Annual Instructional Program Review Template for 2011-2012

Introduction to The Program Review Process for Instructional Programs

Program Review at Foothill College

Purpose

An effective program review supports continuous quality improvement to enhance student learning outcomes and, ultimately, increase student achievement rates. Program review aims to be a sustainable process that reviews, discusses, and analyzes current practices. The purpose is to encourage program reflection, and to ensure that program planning is related to goals at the institutional and course levels.

Process

Foothill College academic programs that lead to an A.A./A.S. or Certificate(s), or are part of a specialized pathway, such as ESL, Developmental English, Math My Way are reviewed annually using this template, with an in-depth review occurring on a three-year cycle. The specialized pathways may be included as part of the program review for the department, or may be done as a separate document if they are not part of a department that offers a degree or certificate. Faculty and staff in contributing departments will participate in the process. Deans provide feedback upon completion of the template and will forward the program review on to the next stage of the process, including prioritization at the Vice Presidential level, and at OPC and PaRC.

Annual review will address five core areas, and include a place for comments for the faculty and the dean or director.

1. Data and trend analysis
2. Outcomes assessment
3. Program goals and rationale
4. Program resources and support
5. Program strengths/opportunities for improvement
6. Administrator's comments/reflection/next steps

Foothill College Program Review Cycle:

2011-2012 All academic programs participate in an annual program review

2012-2013 1/3 of academic programs participate in comprehensive review, remaining 2/3 of programs update their annual program review

Contact: Office of Instruction and Institutional Research, 650-949-7240

Instructions: Complete this template with data on any degree, certificate, or pathway your department offers. Return the completed form to your Dean on the last day of Fall quarter.

Website: http://foothill.edu/staff/irs/programplans/index.php

2011-2012 Submission Deadline:

All program review documents are due to Deans by December 16

Basic Program Information

Department Name: **Chemistry**

Program Mission(s): **To provide undergraduate education founded on a rigorous, applied treatment of chemistry fundamentals coupled with modern analytical equipment and techniques; as well as to prepare students for transfer to a four-year university or allied-health program.**

Program review team:

Name	Department	Position
Kathy Armstrong	Chemistry	Instructor
Richard Daley	Chemistry	Instructor
Mary Holland	Chemistry	Instructor
Londa Larson	Chemistry	Instructor
Amanda Norick	Chemistry	Instructor
Sandhya Rao	Chemistry	Instructor
Victor Tam	Chemistry	Instructor
Peter Murray	PSME	Division Dean
Anna Wu	Chemistry	Laboratory Technician

Programs* covered by this review

Program Name	Program Type (A.S., C.A., Pathway, etc.)	Units**
Chemistry	**AS**	**90**

*If you have a supporting program or pathway in your area for which you will be making resource requests, please analyze it within this program review. For example, ESLL, Math My Way, etc. You will only need to address those data elements that apply.

**Certificates of 27 or more units must be state approved. If you have certificates that are 27 or more units that are not state approved, please indicate your progress on gaining state approval, with the tentative timeline for approval, or your plan for phasing out the certificate.

Section 1. Data and Trend Analysis

1.1. Program Data will be posted on: http://foothill.edu/staff/irs/programplans/programreviewdata.php for all measures except non-transcriptable completion. Please attach all applicable data sheets to the final Program Review document submitted to your Dean. You may use the boxes below to manually copy data if desired.

SEE ATTACHED DATA FROM IRS.

Transcriptable Program	2008-2009	2009-2010	2010-2011	% Change

Please provide any non-transcriptable completion data you have available.

Non-Transcriptable Program	2008-2009	2009-2010	2010-2011	% Change

1.2 Department Data

Dimension	2008-2009	2009-2010	2010-2011	% Change
Enrollment				
Productivity (Goal: 546)				
Success				
Full-time FTEF				
Part-time FTEF				
Full-time Staff				
Part-time Staff				

Department Course Data

	2008-2009			2009-2010			2010-2011		
Course	Enroll.	Prod.	Success	Enroll.	Prod.	Success	Enroll.	Prod.	Success
Ex. ART 1									
Ex. ART 2									

1.3 Using the data and prompts, provide a short narrative analysis of the following indicators.

1. Enrollment trends over the last three years: Is the enrollment in your program holding steady, or is there a noticeable increase or decline? Please comment on the data and analyze the trends.

   Enrollment in chemistry courses has increased by 25% over the past three years. From academic year 2008-09 to 2009-10, enrollment increased 18%, followed by another 6% increase leading into academic year 2010-2011. Analysis of current enrollment numbers comparing Fall 2011 to Fall 2010, shows an enrollment increase of 21%, with a 10% increase in the number of sections offered. Enrollment rates of targeted groups (under-privileged student groups) have declined slightly (from 17% to 13%), while the number of students in these groups remained steady over three years (~350 students annually). Despite rapid growth of the Program, demand for chemistry courses still remains high. Every quarter, nearly all sections are completely enrolled with extensive wait lists, with no indication of demand subsidizing in the next few years.

   With the imminent move to the new PSEC Buildings in 2012-2013, the Program will have space to grow but supporting resources limit expansion beyond current levels. For the past six years, laboratory personnel have remained static while enrollment and workload on the Chemistry Stockroom has increased at least 40%. In order to allow for continued growth, additional Chemistry Stockroom personnel must be hired.

