic understanding, but not enough skill to analyze advance situation. Moment of inertia has a similar factor as friction, which was introduced just before the final, and their math skill is still limited to just solve equations, but application of calculus not solid. Equivalent force system is rather abstract, which has been the most difficult subject. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	
Program (PSME - ENGR) - Engineering AS - 4 - Demonstrated clear communication skills, responsible teamwork, professional attitudes and ethics. **SLO Status:** Active	**Assessment Method:** Final presentations assessed during Engr 10. Engr 10 is offered every quarter, and will be assessed annually. For 2011-2012, it will be assessed in Winter 2012. **Assessment Method Type:** Presentation/Performance **Target:** 70% of students giving the final presentations earn a B or higher on the presentation portion of the final project.	11/20/2012 - 100% of the students earning a grade in the course earned a B or higher on the presentation portion of the final project. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	11/20/2012 - Because of the overwhelming success of the students on their final presentations, we will consider increasing the target from earning a B or better to earning an A or better.
	Assessment Method: Survey of peer evaluation on teamwork assessed during Engr 10. Engr 10 is offered every quarter, and will be assessed annually. For 2011-2012, it will be assessed in Winter 2012. **Assessment Method Type:** Survey **Target:** 70% of students rated as "Satisfactory" or above.	03/21/2012 - 87.5% of the students in Engr 10 were rated as "Satisfactory" or above by their peers. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	03/21/2012 - The students did very well this quarter, much better than I anticipated. They have definitely learned how to work well as a team. I hope they take this skill with them as they progress through their degree plans and beyond.

Unit Course Assessment Report - Four Column

Foothill College

Department - Physics (PHYS)

Mission Statement: The mission of the Physics department is to provide undergraduate education founded on a rigorous, applied treatment of physics? fundamentals coupled with experiential experiences and a broad commitment to generate and disseminate knowledge.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Physics (PHYS) - PHYS 100 - PHYSICS STUDENT ASSISTANCE - Numerical Problems - The students will be able to use analysis to set up and solve numerical problems. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 100 - PHYSICS STUDENT ASSISTANCE - Skill Development - Student will spend the appropriate amount of time in PSME Center working on skills. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 100X - PHYSICS STUDENT ASSISTANCE - Numerical Problems - The students will be able to use analysis to set up and solve numerical problems (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 100X - PHYSICS STUDENT ASSISTANCE - Skill Development - Student will spend the appropriate amount of time in PSME Center working on skills. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:**			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Active			
Department - Physics (PHYS) - PHYS 100Y - PHYSICS STUDENT ASSISTANCE - Numerical Problems - The students will be able to use analysis to set up and solve numerical problems. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 100Y - PHYSICS STUDENT ASSISTANCE - Skill Development - Student will spend the appropriate amount of time in PSME Center working on skills. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 12 - INTRODUCTION TO MODERN PHYSICS - Reflecting on Physics 12 - 1. Students will understand their objectives for taking this course 2. Students will, when the course is over, reflect on how well the course met their objectives (Created By Department - Physics (PHYS)) **Start Date:** 12/01/2010 **End Date:** 06/30/2011 **Course-Level SLO Status:** Active	**Assessment Method:** Students received a survey on the first day of the class and then received another survey (based on the first) on the last day of the class. Students were asked to reflect on their objectives and how well the course met them. **Assessment Method Type:** Survey **Target for Success:** The majority of students in the class report that the class met the objectives which they had set.	11/13/2013 - I redid the survey before and after class one year later and the students responses at the end of the course were even more closely matched with the expectations they had suggested at the beginning of the course. Students report high levels of satisfaction in being able to understand Einstein's work and being able to discuss it with others. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **GE/IL-SLO Reflection:** This course draws 60 to 80 students each time it is offered, and draws many students who are older and see an understanding of modern physics as a personal and intellectual goal. 11/13/2011 - During the pre-survey, the following were the top objectives in taking the course: 1. really understanding something about the	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		theories of relativity - 54 2. knowing more about Einstein's life and outlook - 53 3. really understanding something about atoms & quantum mechanics - 50 4. learning about the history of physics - 39 5. being able to explain Einstein's work to others - 36 In the post-survey, students were asked to rate how well the course met these objectives. a = not at all b = some c = very well Here is how each of the above objectives was rated: 1. relativity: a = 0, b = 6, c = 40 2. Einstein: a = 0, b = 3, c = 40 3. atoms & qm: a = 0, b = 12, c = 35 4. history: a = 0, b = 3, c = 33 5. explain to others: a = 1, b = 13, c = 29 **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	
Department - Physics (PHYS) - PHYS 12 - INTRODUCTION TO MODERN PHYSICS - Understanding Relativity - Students will demonstrate an understanding of how Einstein's theories of relativity changed our understanding (through measurables) of space, time, and mass. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Exam questions on both the quizzes and exams in Physics 12 will probe students' understanding of the ideas of relativity and ask students to apply this understanding to new situations. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Students should be able to answer a majority of these questions successfully (keeping in mind, however, that these are tricky concepts, and even the best students may not get all questions right.)	09/18/2012 - Throughout this evening course, taken by a very wide range of students (wide in ability, background, previous exposure, maturity, time to study, etc.), I try to use visuals and analogies to give them a deeper understanding of the two theories of relativity. I have been developing questions on quizzes and exams that carefully probe this understanding, not just directly, but by asking students to apply what they have learned to new situations. I have examined the results of that subset the assessment quizzes and exams that apply to ideas from relativity. The majority of students were in fact able to demonstrate a good understanding of the key	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		ideas in the course in answering these questions. (As expected, students who did not attend regularly were less able to do this, confirming the importance of all that I do in the class to encourage and require regular attendance.) **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	
Department - Physics (PHYS) - PHYS 27 - COOKING THE EARTH - Critical Thinking – Cause and Effect - Students should be able to demonstrate their understanding of the relationship between greenhouse gasses and climate change. Students should be able to demonstrate their understanding of the relationship between climate change effects (changes in temperature, etc.) and ecosystems. (Created By Department - Physics (PHYS)) **Assessment Cycles:** End of Academic Year **Course-Level SLO Status:** Active	**Assessment Method:** This SLO will be assessed by either an in class exam question(s) or an assignment. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students demonstrate their understanding through mastery of the assignment by earning a B or better.		
Department - Physics (PHYS) - PHYS 27 - COOKING THE EARTH - Computation – Graph Reading - Students should be able to demonstrate their ability to interpret scientific data from a graph and understand the meaning of the data. (Created By Department - Physics (PHYS)) **Assessment Cycles:** End of Academic Year **Course-Level SLO Status:** Active	**Assessment Method:** This SLO will be assessed by either an in class exam question(s) or an assignment. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% of students demonstrate their ability to interpret and understand scientific data through earning a B or better on the assessment.		
Department - Physics (PHYS) - PHYS 2AM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Derivatives in Mechanics -	**Assessment Method:** Roughly half of the problems on the final	09/06/2016 - Students did well on these problems, we had a good success rate in the class.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
The student will be able to apply derivatives to problems in kinematics, dynamics, energy, momentum and related topics (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	exam should involve taking derivatives to solve physics problems. Instructor will examine results. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% Success rate on these problems.	However, we are now moving over to Canvas, which is much more restricted in the complexity of problem that can be handled by the online system. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	09/06/2016 - Press Canvas to increase complexity of quiz problems.
		08/31/2015 - Students performed well on this task. They did a good job of connecting physics with the correct previous math experience. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** None. **Resource Request:** None.	
		06/27/2014 - Students performed well on the final, displaying a mastery of the required skill. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	06/27/2014 - Instructor should continue to develop online problems.
		07/11/2013 - In both the Fall 2012 face-to-face and Winter 2012 online versions of this class, the students mastered taking derivatives to solve physics problems. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	07/11/2013 - Although this class can be viewed as a success, it is still in development, and should be undergoing constant improvement.
Department - Physics (PHYS) - PHYS 2AM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Integrals in Mechanics - The student will be able to apply integrals to problems in kinematics, dynamics, energy,	**Assessment Method:** Roughly half of the problems on the final exam should involve taking integrals to solve physics problems. Instructor will examine	09/06/2016 - Students did well on these problems, we had a good success rate in the class. However, we are now moving over to Canvas, which is much more restricted in the complexity of	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
momentum and related topics. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	results. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% success on the integral problems.	problem that can be handled by the online system. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		08/31/2015 - The students also performed well on these problems. They have mastered this material. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** None	
		06/27/2014 - Students satisfied instructor expectations on the final exam. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		07/11/2013 - In both the Fall 2012 face-to-face and Winter 2012 online versions of this class, the students mastered taking integrals to solve physics problems. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	07/11/2013 - While this class can be viewed as a success, it is new and should be undergoing constant improvement.
Department - Physics (PHYS) - PHYS 2B - GENERAL PHYSICS - Concepts in E&M - Students should be able to solve problems involving the relationships between charges, forces and fields for both electricity and magnetism, the concept of voltage, and simple circuits. (Created By Department - Physics (PHYS))	**Assessment Method:** Students will be pre- and post-tested using a standardized exam. **Assessment Method Type:** Exam - Standardized **Target for Success:** The class should show an improvement of 0.2 as measured by a normalized gain. This	09/01/2016 - The students struggled in 2B this year. One class, with a smaller sample size, posted a Hake gain of 0.26. However, the larger class saw a gain of only 0.17. Both of these classes were taught by veteran instructors who use peer interaction methods, which have been successful in our other courses. **Result:**	09/01/2016 - From a structural point of view, 2B might be our biggest challenge. It covers two very different segments of physics, and attempts to do a great deal of material in a format that only has four hours a week available for classroom instruction.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Course-Level SLO Status: Active	is the national average for physics courses.	Target Not Met **Year This Assessment Occurred:** 2015-2016	We are also moving over to a new text this year. We should examine the exam (where students have always seen a poor Hake gain) to make sure that the instrument has fidelity with the course objectives (and yes, we wrote that last year, but with the new book there's added impetus).
		09/01/2015 - We pre and posted tested for a result of .39, in a small sample size. This result is not surprising as small classes thrive in our peer-interaction environment. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** We have no requests specifically for 2B.	09/01/2015 - We wish to upgrade the assessment tool to get a better view of student success.
		09/17/2013 - We gave a pre-and-post test from publisher generated materials, we found a gain of 0.18, which is below the 0.2 gain we expected. One of the difficulties on the Physics 2 sequence is the comparative lack of class time, we suggest utilizing online/flipped methods to push some instruction out of the classroom so that the instructor can concentrate on non-lecture activities. **Result:** Target Not Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** Faculty would like funds to attend Physics Education Research workshops to learn more about innovative non-lecture techniques.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		09/17/2012 - We pre and post-tested, realizing a gain of 0.23, within range of the national average. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	09/17/2012 - While we met expectations, the peer-interaction model can lead to even stronger gains. Resources in the form of paid student helpers would lead to stronger student achievement.
		04/01/2011 - Our main finding was that our assessment tool was flawed. There was some poor implementation - a flipped page in the test meant that we couldn't correlate certain questions on the scantron sheets, and had to throw them from the sample. The test questions were probably also too hard. We saw Hake gains of roughly 0.1, which is half of the national average for a "typical" test. Given that this was over two different professors, we need to look hard at the test. Also, the test was numerical, and no formulas were given to the students. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	04/01/2011 - Need to reform the pre -post tests, taking out problems that are too hard. Also, since we don't ask students to memorize formulas for their typical exams, if we have a pre- and post-test, we need to provide formula sheets.
Department - Physics (PHYS) - PHYS 2B - GENERAL PHYSICS - Thermodynamics - Students should understand the following concepts from Thermodynamics: 1. Distinctions between temperature, heat and energy. 2. PV diagrams 3. First and Second Laws of Thermodynamics (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Students will be pre- and post-tested with a standardized exam. **Target for Success:** The class should show an improvement of 0.2 as measured by a normalized gain. This is the national average for physics courses.	09/01/2015 - We pre and posted tested for a result of .39, in a small sample size. This result is not surprising as small classes thrive in our peer-interaction environment. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	
		09/17/2013 - We gave a pre-and-post test from publisher generated materials, we found a gain of 0.18, which is below the 0.2 gain we expected. One of the difficulties on the Physics 2 sequence is the comparative lack of class time, we suggest utilizing online/flipped methods to push some instruction out of the classroom so that the	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		instructor can concentrate on non-lecture activities. **Result:** Target Not Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** Faculty would like funds to attend Physics Education Research workshops to learn more about innovative non-lecture techniques.	
		09/17/2012 - We pre and post-tested, realizing a gain of 0.23, within range of the national average. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	
		04/01/2011 - Our main finding was that our assessment tool was flawed. There was some poor implementation - a flipped page in the test meant that we couldn't correlate certain questions on the scantron sheets, and had to throw them from the sample. The test questions were probably also too hard. We saw Hake gains of roughly 0.1, which is half of the national average for a "typical" test. Given that this was over two different professors, we need to look hard at the test. Also, the test was numerical, and no formulas were given to the students. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	04/01/2011 - We need to recalibrate the exam, removing the more difficult items, and providing a formula sheet, as we don't ask our students to memorize physics equations.
Department - Physics (PHYS) - PHYS 2B - GENERAL PHYSICS - Lab Experiments - Lab experiments should teach students the background science, error analysis, and how to perform experiments. (Created By Department - Physics (PHYS))	**Assessment Method:** Either via examination of lab books or in class observation, instructors should evaluate labs for improvement. **Assessment Method Type:** Essay/Journal	09/16/2014 - We decided that the Ohm's Law lab took too much time as currently devised, and would be better presented over a two-week period. **Result:** Target Met **Year This Assessment Occurred:**	09/16/2014 - We should spread this out over two weeks, with the first week consisting of a discovery lab to determine parallel and series circuits, and the second to look at

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Course-Level SLO Status: Active		2013-2014 **Resource Request:** This can be implemented with our current materials, however, physics should have an equipment budget that is more responsive than the SLO cycle, as new labs should be implemented on a shorter timescale than the current funding model.	internal resistances and deviations from Ohm's Law.
		09/17/2013 - Faculty discussed the range of labs in class and agreed that the Equipotential lab is by far the weakest of the batch. The results are not instructive for the students compared to the other labs. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** Monies may be required to purchase/assemble an alternate lab.	09/17/2013 - Faculty will plan new lab experiment to replace this lab, target date Fall 2015.
		07/11/2012 - The lab we chose to examine is one where students examine Ohm's Law. We've found that while the 4B (calculus series) does Ohm's Law in one week, the 2B (algebra/trig) sequence benefits from splitting this lab over two weeks. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** None specific, although budget should be allocated for normal wear-and-tear on electronic labs.	07/11/2012 - With more time, perhaps more activities should be placed into this lab. Currently (no pun intended) in the 4B series we have the instructors choose to investigate the non-ohmic behavior of the lightbulb or the internal resistance of a power supply. Spread over two weeks, the 2B students could do both.
Department - Physics (PHYS) - PHYS 2BM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Electric Fields via Calculus - The student will be able to apply the methods of calculus to calculate electric	**Assessment Method:** Instructor will have a question on the final exam to probe students' knowledge of the topic.	08/31/2015 - While most students do well on this, some struggle. We should have more sample problems showing how to perform these calculations.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
fields and potentials from charge distributions. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% of students should make significant progress on this exam problem.	**Result:** Target Not Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** None. **Resource Request:** None. 06/27/2014 - Students were able to solve these problems. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 08/26/2013 - All students did well on this exam problem. Simple calculus problems are well within the reach of these students. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	
Department - Physics (PHYS) - PHYS 2BM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Gauss's Law and Ampere's Law - The student will be able to apply the methods of calculus to calculate electric and magnetic fields for the appropriate symmetric distributions. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Instructor will have one or more questions on the final exam to probe students' knowledge of the topic. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** At least 80% of students should make significant progress on this problem.	09/06/2016 - Students did well on these problems, they were well prepared. However, we are now moving over to Canvas, which is much more restricted in the complexity of problem that can be handled by the online system. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 08/31/2015 - Studets showed strong performance in this area, as it is put front and center in the course. **Result:** Target Met **Year This Assessment Occurred:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		2014-2015	
		06/27/2014 - Students struggled with this. Although they were able to solve the problems when they recognized the underlying concepts, some failed to see though the word problems. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		08/26/2013 - Some students struggled with this problem. While all were able to employ the mechanics of Gauss's Law, a fraction struggled with the proper evaluation of the total charge using calculus. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	08/26/2013 - I need to make sure that there are multiple instances in the homework of non simple charge distributions.
Department - Physics (PHYS) - PHYS 2BM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Faraday's Law and Corrected Ampere's Law - The student will be able to apply the methods of calculus to solve for the electric/magnetic fields generated from changing electric/magnetic fields. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Instructor will have one or more questions on the final exam to probe students' knowledge of the topic. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** At least 80% of students should make significant progress on the problem(s).	08/31/2015 - Students did well on this question, but the instructor should design better problems to make sure that there is both an conceptual and computational aspect to this. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	
		06/27/2014 - Most students were capable of solving Faraday's Law problems. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		08/26/2013 - Like the Gauss's Law problem, students understood the basics, but had difficulty with another aspect of the problem that involved calculus. In this case, the exam problem was	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		meant to be a challenge, and the results were not surprising. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Physics (PHYS) - PHYS 2BM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Time Behavior of RC, LR, RL and LRC circuits - The student will be able to apply the methods of calculus to solve problems in circuits with time-varying behavior. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Instructor will have a question on the final exam to probe students' knowledge of the topic. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** At least 80% of students should make significant progress on this problem.	09/06/2016 - Students did well on these problems, as there are good resources online. However, we are now moving over to Canvas, which is much more restricted in the complexity of problem that can be handled by the online system. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	09/06/2016 - Press Canvas to allow for more complex quizzes.
		08/31/2015 - Students were able to meet this requirement. There is a good video that lays out the basics and this seems to get the point across to the online students. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	
Department - Physics (PHYS) - PHYS 2C - GENERAL PHYSICS - Waves - Students should demonstrate competence in waves, including: Sound E&M Waves Interference (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** A standardized exam will be used. **Assessment Method Type:** Exam - Standardized	09/01/2016 - This year's assessment posted a Hake gain of 0.34, the best we've ever seen using this instrument. This is also over a decently-sized sample, so we are very pleased. There should be department-level discussion of how to move forwards with 2C. With the addition of our new FT instructor, perhaps this class should always be taught by an FT during the day, and we should make sure that the PT who teaches the possible night section is the same year-to-year. As this class is offered in general once a year, it would be a good idea to not have too many people teaching this "for the first time in a while." **Result:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Target Met **Year This Assessment Occurred:** 2015-2016	
		09/01/2015 - Students had a normalized gain of 0.21 (barely over target of 0.2), which was lower than the gains we saw in the other Physics 2 classes. It has been several years since this class was taught by a full-time instructor. Perhaps this class and the assessment need to have a stronger look from the FT instructors to make sure that the material and expectations are properly aligned. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** FT availabilty for 2C, which has been an ongoing resource allocation issue. Hopefully the addition of a new FT will help address this issue.	
		07/01/2014 - The students had a normalized Hake gain of 0.29, which is better than the national average of 0.2. As 2C students they are high quality, having passed 2A and 2B. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		08/26/2013 - Students took a pre-and-post standardized test, with a gain of 0.24, which is above the national average of 0.2. However, the test should be examined and one or two suspect questions should be removed for future testing. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		06/30/2011 - The initial trial of this SLO was with a standardized exam, pre- and post-tested. This showed poor results for both performance and improvement. This can be attributed to two factors, as seen in the reflections. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	06/30/2011 - The students did poorly for two reasons, the fact that the test did not give them access to equations (normally they get a "cheat sheet" for their exams), and that this population is a very grade-driven one, and the SLO exam had no affect on their grades. It was decided that since we offer only one lecture section of 2C, an examination of their midterms and finals is a better instrument.
Department - Physics (PHYS) - PHYS 2C - GENERAL PHYSICS - Optics - Students should demonstrate competence in optics, including: Relection Refraction Lenses Mirrors (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** A standardized exam will be used. **Assessment Method Type:** Exam - Course Test/Quiz	07/01/2014 - The students had a normalized Hake gain of 0.29, which is better than the national average of 0.2. As 2C students they are high quality, having passed 2A and 2B. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		08/26/2013 - Students took a pre-and-post standardized test, with a gain of 0.24, which is above the national average of 0.2. However, the test should be examined and one or two suspect questions should be removed for future testing. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
		06/30/2011 - The initial trial of this SLO was with a standardized exam, pre- and post-tested. This showed poor results for both performance and improvement. This can be attributed to two factors, as seen in the reflections. **Result:** Target Met	06/30/2011 - The students did poorly for two reasons, the fact that the test did not give them access to equations (normally they get a "cheat sheet" for their exams), and that this population is a very grade-driven one, and the SLO exam had