   Beyond the need for personnel to directly support laboratory operations, maintaining current laboratory course offerings require the purchase of replacement equipment and updated instrumentation to match those used at universities and local companies as well as allocated personnel resources to maintain the instrumentation.

2. Completion Rates (Has the number of degrees/certificates held steady, or increased or declined in the last three years? Please comment on the data and analyze the trends.

   Course completion rates (~75%) have held steady over the past three years even with an enrollment increase of 25% over the same time period. The rate of withdraws (12-14%) and non-passing grades (10-14%) have also remained relatively steady over the same period.

   Continuing these success levels will be contingent on hiring new FT faculty members, who will provide consistency in teaching as well as personnel to develop new courses and programs.

3. Course Offerings (Comment on the frequency, variety, demand, pre-requisites.) Review the enrollment trends by course. Are there particular courses that are not getting the enrollment or are regularly cancelled due to low enrollment?)

Analysis of the core Program course offerings (Chem 1A/B/C and Chem 12A/B/C), show enrollment has increased an average 8.7% between 2009-10 to 2010-11. Looking at a longer three year period since 2008-09, enrollment in these courses increased an average 32%, with the largest growth seen in Chem 1B, 1C and 12A. Without fail, sections are enrolled to capacity with an extensive waitlist at the beginning of each term. No sections have been cancelled due to low enrollment in the past three years. Maximum class sizes range from 24 to 32 students; these limits are fixed due to laboratory capacity and safety. The average section enrollment, regardless of class size restrictions, is slightly above 28 (calculated from total enrollment divided by sections offered annually).

4. Curriculum and SLOs
    a. Comment on the currency of your curriculum, i.e. are all CORs reviewed for Title 5 compliance at least every three years and do all prerequisites, co-requisites and advisories undergo content review at that time? If not, what is your action plan for bringing your curriculum into compliance?
    b. Comment on program mapping and how it ties to the college Mission(s).
    c. Identify any other programs with which your program has overlap, and comment on the purpose of the overlap.
    d. Comment on any recent developments in your discipline which might require modification of existing curriculum and/or the development of new curriculum?
    e. Do all of the courses in your program have SLOs identified? Do all programs have program-level student learning outcomes? If not, what is your plan for completing these?

a. All CORs are reviewed for Title 5 compliance on a three year cycle, and prerequisite, co-requisite and advisories are reviewed annually. At this time, curriculum is current.

b. The Program maps closely to the college mission of preparing students for transfer to four-year universities, primarily the UC and CSU systems.

c. The core Program courses (Chem 1A/1B/1C and 12A/12B/12C) do not overlap with any other Programs on campus. Chemistry 30A and 30B overlap with other programs preparing students to pursue careers in allied health.

d. The increasing cost of hazardous waste disposal and need for more environmentally-minded experiments may require the Program to change curriculum to address these concerns. In addition, the development of a job-training program in analytical instrumentation and/or water analysis for detecting environmental contaminants may soon need to be addressed depending on employer demands and economic conditions.

e. All courses in the program have identified appropriate CL-SLO's, and the department is currently implementing program-level SLO's that were identified in Spring 2011. Data for course-level SLO's have been obtained, analyzed and assessed

on an annual basis. In the current year, CL-SLO's are being modified to have a large scope.

5. Basic Skills Programs (Please describe your Program's connection to this core mission, if applicable):

   Not applicable.

6. Transfer Programs: Articulation (Please describe your Program's connection to this core mission, if applicable)

   The Chemistry Program core courses are designed to perfectly articulate to the UC and CSU systems for students transferring in chemistry, the biological sciences, physics, engineering or other physical science majors.

7. CTE Programs: Labor/Industry Alignment (Please describe your Program's connection to this core mission, if applicable)

   Currently, PSE 41, 42 and 43 courses are offered to train students interested in teaching STEM classes for the K-6, middle school and high school levels.

   Chemistry 30A and 30B support programs preparing students to pursue careers in allied health.

Section 2. Learning Outcomes Assessment Summary

2.1. Attach 2010-2011 Program Level – Four Column Report for PL-SLO Assessment from TracDat, please contact the Office of Instruction to assist you with this step if needed.

SEE NEXT INSERTED PAGE.

2.2 Attach 2010-2011 Course-Level – Four Column Report for CL-SLO Assessment from TracDat

SEE NEXT INSERTED PAGE.

Section 2 Continued: SLO Assessment and Reflection

2.3 Please provide observations and reflection below.

In general, courses are meeting stated CLSLO's when assessing very specific expected outcomes. Starting this year, the Program will be broadening defined CLSLO's (per new instructions). Assessing broader CLSLO's will still utilize current assessment methods such as online homework systems or embedded exam questions. The Program does not anticipate any change from the high target success rates already suggested by collected data.

2.3.a Course-Level SLO

What findings can be gathered from the Course Level Assessments?

Students are regularly meeting target success rates of 70% to 80% and demonstrating proficient use of chemistry theory and laboratory skills.

What curricular changes or review do the data suggest in order for students to be more successful in completing the program?

A majority of students are completing the Program, as suggested by both CLSLO and Institutional Research data. In order to increase the high success rate further and target the small percentage of struggling students, the implementation of more accessible tutoring or booster classes is a possible change. A new course in problem solving skills (Chem 70) was initiated in Fall 2011 to assist students in developing essential study skills for succeeding in science majors. Booster courses for Chem 1B/1C and the organic chemistry (Chem 12A/12B/12C) series should be considered.