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Year This Assessment Occurred: 2010-2011	no affect on their grades. It was decided that since we offer only one lecture section of 2C, an examination of their midterms and finals is a better instrument.
Department - Physics (PHYS) - PHYS 2C - GENERAL PHYSICS - Modern Physics - Students should demonstrate competence in Modern Physics, including Special Relativity Wave Nature of Quantum Physics (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** A standardized exam will be used. **Assessment Method Type:** Exam - Course Test/Quiz	07/01/2014 - The students had a normalized Hake gain of 0.29, which is better than the national average of 0.2. As 2C students they are high quality, having passed 2A and 2B. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	09/16/2014 - While we are seeing good student success in 2C, as a program, 2C has only been offered at night in recent memory. As a department we've seen growth mainly in the 2 sequence, and would like to establish a daytime 2C class. We need to translate our success in the 2C classroom to daytime students.
		08/26/2013 - Students took a pre-and-post standardized test, with a gain of 0.24, which is above the national average of 0.2. However, the test should be examined and one or two suspect questions should be removed for future testing. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
		06/30/2011 - The initial trial of this SLO was with a standardized exam, pre- and post-tested. This showed poor results for both performance and improvement. This can be attributed to two factors, as seen in the reflections. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	06/30/2011 - The students did poorly for two reasons, the fact that the test did not give them access to equations (normally they get a "cheat sheet" for their exams), and that this population is a very grade-driven one, and the SLO exam had no affect on their grades. It was decided that since we offer only one lecture section of 2C, an

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
			examination of their midterms and finals is a better instrument.
Department - Physics (PHYS) - PHYS 2C - GENERAL PHYSICS - Lab Experiments - Labs experiments should teach the students the background science, error analysis and how to perform experiments. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Either by review of lab reports, in-class observation, or independent study, instructors should evaluate the lab experiments on an ongoing basis. **Assessment Method Type:** Essay/Journal	07/01/2014 - Going back to the radioactivity lab, although the students learned what they needed to, there were big difficulties due to the shortage of recent Po-210 sources, we should buy more annually. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** More Po-210 sources should be purchased each year.	09/16/2014 - Additional purchase of Po samples.
		08/26/2013 - We looked the the photoelectric effect experiment this year. Students did well, but we need more lasers, and a better way to shield from stray light. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** Additional funding for improvement of physics lab experiments.	08/26/2013 - We needed more blue lasers, these were purchased. We should also have custom stand-offs to level the photoelectric boxes with the mercury lamps, as our current jack setup is clunky. The lab writeup should be slightly modified so students think more carefully about their data analysis.
		07/11/2012 - The lab we examined was the radioactivity lab. This was deemed to be a strong lab, with students learning about a topic they will need to understand as citizens. There are marginal improvements that could be made. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** Yearly purchases need to be made to	07/11/2012 - The radioactivity lab is much improved, mainly due to the purchase of new Geiger counters several years ago. This has made setup and measurement much easier for the students, allowing them to concentrate on the physics. They can look at a variety of different radioactive sources, and learn the difference between alpha, beta and gamma rays. Due to the

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		replenish isotopes with short half-lives.	nature of these labs, we do need to make yearly purchases of elements that have short half-lives. We should explore if chemistry or math (exponential decay) can make use of shared resources.
Department - Physics (PHYS) - PHYS 2CM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Optics - The student will be able to interpret phenomena in Waves and Optics with a calculus treatment. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** There should be at least one problem on the final exam that pertains to optics. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% of the class should be able to solve said problem(s).	09/06/2016 - Students showed a strong understanding of rainbows, above and beyond expectations. This was the targeted evaluation, and overall the instructor saw that students were experiencing success in this class. This is at the end of a sequence, and the level of question that the students were answering was clearly above that in the first two quarters. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		06/27/2014 - Students solved a difficult Snell's Law problem. More development should go into the online presentation though. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		07/11/2013 - The students properly solved a problem involving the physics of rainbows. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	07/11/2013 - This course is new, and should be constantly be going under revision. This course should be moved online for the 2013-2014 school year.
Department - Physics (PHYS) - PHYS 2CM - GENERAL PHYSICS - CALCULUS SUPPLEMENT - Modern Physics - The	**Assessment Method:** There should be problems on the final that	08/31/2015 - Students could solve the particle in a box, which is the bread-and-butter case.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
student will be able to solve problems in Modern Physics involving calculus. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	pertain to radioactivity and/or simple quantum mechanics. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% should show a mathematical understanding of the exam problems presented.	**Result:** Target Met **Year This Assessment Occurred:** 2014-2015 06/27/2014 - Students showed a strong success when doing a straightforward Shrodinger's Equation problem. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 07/11/2013 - Students were given both a radioactivity problem and a particle in the box question. All were able to solve the particle in the box. Most were able to solve the radioactivity problem, although some others struggled. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	
Department - Physics (PHYS) - PHYS 36 - SPECIAL PROJECTS IN PHYSICS - Topic Investigation - Students have a understanding of a topic investigated in class. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Performance at the Physics Show **Assessment Method Type:** Observation/Critique **Target for Success:** Students perform well at the Physics Show	09/18/2012 - Students were given several topics from their introductory physics classes to explain to an audience of elementary school children. Our students explained the physics while performing memorable demonstrations of the topics. Learning outcomes for our students include: improved understanding of the physics topics; preparing science explanations and teaching them to young people; building confidence by making their oral presentation in front of large groups of people; developing / fostering a joy of teaching. This program is a real "win-win" for the community and our students. It has been a great success and we plan to continue offering this opportunity to our students. **Result:** Target Met	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Year This Assessment Occurred: 2011-2012	
Department - Physics (PHYS) - PHYS 36 - SPECIAL PROJECTS IN PHYSICS - Communicate Understanding - Students can convey this understanding in written and/or oral form. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Observation of Physics Show performance. **Assessment Method Type:** Observation/Critique **Target for Success:** Students perform well at the Physics Show.	09/18/2012 - Students were given several topics from their introductory physics classes to explain to an audience of elementary school children. Our students explained the physics while performing memorable demonstrations of the topics. Learning outcomes for our students include: improved understanding of the physics topics; preparing science explanations and teaching them to young people; building confidence by making their oral presentation in front of large groups of people; developing / fostering a joy of teaching. This program is a real "win-win" for the community and our students. It has been a great success and we plan to continue offering this opportunity to our students. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	
Department - Physics (PHYS) - PHYS 36X - SPECIAL PROJECTS IN PHYSICS - Topic Investigation - Students have a understanding of a topic investigated in class. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 36X - SPECIAL PROJECTS IN PHYSICS - Communicate Understanding - Students can convey this understanding in written and/or oral form. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:**			

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Active Department - Physics (PHYS) - PHYS 36Y - SPECIAL PROJECTS IN PHYSICS - Topic Investigation - Students have a understanding of a topic investigated in class. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 36Y - SPECIAL PROJECTS IN PHYSICS - Communicate Understanding - Students can convey this understanding in written and/or oral form. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active			
Department - Physics (PHYS) - PHYS 4A - GENERAL PHYSICS (CALCULUS) - Kinematics, Newton's Laws, Energy, and Momentum - Students should be able to solve problems involving Kinematics, Newton's Laws, Energy, and Momentum, and know when to use which concept. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Students will be pre- and post-tested with a standardized exam from the Physics Education literature. **Assessment Method Type:** Exam - Standardized **Target for Success:** The class should show an improvement of 0.2 as measured by a normalized gain. This is the national average for physics courses.	09/07/2016 - The FCI was administered three times. In one class the gain was 0.42, in another it was 0.4. In the last it was far below expectations. The two classes with good scores were peer-interaction classes, the last was taught by a person who had not taught it in a while. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 09/01/2015 - This class saw an improvement of 0.21 barely exceeding our target, and well below the gains we saw across the rest of the department. This was in a triple-lab section. The large-lecture format should be avoided in the interests of student success. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:**	09/08/2016 - Physics 4A is the wide end of the funnel for our department, and we need the best instruction possible. We need to have better communication around pedagogy, and keep a better eye on progress.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Physics would like to start offering single-lecture Physics 4A classes to address success and retention. This will be a hit to productivity.	
		07/01/2014 - The class pre-tested at 12 and post-tested at 16, for a Hake gain of 0.27. This was for a class that started near 60. Note that the pre/post raw scores are not as high as they have been when we've tested in the past, indicating that perhaps the incoming quality of student has dropped (or perhaps this is due to testing during Winter). In any case, these gains found, while above the norms for lecture-style classes, are low for peer-interaction classes, which is not surprising given the size of the class. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** At some point there needs to be a frank discussion about the pedagogy of large lectures.	09/16/2014 - There are two areas of concern. One is that students appear to be less prepared than in the past. We wish to address this by modifying Physics 6 and offering it on a regular schedule. We are also concerned about the effects of double-lab lectures. When productivity is not a driving factor in enrollment, we should discuss either single-lab lectures or a cap on the combined total of students across two lab sections.
		08/26/2013 - Students were tested with the Mechanics Baseline Test. The class showed a gain of 0.31, which was good for a class that started with a population in the mid-50s. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	08/26/2013 - Faculty and counselors should push to move students from the Physics 4A classes into the Physics 5A classes, where they can slow down the pace of instruction in order to see better results. This will require a commitment to the Physics 5 sequence, which may have to run with some smaller class sizes.
		07/02/2012 - The measured section showed a gain of 0.21, exceeding both the national average and the stated target. **Result:** Target Met **Year This Assessment Occurred:**	07/11/2012 - While the target was met, a gain of 0.21 is lower than we've seen for classes taught with more peer instruction. Our experience has been that with greater interactive time, more gain

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		2011-2012 **Resource Request:** Funding for in-class peer interaction aids. **GE/IL-SLO Reflection:** The Mechanics Baseline Test requires that students solve basic physics problems, this test requires the skills found in both the Computation and Creative, Critical and Analytical Thinking GE Outcomes. The student gains on this test exceeded the national average, and the department is satisfied with the results.	by the students. With class sizes growing, money for instructional support in the form of hired helpers may be beneficial.
		12/15/2010 - We once again used the Mechanics Baseline Test as an evaluative instrument. As a department we saw a Hake gain of 0.45 +/- 0.11 for students who passed the class. In terms of raw data, the difference in pre-test scores between those that passed and those that failed was not statistically meaningful. However, the average raw gain for those that passed was almost double than that for those that failed. This shows that the judgement of the professors is matched by an outside evaluation. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	12/15/2010 - Progress has been made in planning an extended physics series, which would allow for more peer-interaction in the classroom. More discussion needs to take place in terms of homework policy.
		04/01/2010 - Marasco taught both sections. Using the Mechanics Baseline Test, one section had a Hake gain of 0.21+/-0.10 and the other had a gain of 0.40+/-0.19, with large error bars due to small sample sizes. While it was hard to find national averages for the MBT, the literature suggests that the average gains match the results from the FCI (average gain of 0.2). students who got Fs. The A students responded quickly, revealed that they took manageble course loads (fewer than 20 units), for the most part did not work part-time jobs, had good math prep, and	11/16/2011 - Within the constraint of class size, the department will focus more on peer-instruction methods over lecture. Our belief is that we should offer a course sequence that spreads Physics 4A+4B over three quarters, the additional time allows for more peer interaction methods. The stronger students believed that