How well do the CL-SLOs reflect the knowledge, skills, and abilities students need in order to succeed in this program?

The currently defined CL-SLO's reflect very specific areas of knowledge, skills and abilities, which students must understand in order to be successful. Going forward, CL-SLO's will be redefined to assess a broader level of student understanding. Since the current CL-SLO's focus on already difficult to master skills and principles, the Program anticipates the newly defined broader CL-SLO's to have similar success rates.

How has assessment of course-level student learning outcomes led to improvement in student learning in the program?

CL-SLO's have provided data on concepts/theories that students regularly struggle with. This has helped faculty identify areas that should be emphasized when teaching the Program's core classes.

2.3.b Program-Level SLO

What summative findings can be gathered from the Program Level Assessments?

Program Level Assessments are currently being implemented with data pending.

How has assessment of program-level student learning outcomes led to certificate/degree program improvements?

Not applicable at this point.

2.4 Annual Action Plan and Summary: Using the information above, list the program's action steps, the related Core Mission objective, SLO assessment data and the expected impact on student success.

Action Step	Related SLO assessment (Note applicable data)	Related ESMP Core Mission Goals (Basic Skills, Transfer, Work Force, Stewardship of Resources)	How will this action improve student learning/success?
1. Hire Laboratory Coordinator to increase current class offerings and expand instrumentation curriculum	**Number of course sections offered and depth of instrumentation is limited by the strained, under-staffed laboratory stockroom.**	**Transfer**	**More lab personnel will allow for the purchase and maintenance of updated equipment to help reinforce chemical theories learned in the classroom.**
2. Develop additional "booster" courses for advanced general chemistry and/or organic chemistry	**Success rates have hovered near 75%; Program would like to focus on the small percentage of struggling students.**	**Transfer**	**Increases resources and contact time available to the student.**
3. Develop independent student research program focusing on environmental chemistry	**Reinforces critical thinking and analytical problem solving skills.**	**Transfer**	**Helps students develop skills required at the UC/CSU level, professional and graduate schools.**

Section 3: Program Goals and Rationale

Program goals should be broad issues and concerns that incorporate some sort of measurable action and should connect to Foothill's core missions, *Educational & Strategic Master Plan* (ESMP), the division plan, and SLOs.

3.1 Program relation to college mission/core missions

The Program commits itself to providing access to outstanding educational opportunities for all of our students, in order to prepare them for transfer or placement in allied-health programs.

3.2 Previous Program Goals from last academic year

Goal	Original Timeline	Actions Taken	Status/Modifications
1. Increase student success in sequence courses	**Long term**	**Hired an additional (non-replacement) FT faculty member;** **Addition of a Chem 70 "booster" class for general chemistry (Chem 1A).**	**New FT faculty member has been teaching Chem 1A, providing greater consistency in teaching standards.** **Enrollment In Chem 70 has been steadily increasing.**
2. Expand course offerings	**Long term**	**Addition of Chem 70 "booster" class**	**Enrollment is steadily increasing; may expand "booster" concept to organic chemistry.**
3. Improve teaching consistency	**Long Term**	**Addition of (non-replacement) FT faculty member** **Maintain a regular, committed pool of PT faculty**	**Continued growth will necessitate additional FT faculty.** **PT faculty pool has remained constant with many achieving REP.**
4. New learning technologies	**Long Term**	**None**	**N/A**
5. Develop K-12 teachers	**Long Term**	**Maintained PSE 41, 42, 43**	**None**
6. Lower book costs	**Long Term**	**Our current publishers provide an online textbook component for less cost.** **Increased authoring of laboratory procedures has led to a decrease in the cost of a lab manual for students.**	**Addition of free online resources into lecture and laboratory curricula.**

3.3 New Goals: Goals can be multi-year

Goal	Timeline (long/short-term)	Supporting Action Steps from section 2.4 (if applicable)	How will this goal improve student success or respond to other key college initiatives
1. Expand course offerings to match enrollment growth	**Long Term**	**1. Hire Laboratory Coordinator to increase current class offerings and expand instrumentation curriculum** **2. Develop additional "booster" courses for advanced general chemistry and/or organic chemistry**	**Provide access to an ever-increasing student population that is taking core science classes prior to transferring to a four-year university.** **Increase contact hours with students that struggle in advanced chemistry courses.**
2. Develop new courses and student research program addressing general education and environmental chemistry	**Long Term**	**1. Hire Laboratory Coordinator to increase current class offerings and expand instrumentation curriculum**	**Beyond the strictly physical science majors, the general student population will be required to have an understanding of science in their own non-technical occupations. NSF grants have shown increased student success and retention when students participate in research.**
3. Develop certificate training program to help meet needs of current employers	**Long Term**		**Employers have expressed the need for a trained employee pool, particularly with analytical instrumentation, energy and green chemistry.**

Section 4: Program Resources and Support

4.1 Using the tables below, summarize your program's resource requests.

Full Time Faculty and/or Staff Positions

Position	$ Amount	Related Goal from Table in section 3.3	Possible funding sources (Lottery, Measure C, Basic Skills, Perkins, etc.)
Laboratory Coordinator	$80,000	Goals 1, 2, 3	

Reassigned Time

Position	$ Amount	Related Goal from Table in section 3.3	Possible funding sources (Lottery, Measure C, Basic Skills, Perkins, etc.)
Department Coordinator	$15,000	Goals 1, 2, 3	
Inorganic/Organic Chemistry Booster Course	$10,000	Goals 1, 2, 3	