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		did the homework. The students who failed were slow to respond, and the only clear thing is that they did not do the homework. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	the faster homework cycle was beneficial, the weaker students don't do homework in either case.
		06/30/2009 - Cascarano's classes pre-tested with a score of 18.3 and post-tested at 22.9. Marasco post-tested only, with a score of 22.9. Cascarano's measured gain was 0.39, which well exceeds the average gain for physics lecture classes of 0.2, and compares with peer instruction gains in the 0.3 to 0.6 range. Intrument was the FCI. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	06/30/2009 - Within the constraint of class size, the department will focus more on peer-instruction methods over lecture. Homework assignments will work over a shorter cycle, and more context-rich assignments will be offered. Smaller class sizes promote better peer interaction.
Department - Physics (PHYS) - PHYS 4A - GENERAL PHYSICS (CALCULUS) - Lab Experiments - Via lab experiments, students will have an understanding of the background science, error analysis, and how to perform experiments. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Instructors will examine a lab for major revision/improvement. **Assessment Method Type:** Class/Lab Project **Target for Success:** Instructors should be satisfied that implementation of lab revision will lead to improved student understanding in lab. These improvements should also reflect current best practices in pedagogy.	10/05/2016 - This year we undertook a major revision of our 4A labs with the assistance of an outside expert in Physics Education Research. While most of the new labs are strong, we need to think about the spreadsheet/simulation labs. If time provides, they should be replaced by labs that focus on iterative cycles of experimentation. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 **Resource Request:** In order to take advantage of outside help, we needed to be nimble. We were able to reform our labs with the equipment at hand, but this did limit our options. If Physics had	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		a lab budget for annual retooling of labs, we could be more flexible.	
		06/27/2014 - This year we introduced a spreadsheet lab that investigated the launch of a V2 rocket. This spiked student interest, it may be of interest to invest in a rocket lab. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** It may take several hundred dollars to implement this lab, and there will be recurring quarterly costs. **Resource Request:** It may take several hundred dollars to implement this lab, and there will be recurring quarterly costs.	06/27/2014 - Before taking too much action, we would need to chat with the fire department to discuss proper permitting. If we get permission, there is a whole treasure trove of STEM that could be explored in a way that would excite students at the introductory 4A level.
		08/26/2013 - Instructors were overall happy with the range of experiments for this course. On the other hand, we did move to a new building, and increased the cap on our class size. As such, we used equipment that had previously been classified as spares for normal use. We need to make sure that our supplies are properly in order **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** Consideration should be given for additional purchases of lab equipment due to the larger lab classes.	
		07/10/2012 - In general, instructors were satisfied with the labs. However, wear and tear does cause attrition on our equipment. With smaller classes, if we are missing one or two setups, the issue is not noticed, but as we are running closer to capacity (class size limits actually mean that students sometimes work in lab groups of greater than two),	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		it is more important that we have full class sets plus spares for our lab equipment. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** Funding for repair/replacement of instructional lab equipment.	
		07/02/2012 - The ballistic pendulum lab suffers from equipment that is hard for students to use. The "bullet" often bounces off of the target, and much instructor time is spent simply getting the experiment to work **Result:** Target Not Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** $10K for new ballistic pendula.	07/10/2012 - A part-time instructor suggests that the equipment from PASCO is superior. These units can be found at http://www.pasco.com/prodCatalog/ME/ME-6830_ballistic-pendulum/index.cfm at a cost of roughly $800 prior to taxes and shipping. A class set of 12 could be purchased for $10k, and would serve both 2A and 4A labs. 07/02/2012 - This can be addressed by simply moving the inquiry lab a week earlier. This benefits the students in two ways, not only does it solve the original problem, but it also gives students another week's worth of gravity, which is helpful to the prior lab which requires a strong understanding of the relationship between orbits and energy. **Follow-Up:** 07/11/2013 - The pendulum lab was moved up, and works better.

Department - Physics (PHYS) - PHYS 4C -

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
GENERAL PHYSICS (CALCULUS) - Wave Concepts - Students should understand the following concepts about waves: 1. wave motion and energy transport by waves, 2. reflection and transmission, interference and standing waves, 3. intensity of sound and interference of sound 4. Doppler effect (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Students will be tested twice, once in midterm, once in final in Mechanical waves. **Assessment Method Type:** Exam - Course Test/Quiz	10/09/2015 - Students are getting better on individual midterms, (77%), but not as good in final (63%). Conceptual discussions improves students understanding the concepts, but problem solve is still a challenge for many of them. One evidence that students don't have enough exercise on problem solving is the homework quiz. The average score is 72% which should have been over 80% since the nature of the quiz is basically a duplicate of homework problem assigned. I am adding the number of examples on problem solving in class to help students getting better on problem solving skills. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	
		10/02/2014 - I have increased number of test from two midterms to four midterms. Students seem to do better in final than in individual midterms. There is slight increase for the same topics comparing midterm (65%) with final exam (68%). Based on students performance, students mastered the basic topics covered in 4C. They usually do well on straight forward questions relating one topic only (76%). But when a problem involved multiple steps and multiple concepts, students find it challenging (62% to 68% correct). I will do more practice problems while keep the conceptual discussion as much as possible. Usually students are interested and involved in discussion better. But in general they do not practice as much as they should. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		04/20/2012 - Students this quarter seem to have good grasp of wave concept. Wave question on Final exam, 70% get 9 and above out of 10. 74% passed question. 25% failed to realize how the concept is applied in real life. Majority of the students showed their good understanding in concept: 61 % of the students got over 90% right, and 26% got over 80% correct, only 13% got 60% correct. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	
		04/01/2011 - Students understand the basic concepts introduced. Average students can apply the basic principal to similar situation. But if problem involves more than three steps, average student have trouble solving the problem. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	04/20/2012 - Students this quarter seem to have good grasp of wave concept. Wave question on Final exam, 70% get 9 and above out of 10. 74% passed question. 25% failed to realize how the concept is applied in real life. Majority of the students showed their good understanding in concept: 61 % of the students got over 90% right, and 26% got over 80% correct, only 13% got 60% correct. 04/01/2011 - Balance lecture time and group study time. More group problem solving in class. Time. The biggest challenge is time.
Department - Physics (PHYS) - PHYS 4C - GENERAL PHYSICS (CALCULUS) - Thermal Physics - Students should	**Assessment Method:** Students will be tested twice, once in midterm, once in final exam.	10/05/2016 - The class grade is about the same as last year, (71% midterms and 62% final). Conceptual discussions improves students	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
understand the following concepts Thermal physics: 1. Temperature, internal energy and heat transfer 2. Specific heat and Calorimetry 3. Zeroth, first, and second law of thermodynamics 4. Thermal processes and heat engines Students will articulate how thermodynamic principles affect real-world phenomena or students will be able to identify natural phenomena that are affected by heat and appraise how thermodynamic changes will affect natural systems (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method Type:** Exam - Course Test/Quiz	understanding the concepts, problem solving continuously challenges students. Another challenge to me is how to motivate students to read before lecture so they can get the most of the lecture and in-class exercise. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	10/05/2016 - I am adding detailed study worksheet this year for students before lecture and after lecture. I am looking forward to see the how it will help students learn more effectively.
		10/02/2014 - I have increased number of test from two midterms to four midterms. Students seem to do better in final than in individual midterms. There is slight increase for the same topics comparing midterm (65%) with final exam (68%). Based on students performance, students mastered the basic topics covered in 4C. They usually do well on straight forward questions relating one topic only (76%). But when a problem involved multiple steps and multiple concepts, students find it challenging (62% to 68% correct). I will do more practice problems while keep the conceptual discussion as much as possible. Usually students are interested and involved in discussion better. But in general they do not practice as much as they should. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		09/17/2013 - Students were tested on heat engines, a typical topic in thermodynamics on both the midterm and final, and had aggregate score of 70%, which matches to goal of 70%. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:**	09/17/2013 - Instructor has generated videos in CCC confer, she will seek ways of making them more accessible to students. In addition, there are some pieces of lab equipment that should be purchased as we have a limited supply and this is acting as a choke point in labs.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Money for lab purchases, see action plan.	
		04/20/2012 - Students have good grasp of energy, work in thermodynamics. 87% of the students answered this part of the question correctly. But they seem to have trouble to understand abstract ideas like entropy. Only 60% seems to get it. **Result:** Target Not Met **Year This Assessment Occurred:** 2011-2012	
		04/01/2011 - Students understand the basic concepts introduced. Average students can apply the basic principal to similar situation. But if problem involves more than three steps, average student have trouble solving the problem. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	04/01/2011 - Balance lecture time and group study time. More group problem solving in class. Time. The biggest challenge is time.
Department - Physics (PHYS) - PHYS 4C - GENERAL PHYSICS (CALCULUS) - Optics - Students should understand the following concepts about optics: 1. Index of refraction and Snell's law 2. Image formed by reflection and refraction 3. Thin lens and lens maker equation 4. Optical instruments 5. Interference in Young's double slit experiment and thin film 6. Single slit diffraction and limits of resolution (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Students will be tested twice, once in midterm, once in final in Mechanical waves. **Assessment Method Type:** Exam - Course Test/Quiz	10/02/2014 - I have increased number of test from two midterms to four midterms. Students seem to do better in final than in individual midterms. There is slight increase for the same topics comparing midterm (65%) with final exam (68%). Based on students performance, students mastered the basic topics covered in 4C. They usually do well on straight forward questions relating one topic only (76%). But when a problem involved multiple steps and multiple concepts, students find it challenging (62% to 68% correct). I will do more practice problems while keep the conceptual discussion as much as possible.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Usually students are interested and involved in discussion better. But in general they do not practice as much as they should. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014	
		04/01/2011 - Students seem to have more problem in these areas since this is the last portion of the quarter. There is not much time for them to fully sink in the information delivered. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	04/01/2011 - Demonstration seems to really catch students attention. Assignment is appropriate. Perhaps more problems will help student to sink in the information delivered. Course evaluation procedure works well for students. Daily quizzes really push student to stay current in class, and keep up the reading.
Department - Physics (PHYS) - PHYS 4D - GENERAL PHYSICS (CALCULUS) - Einstein's Theory - Students should have both a conceptual and computational understanding of Einstein's theory of special relativity. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** A midterm will be devoted to special relativity, as well a problem on the final. Conclusions will be drawn from students' performance. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** At least 80% of the students should be able to solve simple problems such as length contraction or time dilation, and 80% should be able to solve paradoxes at the level of the Twin Paradox.	09/01/2016 - Students this year were successful at relativistic collisions and also paradoxes. We've moved away from more complicated timing problems that involve propagation of radio signals, which is a rich problem, if there is time in class, we should move back to that again. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	09/01/2016 - The instruction surrounding special relativity has been decently successful over the past several years. While SR is one of the topics that is covered very well by the book, at some point there should be a written resource for 4D that covers the topics at greater depth than is offered by our text.
		08/31/2015 - Students performed well this year on problems involving both relativistic collisions and velocity addition, two of the more difficult concepts. **Result:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** None	
		06/27/2014 - Students again were able to solve basic problems in relativity and show a conceptual understanding of the common paradoxes. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** None.	
		07/11/2013 - Students did well on relativity once again this year. The can solve the simple problems, as well as velocity addition. The collision problems showed that the students had difficulty with momentum, which is disturbing in its own right, but not with the affects of relativity on the problem. Students demonstrated a good understanding of the paradoxes, and in addition asked excellent questions in class when we covered the topic. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	
		07/27/2012 - This year's students showed strong understanding of relativity, exceeding the targets for assessment. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	07/27/2012 - Physics 4D was taught by a part-timer this year, due to Professor Marasco's PDL. The part-timer spent three weeks on relativity, rather than the typical two. It is unclear if this luxury can be afforded as a permanent change.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		06/30/2011 - We seem to have hit a plateau on the collision problem, the better students can handle the mechanics, but many cannot. One thing I've observed is that I tell them in class to set "c" to one, and the students who have problems aren't doing this. So the ones that pay attention in class succeed. This isn't earth-shattering, but I'd like to see more students be attentive in class. Perhaps I need to whiteboard certain problems. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	11/15/2011 - Whiteboard some of the more concrete examples? I think we may run into time issues. This class didn't have nearly as much homework participation, I need to stress it more.
		06/30/2010 - Students again showed mastery of the basics. There were improvements in relativistic collisions as more time was spent on mometum-mass-energy triangles in class. This year they seemed to have problems with the paradoxes though. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	06/30/2010 - Triangles worked very well. Perhaps think-check-talk should be put in place for the paradoxes. They were given a shotgun of online problems. This seemed to work well.
		06/30/2009 - While students could do basic relativity problems (length contraction, time dilation, mass), they had problems with tougher problems that involved more than two frames. Computations of relativistic collisions proved difficult. Conceptually the students were firm. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	11/15/2011 - As students have shown mastery of the basics, perhaps slightly more time on multiple-frame problems should be given. As for collisions, the energy-momentum-restmass triangle should be moved to front-and-center. Also, the use of natural units should be introduced after letting students struggle with c^2 terms. An increase in the number of difficult homework problems should be made. The easy problems are a little too easy, and are perhaps needlessly repetitive.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Physics (PHYS) - PHYS 4D - GENERAL PHYSICS (CALCULUS) - Schrodinger Equation - Students should have an understanding of the Schrodinger Equation and be able to solve problems with introductory-level potentials. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** A midterm will be devoted to the Schrodinger Equation, as will a problem on the final. Conclusions will be drawn from students' performance. **Assessment Method Type:** Exam - Course Test/Quiz	09/01/2016 - Students did very well with problems like particle-in-a-box in multiple dimensions. The instructor should survey the relevant textbooks to see if the quantum harmonic oscillator is appropriate for this level, as that is a challenging model that is currently not part of the curriculum. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		08/31/2015 - Students performed well at a basic level, but struggled with the concept of degeneracy, which was done at a fast pace in lecture. Degeneracy should be covered more deeply in future years. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** None.	
		06/27/2014 - Students did very well on basic problems, but had some difficulty with more advanced challenge problems. The instructor was pleased with the overall performance of the students. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** None.	
		07/11/2013 - The students had such a strong understanding of particle in a box this year that I went beyond our normal curriculum and spent some time talking about degeneracy. In addition, they were able to contextualize particle in a box	07/11/2013 - At some point an effort should be made to come up with appropriate-level practice problems. The ones in the book tend to be too easy.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		into an organic chemistry problem. My hat is off to the students. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None.	
		07/27/2012 - Students had strong understanding of Schrodinger's equation in both the wave and matrix form. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	07/27/2012 - The part-timer spent a good deal of time on these concepts, at the expense of time on the hydrogen atom. In this case the basics were probably over-emphasized, although more advanced material was certainly both covered and mastered by the students.
		06/30/2010 - More or less the same results as last year, students could do standard problems such as particle-in-a-box. There seemed to be more trouble with "here's a potential, draw a wave function" type problems, but still did OK as a group. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	06/30/2010 - I drew the same diagram on the board as I did the previous year, and before I could explain the bits and pieces, was asked about it by a bright student. I quickly made the point that different things were done on the same scale. What I should do is draw them out in different colors and be very clear why I am doing that.
		06/30/2009 - Students could do standard problems such as particle-in-a-box. There seemed to be more trouble with "here's a potential, draw a wave function" type problems, but still did OK as a group. **Result:** Target Met	06/30/2009 - I follow the tradition of drawing the wave function on the same graph as the potential, which is confusing to students. I need to be more explicit about what is the energy, and what is the wave function. Also, a short review of energy diagrams would probably be helpful.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Year This Assessment Occurred: 2010-2011	More graphical assignements should be given.
Department - Physics (PHYS) - PHYS 4D - GENERAL PHYSICS (CALCULUS) - Lab Experiments - The lab experiments should give students deeper understanding into the historical experiments that form the basis of modern physics and the science involved. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** The lab reports from one of the experiments will be scrutinized with the goal of revising the experiment. **Assessment Method Type:** Essay/Journal	09/01/2016 - In general,there was more plagiarism this year than in years past in the lab reports. The instructor needed to address this with the introduction of TurnItIn. We struggled with the e/m experiment for one more year, as it is being phased out of the 4B menu, we won't have it in 4D. The suggestion from last year to spend more time in radioactivity was a good one, and we should have acted on it this year. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	09/01/2016 - We need to phase out the e/m experiment, as we don't have enough safe setups. Even though we were granted funds for replacement by administration, the experiment is too "cook book" in its modern form (not enough variables for students to adjust). In response to losing this lab, the instructor will spread out the first radioactivity lab over two weeks. The first week will feature investigations in distance, and the second shielding and radioactive decay.
		08/31/2015 - While the e/m redux experiment is a good look at returning to a previous experiment, in the future we'll be doing that through 4A (and perhaps more) labs, and should be able to remove this one from the 4D curricula, with replacement by something from another part of 4D. It is possible that we will expand out the radioactivity labs into three weeks, as they tend to be rushed. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** There are no major purchases being considered at this point, but there are constant small costs in terms of replacement, repairs and incremental	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		upgrades. Physics should have an established year-to-year ongoing lab budget.	
		06/27/2014 - While there is the need to replace one of the labs, it is believed that the lab program will be much better improved by small incremental purchases to support many of the labs rather than investing in one class set of more fancy equipment. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** See action plan.	06/27/2014 - There are many places for small improvements in equipment. These as purchases of gas discharge tubes (these run $40 to $75 each, purchase 10-15), increasing the annual purchases of Po-210 sources ($60 eachx4), wooden offsets($100?), and LEDs and lasers ($25*6?). Rather than breaking things out in program plans every year, the department should simply have a well-supported equipment budget.
		07/11/2013 - I looked at the traditional photoelectric effect lab this year. We added blue lasers to the mix. However, students struggled with light contamination. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** Funds towards improving this lab would be minor, and could come out of the physics department's lab monies.	07/11/2013 - We needed more blue lasers, these were purchased. We should also have custom stand-offs to level the photoelectric boxes with the mercury lamps, as our current jack setup is clunky. The lab writeup should be slightly modified so students think more carefully about their data analysis.
		07/01/2012 - This year we looked at the electron diffraction lab. Students showed a strong understanding of wave-particle duality, which is at the heart of quantum mechanics. The combination of real and virtual equipment provided a nice balance to the lab. One of the diffraction globes seems to be going, and if there are funds, should be replaced. Also, many students did not suppress the zeroes when appropriate on their graphs, and that finding needs to be propagated	07/01/2012 - The findings point to both solid instruction in lecture, and a well-designed lab. Outside of purchase of replacement parts, no action needs to be taken directly related to this lab. Physics faculty should discuss grading of graphs in lab reports as an item in a future department meeting.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		through the department. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012 **Resource Request:** If possible, a new electron diffraction globe should be purchased.	
		06/30/2011 - I looked at workflow this quarter. Most labs ran well, but two labs (Franck-Hertz and Electron diffraction) did not perform as well due to lack of equipment. **Result:** Target Not Met **Year This Assessment Occurred:** 2010-2011 **Resource Request:** A pair of additional electron diffraction units will cost $4000. Bringing the Franck-Hertz lab up to speed should run about $5000. These numbers are hard to justify in the current economic situation, unless the money can come from Measure E as lab e	06/30/2011 - I considered doing these labs in parallel, meaning that we would set out equipment for both labs, with half the population doing each lab, and then switching for the following week. This can be done for certain experiments, but electron diffraction needs to be done in full darkness, and Frank-Hertz in the light, so this is not an option. See resource request. **Follow-Up:** 11/15/2011 - A cheap vendor was found for Franck-Hertz, still working on electron diffraction.
		06/30/2010 - I use the pre-labs as peer-instruction. I'm now finding that each group member simply learns a very small part of the experiment. This needs to change. **Result:** Target Not Met **Year This Assessment Occurred:** 2010-2011	06/30/2010 - To make sure that each person masters the full lab, I'll have them prepare the pre-lab and tell them that I can point to any person at any time and say "switch" and the new person should be able to pick up and explain. **Follow-Up:** 11/15/2011 - The threat of a "switch" seems to have done the trick.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		06/30/2009 - I looked at the second Photoelectric Effect lab. While the students understood the concepts, they had trouble with the actual measurements. The act of determining a knee voltage visually is difficult, and many failed to reject their green LED as "bad data". **Result:** Target Met **Year This Assessment Occurred:** 2010-2011 **Resource Request:** Purchase of optical lab bench equipment would be nice, but I think this prices out to $2000 a setup, an impossibility in our current economic state.	06/30/2009 - The part of the lab that requires visual judgement will be replaced by students building a circuit to test for the knee voltage. Students will also have access to wavelength vs. intensity scans that will give hints as to why student should reject the Green data point. **Follow-Up:** 11/15/2011 - In the years since, the electrical testing of the knee voltage has worked very well.
Department - Physics (PHYS) - PHYS 54H - HONORS INSTITUTE SEMINAR IN PHYSICS - Physical/Conceptual Understanding - Students have a physical/conceptual understanding of a topic investigated in class. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** As this class is a seminar, the students will share their knowledge via in-class discussion, evaluated by the instructor. **Assessment Method Type:** Discussion/Participation	08/31/2015 - This class was a projects-based seminar, and the instructor was impressed by the level of collaboration and cross-pollination between the different groups. This was a strong batch of students, and they supported each other in their understanding. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	
		06/27/2014 - This class was not offered this academic year. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** None.	
		06/30/2011 - This class was centered on the Space Shuttle, as NASA was retiring it during the time frame and it was therefore topical. Students picked topics, and explained them to the rest of	06/30/2011 - This class ran with four students. Perhaps Physics 34H is running in a bad quarter, or at a bad time. We should talk to the Honors