B Budget Augmentation

B Budget FOAP	$ Amount	Related Goal from Table in section 3.3	Possible funding sources (Lottery, Measure C, Basic Skills, Perkins, etc.)
Contract Instrument Maintenance Personnel	$5,000	Goals 1, 2, 3	B- Budget

Facilities and Equipment

Facilities/Equipment Description	$ Amount	Related Goal from Table in section 3.3	Possible funding sources (Lottery, Measure C, Basic Skills, Perkins, etc.)
Automated Chemical Inventory System	$10,000	Goal 1, 3	Measure C/FF&E
90 MHz NMR	$120,000	Goal 1, 2, 3	Measure C/FF&E
Replacement Laboratory Glassware	$40,000	Goal 1, 2	Measure C/FF&E
Rotary Evaporation System	$10,000	Goal 1, 2	Measure C/FF&E
HPLC System	$40,000	Goals 1, 2, 3	SLI Targeted donations/sponsors
Vernier Data Acquisition Systems	$20,000	Goal 1, 2	Measure C/FF&E
Bench-top Laptops	$12,000	Goal 1, 2	Measure C/FF&E
GC System with Computer Interface and Data Analysis	$8,000	Goal 1, 2, 3	Measure C/FF&E

UV/Vis Spectrometer	$10,000	Goal 1, 2, 3	Measure C/FF&E
General Lab Equipment and Consumables	$20,000	Goals 1, 2	Measure C/FF&E

One-time/Other: (Release time, training, etc.?

Description	**$ Amount**	**Related Goal from Table in section 3.3**	**Possible funding sources (Lottery, Measure C, Basic Skills, Perkins, etc.)**
Environmental Chemistry Course Development	$10,000	Goals 1, 2, 3	Reassign Time or SLI/Foundation Fund
Analytical Instrumentation Course Development	$10,000	Goals 1, 2, 3	Reassign Time or SLI/Foundation Fund
Technical Certificate Program Development	$10,000	Goals 1, 2, 3	Perkins, Reassign Time or SLI/Foundation Fund
Student Research Program with Environmental Emphasis	$10,000	Goals 1, 2	SLI/Foundation Fund and make course WSCH bearing.

Section 5: Program Strengths/Opportunities for Improvement

5.1 Use the matrix provided below and reflect on the program relative to students' needs, briefly analyze the program's strengths and weaknesses and identify opportunities and challenges to the program. Consider external and internal factors, such as demographic, economic, educational, and societal trends. Some considerations may include current and future demand for the program, similar programs at other comparable institutions, and potential auxiliary funding.

	INTERNAL FACTORS	EXTERNAL FACTORS
Strengths	**The Program has maintained a constant student success rate while increasing enrollment 25% over 3 years. Students leave the Program prepared to transfer to four-year institutions and are successful thereafter.**	**Program has an excellent reputation at transfer institutions. Many four-year universities recognize the strength of our Program and are increasingly accepting our students. These institutions include USC, Cornell, UC Berkeley, UCLA, UCSD and UC Davis.**
Weaknesses	**The Program is limited in its growth due to understaffing in both the stockroom and FT faculty members. Laboratory staff is strained and the Program cannot meet demand for courses if more personnel are not hired, nor provide more instrument-oriented coursework.** **Contributions to campus governance are limited due to an inflexible laboratory-teaching schedule.**	**Increasing course offerings beyond the traditional transfer and allied health track is limited due to reduced funding from the state.**
Opportunities	**The Program is moving to the new PSEC Building in Fall 2012, providing opportunity for growth in terms of physical space and some equipment; however, lab staff and faculty need to be hired for growth to continue.** **With more space and equipment, development and implementation of certificate programs for training on analytical instrumentation and green chemistry are possible.**	**SLI/Foundation associated with the opening of the PSEC will assist in partially meeting funding needs and potentially increase enrollment and growth.**

Threats	**Decreased contributions from the state budget.**	**Online courses or proprietary schools that offer chemistry courses that are non-transferable.**

5.2 Are there any critical issues you expect to face in the coming year? How will you address those challenges?

The most critical issues facing the Program are as follows:

- **limited expansion due to an understaffed and overworked laboratory stockroom technician**
- **increased demand for classes**
- **migration to the new PSEC Building.**

In order to address current lab stockroom needs, student helpers have been hired to temporarily alleviate pressure on the laboratory technician. This allows some time for the laboratory technician to prepare experiments instead of servicing students; however, this is not adequate. Student helpers are only employed for one to two quarters, which requires constant rehiring of new student employees whom need training. The technician is almost unable to keep up with the increasing number of lab sections and complicated experiment setups. Based on the lab sections offered, the technician's workload has increased substantially in the past few years. Growth will essentially plateau without additional FT personnel that can adequately handle chemicals and maintain instrumentation.

To handle the increasing demand for classes, new sections are opened every quarter, which over-extends the resources of the laboratory stockroom. Regularly, students are being turned away and forced to delay plans of graduation or transfer.

As for moving equipment to the new building, the department is currently investigating EH&S safety guidelines for the transport of chemicals and sensitive equipment.

The hiring of a Laboratory Coordinator to manage staffing in the Chemistry Stockroom, maintain instrumentation throughout the Program, handle budgetary matters and ordering chemicals/equipment, will allow for growth and partially alleviate the workload of the only FT laboratory technician.

5.3 What statements of concern have been raised in the course of conducting the program review by faculty, administrators, students, or by any member of the program review team regarding overall program viability?

1. Funding and staffing are the two main reasons why program growth cannot occur much further.

2. Reassign or release time is necessary to develop new courses or develop curricula that involve more analytical equipment, student research and work force training.

5.4 Address the concerns or recommendations that were made in prior program review cycles.

In the previous Program Review cycle, the request for additional laboratory personnel was not fully funded.

5.5 After reviewing the data, what strengths or positive trends would you like to highlight about your program?

The Chemistry Program at Foothill College is growing at a fast rate. Due to current economic conditions, the demand for classes at the community college level has increased dramatically. Our Program has met the demand and offered more classes, with enrollment increasing 25% over three years. Despite the influx of students, our success rates have remained steady (~75%).

Section 6: Feedback and Follow Up

This section is for the Dean to provide feedback.

6.1 Strengths and successes of the program as evidenced by the data and analysis:
The Chemistry Program has had consistent student success rate of 75% and a year-over-year growth rate of 8.7%. Some reasons are:

1. The faculty are very collegial within the department and outside.
2. All the FT and some PT Faculty provide time in the PSME Center.
3. The PT Faculty are seasoned faculty and provide adequate level of instruction and testing.
4. The faculty update their course and lab materials on a regular basis.
5. Leading the Stanford Internship program
6. The labs have had exemplary hazmat reports (Mona Voss).

6.2 Areas of concern, if any: Chemistry department has been fortunate that the number of sections have been able to expand without any Hazmat issues. The current staff has been stretched in providing lab support.

1. The move to PSEC will require support from a certified chemical moving company or purchase all new chemicals and dispose of current inventory.
2. PSEC has an additional lab, going from a total 4 to 5 labs plus an instrumentation lab. Current staff is not trained in the instrumentation and not enough time to service the new lab.
3. Lack of time for faculty to develop new courses or wait for faculty to have PDL.
4. Vendor professionals have not maintained the equipment. This will impact classes and students experiments.
5. The next concern is the professional development for the full-time faculty but more importantly the part-time faculty in the use of technology, common standards for student success in a course as well as the sequence, and new teaching techniques and methodology identified in working with outside programs such is Gates foundation and Carnegie foundation.
6. The continued funding of the PSME Center to include the “Boot Camps” to provide remedial assistance.

6.3 Recommendations for improvement:
The recommendations map to areas of concerns above.

1. Lab Staff: Hire a FT lab coordinator that is responsible for lab scheduling, ordering, instruments, and lab preparation.
2. PSEC Chem Move: FHDA identify a mover or create a new order list for labs.
3. Expansion:
    a. Hire a FT lab coordinator.
    b. Create new labs that are green.
    c. New instrumentation from SLI/Foundation donations.
4. New courses: Provide reassign time
    a. Develop new courses based on resource sustainability

   b. Develop new instrumentation lab courses and certificates
      i. Collaborate with Biology & Biotech
   c. Develop student lab research program
5. Lab equipment: Increase B-Budget to have equipment maintenance contracts and annual inspections.
6. Professional Development:
   a. Invite chemistry "experts" for lectures or 1 quarter visiting professor
   b. Develop quarterly ½ day seminars for FT & PT
      i. Pay PT $100 stipend
   c. Provide FT faculty reassign time to collaborate with local colleges (Stanford, UCSC) and Foundations (Gates, Carnegie, Packard).
      i. Use external funds such as grants and Foundation funds when possible
      ii. Contact colleges Foundations and Colleges.
7. PSME Center:
   a. The Center requires a FT Faculty to develop new curriculum and provide coordination between Chem Classes with Center support.
   b. Additional Graduate Student staff required supporting start of quarter assessments as well as remedial/booster class support.
   c. Identify and fund a publisher independent LMS for centralized course materials, assessments, homework and student tracking from course to course.

6.4 Recommended Next steps:

_X_ Proceed as planned on program review schedule

___ Further review/Out of cycle in-depth review

FOOTHILL COLLEGE PROGRAM REVIEW DATA

11/09/11

PSME Chemistry

Enrollment Trends

	FH			
	2008-09	2009-10	2010-11	Chg 09-10 to 10-11
Enrollment	2,154	2,548	2,695	6%
WSCH	21,011	25,704	25,785	0%
FTES	467	571	573	0%
AY_WSCH	17,562	21,784	23,614	8%
AY_FTEF	10.8	13.4	14.0	4%
AY_Productivity	543	540	563	4%

Full and Part Time Faculty Load

	FH			
	2008-09	2009-10	2010-11	Chg 09-10 to 10-11
Fulltime Load	3.8	4.9	5.4	9%
Fulltime Percent	30%	33%	34%	5%
Parttime/OL Load	8.8	10.2	10.4	2%
Parttime/OL Percent	70%	67%	66%	-2%

Course Success

	FH					
	2008-09		2009-10		2010-11	
	Enr	Percent	Enr	Percent	Enr	Percent
Pass	1633	76%	1885	74%	2006	74%
Did Not Pass	222	10%	348	14%	351	13%
Withdrew	299	14%	315	12%	338	13%
Total	2154	100%	2548	100%	2695	100%

Ethnicity

	FH					
	2008-09		2009-10		2010-11	
	Enr	Percent	Enr	Percent	Enr	Percent
Targeted Groups	375	17%	322	13%	356	13%
Not Targeted	1,779	83%	2,226	87%	2,339	87%
Total	2,154	100%	2,548	100%	2,695	100%

Definitions

Enrollment/Grades:
Sum of end-of-term grade count including Ws. 4 Quarters.