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		the class. The students who were not speaking that day were tasked with asking questions at an appropriate level. The class performed to the expectations of the instructor. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	Program about this.
Department - Physics (PHYS) - PHYS 54H - HONORS INSTITUTE SEMINAR IN PHYSICS - Mathematical Understanding - Students have a mathematical understanding of a topic investigated in class. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** As this class is a seminar, the students will share their knowledge via in-class discussion, evaluated by the instructor. **Assessment Method Type:** Discussion/Participation	06/27/2014 - This class was not offered this academic year. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** None.	
Department - Physics (PHYS) - PHYS 6 - INTRODUCTORY PHYSICS - Kinematics, Newton's Laws, Energy, and Momentum - Students should understand the following basic concepts from mechanics: Kinematics, Newton's Laws, Energy, and Momentum (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** Students' midterm and final exam will be compared to analyze their understanding on Newton's second Law. **Assessment Method Type:** Exam - Course Test/Quiz	10/09/2015 - I have not changed anything for the fall 2014 and summer 2015. Posting discussion topics counting it as part of students' grade seems to work as nicely as last year. There were more discussion topics that from students in addition to discuss the topics that I posted. I found that the people who were very actively participating the discussions are not likely to withdraw. Students have better grasp of Newton's Law in theory (70% for the fall 2014, and 85% for summer 2015), but still have difficult time with application of Newton's Law (65% for the fall 2014, and 79% for the summer 2015). I am planning on making videos for this class on some of the most difficult topics and problems solving. Hopefully that will help students on understanding the topics better. **Result:**	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** None	
		10/02/2014 - I have increased the number of discussion topics that students need to post. It has very positive effect. From students posts, they have sense of community and they help each other, and debate about topics that they have questions about. The dropping rate is kept at 18%, with overall higher enrollment, 27 people took final exam while the previous year only 18 people took the final. Online test still score better than in person test. One reason could be that they are give longer time margin for taking the test to compensate some technical issues by taking it online which in person test has no such a margin. Also the online test is not proctored, students might relax better, not as much pressure as proctored exam. The final is comprehensive, it is more difficult for most of students. It's true for face to face classes. Students seem to have better grasp on work and energy, but have difficulty when combined with force. Application of Newton's law is still a challenging topic. I will continue use discussion and encouraging students post their own topics. I will focus on more practice problems on Force related topics so students have chance to deal with it under my guidance. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** Due to shifting needs, Physics 6 is due for	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		an overhaul, this should be part of a PDL assignment, if not an entire PDL assignment.	
		12/16/2013 - Students seem to do better on tests that are given online. There are two possible reasons: one is that they are given enough time so they have time to think about the problem and look up references to have right answers. The other is that they have outside help which can be any form in addition to their textbook or online resources. Other people's help, for example. There are quite many high school students who have parents or other relatives/friends who are knowledgeable on this subject. Compared to one problem about Newton's Second Law: the average score is 85% out of 10 questions in the online test, while the average score is only 55% out of three questions in final exam which is a test in classroom in person. There is noticeable improvement in dropping rate this term that I contribute to the adoption of making the online discussion scored verses making the discussion optional as I have done in the past. In Summer 2012, there is 28% withdraw rate while in Summer 2013, the withdraw rate dropped to 18%. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	12/16/2013 - I will definitely keep the discussion scored, and increase the number of posting requirement. I believe having to post discussions make them more actively engaged in the class. It also gives them a sense of learning community. As for the higher grade for online test and lower grade for the in-person test, I am not sure how to improve that. But one thing I will keep doing is to make the weight of the online test light and in-person test heavy.
Department - Physics (PHYS) - PHYS 6 - INTRODUCTORY PHYSICS - Basic Concepts - Students should understand the following basic concepts from Electricity: Charges, electric forces and electric field. (Created By Department - Physics (PHYS)) **Course-Level SLO Status:** Active	**Assessment Method:** The class will be given a pre-lecture test and post lecture test within their final exam to analyze their understanding of electric charges, and electric forces. **Assessment Method Type:** Exam - Course Test/Quiz	10/05/2016 - I have added discussion topics for the fall 2015 and summer 2016. So there are number of topics that students can discuss with the class. Same find as last year that the people who were very actively participating the discussions are not likely to withdraw and generally do better.	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		From quizzes, students did better in application of Newton's laws, with average of 85%. Making videos for this class on some of the most difficult topics are the activities for my sabbatical. Hopefully that will help students on understanding the topics better. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016	
		12/16/2013 - Students seem to do better on tests that are given online. There are two possible reasons: one is that they are given enough time so they have time to think about the problem and look up references to have right answers. The other is that they have outside help which can be any form in addition to their textbook or online resources. Other people's help, for example. There are quite many high school students who have parents or other relatives/friends who are knowledgeable on this subject. Compared to one problem about Newton's Second Law: the average score is 85% out of 10 questions in the online test, while the average score is only 55% out of three questions in final exam which is a test in classroom in person. There is noticeable improvement in dropping rate this term that I contribute to the adoption of making the online discussion scored verses making the discussion optional as I have done in the past. In Summer 2012, there is 28% withdraw rate while in Summer 2013, the withdraw rate dropped to 18%. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	12/16/2013 - I will definitely keep the discussion scored, and increase the number of posting requirement. I believe having to post discussions make them more actively engaged in the class. It also gives them a sense of learning community. As for the higher grade for online test and lower grade for the in-person test, I am not sure how to improve that. But one thing I will keep doing is to make the weight of the online test light and in-person test heavy.

Unit Assessment Report - Four Column

Foothill College

Program (PSME - PHYS) - Physics AS

Primary Core Mission: Transfer

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Program (PSME - PHYS) - Physics AS - Problem Solving - Upon completion of the AS degree, students will demonstrate the ability to apply the laws of physics to word problems, properly manipulating basic mathematical formulae to arrive at the correct answers. **SLO Status:** Active	**Assessment Method:** Problems on the midterm(s) and final exam will be examined to verify that the students are properly solving physics problems. This assessment will be performed in Physics 4D. **Assessment Method Type:** Exam - Course Test/Quiz **Target:** 90% of students should meet a level satisfactory to the examiner.	10/05/2016 - Students clearly mastered this skill by the end of the sequence. They are adept at taking apart multi-step problems and reasoning their way through to a solution. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 08/31/2015 - At the end of the sequence, physics students are able to take questions posed with information made up of both relevant and irrelevant data, select out what they need, and use that to solve multi-step problems. These students are ready for advanced work at four-years. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** We need additional faculty in order to meet enrollment demands. **Resource Request:** We need additional faculty in order to meet enrollment demands. 06/27/2014 - Students are more than capable of solving word problems the proper use of mathematics applied to physics. The department is doing a strong job preparing students for future efforts in math, the sciences, and engineering. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** See Course-Level Resource Requests	

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Resource Request: See Course-Level Resource Requests **Resource Request:** See Course-Level Resource Requests **Resource Request:** See Course-Level Resource Requests	
		08/26/2013 - Students were able to solve problems very well. At the completion of the sequence, they have been properly trained in this skill. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** It is the belief of several of the faculty that this success is bolstered by peer-interaction instructional methods, and any support that would allow us to increase the portion of our class time in this direction is beneficial.	
		07/27/2012 - While the specifics of each problem may or may not have been solved by the students, all of the students had the skills needed to apply equations and mathematics to word problems. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	07/27/2012 - It is gratifying to see the difference between exams from the start of students' physics careers at Foothill and the end. The work is clearly at a higher level.
Program (PSME - PHYS) - Physics AS - Communication of Scientific Results - Upon completion of the AS degree, students will demonstrate the ability to effectively communicate physics by crafting written lab reports and/or giving oral presentations. **SLO Status:** Active	**Assessment Method:** In the case of written communication, student lab reports will be evaluated against a rubric. For oral presentations, students shall deliver a mini-lecture to the class. This assessment will be performed in Physics 4D. **Assessment Method Type:** Portfolio Review **Target:** 90% of students should show mastery.	10/05/2016 - Despite some issues with plagiarism, students found their voice in writing physics lab reports at the appropriate level. However, we are asking them to do more writing in labs at the start of the sequence, and anecdotal evidence suggests that some of our international students are struggling with this new expectation. **Result:** Target Met **Year This Assessment Occurred:**	10/05/2016 - Instructors should monitor if ESL students are facing larger-than-normal challenges with documenting their lab experiences. While there are many equity and resource issues at hand, if a serious problem exits it should be addressed. At this point we need to be collecting data.

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		2015-2016	
		08/31/2015 - For the second year, a week's worth of labs was cancelled for one-on-one writing workshops. This lead to strong lab reports by most students, although some still struggle written English. Oral reports were good, but again some struggled with English. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015	08/31/2015 - Again, it would be worthwhile to explore supports for written English, perhaps in the PSME Center? This may be problematic, as it would duplicate other services. For oral reports we should develop a peer-reviewed rubric so students have a better idea of expectations as a deeper level of accountability.
		06/27/2014 - Students as a whole showed mastery in communication, with some wide disparities on both the high and low ends. It would be helpful if there were more resources available for international students, and native English speakers who struggle with their communication skills. We should explore resources for students who struggle with English. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** See Course-Level Resource Requests	06/27/2014 - This year I cancelled lab during week three, and instead gave each lab group focused personal time aimed at improving the quality of their scientific writing. This gave rise to a large jump in quality, and this practice should be repeated every year. We need to explore resources for students who have English-related problems that go beyond the scope of instruction that can be provided by the physics department.
		08/26/2013 - While students were eventually able to rise to an acceptable level, the quality of lab reports at the start of Physics 4D was quite low. The instructor dropped the first three labs grades from the course grading as the students needed time to develop. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	08/26/2013 - Physics faculty should have a day-long meeting to properly establish norms for the department and to communicate them to all concerned parties.

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Resource Request: Physics faculty should have some type of departmental meeting day to get all the involved parties on the same page.	
		07/27/2012 - While the written lab reports were decent when evaluated by a rubric measuring "what should go in a lab report", the overall level of English was mixed. **Result:** Target Met **Year This Assessment Occurred:** 2011-2012	07/27/2012 - Since effective written communication is a cornerstone of the modern job market, we are hurting our students by not emphasizing English skills more in lab reports. We should more strongly grade on style and delivery.
Program (PSME - PHYS) - Physics AS - Lab Skills - Upon completion of the AS degree, students will demonstrate mastery of lower-level lab skills such as proper use of standard lab equipment and proper application of data analysis. **SLO Status:** Active	**Assessment Method:** Students will be observed in lab by the instructor for use of lab equipment, lab reports will be examined for mastery of data analysis. This assessment will be performed in Physics 4D. **Assessment Method Type:** Class/Lab Project **Target:** 90% of students should demonstrate mastery.	10/05/2016 - This year saw the introduction of a new approach to instruction in our introductory classes. Over the next several years we'll roll out this approach in the other classes in the sequence. While the students still possess "lab skills", we are trying to make labs more like "real life" rather than cookbook. **Result:** Target Met **Year This Assessment Occurred:** 2015-2016 **Resource Request:** This may need to be supported over a PDL project or two.	
		08/31/2015 - Again, students had a large disparity in their sophistication around error analysis at the start, but these were rectified prior to completion. Overall labs skills were excellent. **Result:** Target Met **Year This Assessment Occurred:** 2014-2015 **Resource Request:** Support should be given for reform of labs, perhaps in the form of release time.	08/31/2015 - Physics 6 is not the appropriate place for error analysis, both because not everyone takes it, and it has no lab component. Instead, we are starting to reform our labs, starting with 4A. This is being done in conjunction with a Physics Education Research group at a local R1. If successful, we can bootstrap from those labs to the rest of our experiments. This may

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Resource Request: Support should be given for reform of labs, perhaps in the form of release time. Lab purchases should come from an ongoing dedicated budget.	involve some costs in terms of release time and equipment.
		06/27/2014 - The students demonstrated mastery of the operation of lab equipment. Upon entry to Physics 4D there was a large disparity in skills surrounding data analysis. While this was addressed successfully in 4D, this wide range of prior preparation is an ongoing problem. **Result:** Target Met **Year This Assessment Occurred:** 2013-2014 **Resource Request:** See Course-Level Resource Requests. **Resource Request:** See Course-Level Resource Requests. **Resource Request:** See Course-Level Resource Requests. **Resource Request:** See Course-Level Resource Requests.	06/27/2014 - Faculty need to stress the importance of data analysis in earlier coursework. Perhaps this could also be addressed in Physics 6?
		08/26/2013 - The students came into this class with a good sense of how to use lab equipment, however, it was a real struggle to get them to use proper data analysis, a skill that they should have mastered by this point in their physics careers. They were eventually brought up to speed. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** See previous PSLO.	08/26/2013 - The physics faculty should have some type of retreat to properly establish and communicate departmental norms.
		07/27/2012 - Students displayed strong lab skills, and were comfortable in lab. **Result:** Target Met	07/27/2012 - After 40+ hours of labs (not counting whatever they did in chemistry), our students are "at home" in labs. They do not need

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Year This Assessment Occurred: 2011-2012	cookie-cutter instructions, and for the most part can proceed with minimal guidance from the instructor. They are ready to move on to the next level where they will see multi-week experiments.