WSCH:
Sum of quarterly End-of-Term Weekly Student Contact Hours. 4 Quarters.

FTES:
Fulltime equivalent students, (WSCH * 11.67) / 525.

AY_WSCH:
Sum of quarterly End-of-Term Weekly Student Contact Hours. 3 Quarters.

AY_FTEF:
Sum of teaching load factors for Fall, Winter, and Spring quarters by assignment type, excluding all reassignments.

AY_Productivity:
3-term total WSCH / 3-term total AY_FTEF, excluding all reassignments.

Success %:
Number of students receiving an A,B,C or CR grade / total number of students receiving a grade.

Targeted Groups:
African Americans, Latinos, Filipinos

Notes:
Full and part time faculty load is based on fiscal year. 4 Quarters. Figures do not include reassigned time.

Course Enrollment Trends

		FH			
		2008-09	2009-10	2010-11	Chg 09-10 to 10-11
CHEMF001A	Enrollment	407	471	470	-0%
	AY_Productivity	549	542	598	10%
CHEMF001B	Enrollment	298	370	415	12%
	AY_Productivity	552	525	563	7%
CHEMF001C	Enrollment	190	253	276	9%
	AY_Productivity	434	470	522	11%
CHEMF012A	Enrollment	100	146	154	5%
	AY_Productivity	505	583	579	-1%
CHEMF012B	Enrollment	80	96	106	10%
	AY_Productivity	459	373	455	22%
CHEMF012C	Enrollment	73	64	74	16%
	AY_Productivity	657	518	598	15%
CHEMF025.	Enrollment	314	405	437	8%
	AY_Productivity	620	670	623	-7%
CHEMF030A	Enrollment	474	522	547	5%
	AY_Productivity	611	624	618	-1%
CHEMF030B	Enrollment	181	212	181	-15%
	AY_Productivity	404	442	422	-4%
CHEMF036Y	Enrollment	29			
	AY_Productivity	#INF			
CHEMF070.	Enrollment			30	
	AY_Productivity			225	
CHEMF100.	Enrollment	4	4	1	-75%
	AY_Productivity	#INF	#INF		#NAN
CHEMF100X	Enrollment	2	4	3	-25%
	AY_Productivity		#INF	#INF	#NAN

		FH			
		2008-09	2009-10	2010-11	Chg 09-10 to 10-11
CHEMF100Y	Enrollment	2	1	1	0%
	AY_Productivity	#INF	#INF	#INF	#NAN

Course Success

		FH							
		Pass		Did Not Pass		Withdrew		Total	
		Enr	Percent	Enr	Percent	Enr	Percent	Enr	Percent
CHEMF001A	2008-09	298	73%	45	11%	64	16%	407	100%
	2009-10	344	73%	56	12%	71	15%	471	100%
	2010-11	341	73%	58	12%	71	15%	470	100%
CHEMF001B	2008-09	229	77%	33	11%	36	12%	298	100%
	2009-10	260	70%	51	14%	59	16%	370	100%
	2010-11	303	73%	47	11%	65	16%	415	100%
CHEMF001C	2008-09	147	77%	15	8%	28	15%	190	100%
	2009-10	201	79%	20	8%	32	13%	253	100%
	2010-11	232	84%	17	6%	27	10%	276	100%
CHEMF012A	2008-09	84	84%	11	11%	5	5%	100	100%
	2009-10	103	71%	29	20%	14	10%	146	100%
	2010-11	109	71%	26	17%	19	12%	154	100%
CHEMF012B	2008-09	67	84%	10	13%	3	4%	80	100%
	2009-10	76	79%	14	15%	6	6%	96	100%
	2010-11	85	80%	9	8%	12	11%	106	100%
CHEMF012C	2008-09	65	89%	4	5%	4	5%	73	100%
	2009-10	53	83%	5	8%	6	9%	64	100%
	2010-11	68	92%	2	3%	4	5%	74	100%
CHEMF025.	2008-09	221	70%	41	13%	52	17%	314	100%
	2009-10	298	74%	68	17%	39	10%	405	100%
	2010-11	302	69%	80	18%	55	13%	437	100%
CHEMF030A	2008-09	338	71%	51	11%	85	18%	474	100%
	2009-10	360	69%	91	17%	71	14%	522	100%
	2010-11	378	69%	98	18%	71	13%	547	100%
CHEMF030B	2008-09	152	84%	8	4%	21	12%	181	100%
	2009-10	181	85%	14	7%	17	8%	212	100%
	2010-11	159	88%	11	6%	11	6%	181	100%
CHEMF036Y	2008-09	28	97%	1	3%			29	100%
CHEMF070.	2010-11	27	90%	1	3%	2	7%	30	100%
CHEMF100.	2008-09	2	50%	1	25%	1	25%	4	100%
	2009-10	4	100%					4	100%
	2010-11					1	100%	1	100%
CHEMF100X	2008-09			2	100%			2	100%
	2009-10	4	100%					4	100%
	2010-11	2	67%	1	33%			3	100%

		FH							
		Pass		Did Not Pass		Withdrew		Total	
		Enr	Percent	Enr	Percent	Enr	Percent	Enr	Percent
CHEMF100Y	2008-09	2	100%					2	100%
	2009-10	1	100%					1	100%
	2010-11			1	100%			1	100%

Unit Course Assessment Report - Four Column

Foothill College

Department - Chemistry (CHEM)

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings	Reflection/Action Plan & Follow-Up
Department - Chemistry (CHEM) - CHEM 12A - ORGANIC CHEMISTRY - Reactivity - Predict the products of reactions involving organic compounds (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** 2011-2012 **Start Date:** 09/26/2011 **End Date:** 09/24/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Embedded M/C question on Final Exam **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 85%		
Department - Chemistry (CHEM) - CHEM 12C - ORGANIC CHEMISTRY - Organic Target Molecules - Design a concise, logical chemical synthesis of an expanded array of organic target molecules from simple precursors. (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** 2010-2011 **Start Date:** 04/04/2011 **End Date:** 06/24/2011 **Course-Level SLO Status:** Active	**Assessment Method:** An open-ended question embedded during the final exam that provides the student a complex target molecule, which must be synthesized from simple starting material. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Out of 20 possible points, and a 3 point deduction for each error in the student's synthetic scheme, students scoring around 17 points would be considered proficient at synthesis. **Related Documents:** Chemistry 12C - Synthesis 01	06/24/2011 - For a class size of 50 students, the average score for the assessed synthesis question (which focused on aromatic and amine chemistry) was 16.54/20.00, while the median score was 20. Over half the students scored 20/20 on this question, with nearly all others scoring above 14 points. Only 4 students scored less than 10 points. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	10/14/2011 - Synthesis questions are the most difficult and complex in organic chemistry. A majority of the students' schemes demonstrated proficiency in selecting compatible chemical reagents, foresight in building carbon scaffolds, and analysis in functional reactivity. This data demonstrates students have gained skills in organic synthesis and are able to carry these abilities into the workforce.
Department - Chemistry (CHEM) - CHEM 12C - ORGANIC CHEMISTRY - Organic Molecule Reactivity - Recognize structural features of organic molecules important to their reactivity. (Created By Department - Chemistry (CHEM))	**Assessment Method:** A series of embedded, open-ended question on the final exam where the student must predict the product of multi-step chemical reactions. **Assessment Method Type:** Exam - Course Test/Quiz	06/24/2011 - For a class size of 50 students, the average score was 20.7/30.0, with a median score of 23. Over 32 students scored at least 21 points or higher, with only 8 students scoring less than 15 points. **Result:**	10/14/2011 - By the end of Chemistry 12C, students have learned 200+ reactions that are continually used during the series. Being able to filter through this large database of reactions and reagents

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings	Reflection/Action Plan & Follow-Up
Assessment Cycles: 2010-2011 **Start Date:** 04/04/2011 **End Date:** 06/24/2011 **Course-Level SLO Status:** Active	**Target for Success:** Six questions (worth 5 points each, total 30 points) will be assessed. Answer are worth partial credit if slight errors are made (approximate 2 point deduction per error). An average of 21 points would consider the student proficient and knowledgeable of various reactivity theories. **Related Documents:** Chemistry 12C - Reactions 01	Target Met **Year This Assessment Occurred:** 2010-2011	is a huge feat. A majority of students were able to answer over half of the multistep reaction questions correctly. Considering the complexity of molecules at this level, the data suggests students are able to successfully identify reactive sites on molecules and predict with moderate consistency the product of the reaction. This data demonstrates students have gained skills in assessing reactivity which can be applied to biomolecular chemistry and biochemistry, as well as chemical-related jobs in the workforce.
Department - Chemistry (CHEM) - CHEM 1C - GENERAL CHEMISTRY & QUALITATIVE ANALYSIS - Buffer Solutions - Students will understand the concept of buffer solutions. They will: a) understand the general components necessary for a solution to act as a buffer. b) be able to determine if a given solution can act as a buffer and its optimum pH range. c) understand the chemical reaction(s) that work to stabilize pH within a buffer solution. d) be able to write the chemical reactions that work to stabilize pH within a buffer solution. (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** 2012-2013 **Course-Level SLO Status:** Active	**Assessment Method:** Prelabs **Assessment Method Type:** Departmental Questions		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings	Reflection/Action Plan & Follow-Up
Department - Chemistry (CHEM) - CHEM 25 - FUNDAMENTALS OF CHEMISTRY - Dimensional Analysis - The students will be able to use dimensional analysis to set up and solve numerical problems. (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** 2011-2012 **Course-Level SLO Status:** Active	**Assessment Method:** Results from selected assignments in the online homework system will be compiled and reviewed. **Assessment Method Type:** Departmental Questions **Target for Success:** Correct response rates from 70 to >90% will be targeted depending on the timing (within the term) and the difficulty of the selected assignment.	04/29/2011 - Two exercises were chosen to evaluate SLO #1 and were administered by all Chemistry 25 faculty in Winter 2011 through the required online homework component of the course. The first exercise was: (Exercise 2.110: Cumulative Problems) A backpacker carries 2.5 L of white gas as fuel for her stove. How many pounds does the fuel add to her load if the density of white gas is 0.79 g/cm3? The second exercise (Exercise 6.102: Cumulative Problems) was: Fingernail-polish remover is primarily acetone (C3H6O). How many acetone molecules are in a bottle of acetone with a volume of 415 mL? (density of acetone = 0.788 g/cm3) The first exercise was completed in the first two weeks of the term. Only 75% of the 114 students who completed the exercise answered correctly. This reflects the different levels of preparedness by students entering the course. By the end of the first month, when the second exercise was completed, 92% of the students answered this similar problem correctly, indicating an improvement in the critical analytical thinking skills required for solving dimensional analysis exercises. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011 **IL-SLO Reflection:** No change recommended. The results were compared with results from the entire database of students who completed these exercises (over 5000 students). The Foothill students performed better on both exercises with 75 and 92% answering the first and	05/30/2011 - No change recommended. The implementation of graded online homework will continue to be a vital component in ensuring students are learning the importance of dimensional analysis.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings	Reflection/Action Plan & Follow-Up
		second exercises correctly compared with correct response rates of 67 and 71% for the overall database.	
Department - Chemistry (CHEM) - CHEM 25 - FUNDAMENTALS OF CHEMISTRY - Physical and Chemical Properties and Change - The students will be able to identify physical and chemical properties and change (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** 2010-2011 **Course-Level SLO Status:** Active	**Assessment Method:** Results from selected assignments in the online homework system will be compiled and reviewed. **Assessment Method Type:** Departmental Questions **Target for Success:** Correct response rates from 70 to >90% will be targeted depending on the timing (within the term) and the difficulty of the selected assignment.	04/29/2011 - The exercise that follows was chosen to evaluate SLO #2 and was administered by all Chemistry 25 faculty in Winter 2011 through the required online homework component of the course: (Exercise 3.38: Problems ? Physical and Chemical Properties and Physical and Chemical Changes) The following list contains several properties of ozone (a pollutant in the lower atmosphere but part of a protective shield against UV light in the upper atmosphere). Which are physical properties and which are chemical properties? (a) bluish color (b) pungent odor (c) very reactive (d) decomposes on exposure to ultraviolet light (e) gas at room temperature The 114 students who completed this exercise all earned 100% on their first attempt. The question does ask about odor being a physical or chemical property, which can be confusing for some students who think that the chemistry that occurs in the nose in order for a person to process is a smell is not to be considered when classifying a substance as having an odor (a physical property). **Result:** Target Met **Year This Assessment Occurred:** 2010-2011	04/29/2011 - Target met; no change recommended
Department - Chemistry (CHEM) - CHEM 25 - FUNDAMENTALS OF CHEMISTRY - Mole and Avogadro's Number - The students will understand the meaning and uses of the	**Assessment Method:** Results from selected assignments in the online homework system will be compiled	04/29/2011 - The exercises that follow were chosen to evaluate SLO #3 and were administered by all Chemistry 25 faculty in Winter 2011 through	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings	Reflection/Action Plan & Follow-Up
mole and of Avogadro's number. (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** 2011-2012 **Course-Level SLO Status:** Active	and reviewed. **Assessment Method Type:** Departmental Questions **Target for Success:** Correct response rates from 70 to >90% will be targeted depending on the timing (within the term) and the difficulty of the selected assignment.	the required online homework component of the course: (Exercise 6.54: Problems ? The Mole Concept) A salt crystal has a mass of 0.12 mg. How many NaCl formula units does it contain? (Exercise 6.86: Problems ? Calculating an Empirical Formula) Samples of several compounds are decomposed, and the following are the masses of their constituent elements. Calculate the empirical formula for a compound containing 0.672 g Co, 0.569 g As, 0.486 g O There were two separate exercises chosen to more fully assess the scope of mastery regarding the important, yet broad, concept of the mole. Both exercises were quantitative. For (1), the correct response rate of 89% was reassuring that this important objective is being mastered by the majority of students. For (2), the percentage of correct answers dropped to 73%, with many students incorrectly proposing a formula that matches a more common form of the arsenate polyatomic ion but does not match the formula that would have been derived from the data given. This suggests that students may have done an internet search for the compound rather than doing the necessary calculations. **Result:** Target Met **Year This Assessment Occurred:** 2010-2011 **IL-SLO Reflection:** It is important to do examples that showcase the different pitfalls of assuming, for example, an ionic compound composed of Fe and O is not necessarily assumed to be FeO (iron(II) oxide), because perhaps the data would calculate another stable form: Fe2O3 (iron(III) oxide).	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings	Reflection/Action Plan & Follow-Up

Unit Assessment Report - Four Column

Foothill College

Program (PSME - CHEM) - Chemistry AS

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings	Action & Follow-Up
Program (PSME - CHEM) - Chemistry AS - 1 - Knowledge of current theories and applications in the field of chemistry **Year PL-SLO implemented:** 2011-2012 **PL-SLO Status:** Active	**Assessment Method:** Standardized Achievement and Self-Report Tests: Students will be tested on six core topics in chemistry that correlate to topics used in later assessments (for example, the American Chemistry Society (ACS) General Chemistry Exam, or equivalent, and the ACS Organic Chemistry Chemistry Exam, or equivalent.) **Assessment Method Type:** Exam - Standardized **Target:** Students scoring in the 70 percentile compared to the nation.		
Program (PSME - CHEM) - Chemistry AS - 2 - An enhanced ability to research, assess and comprehend topics of interest, both for matriculation and professional success **Year PL-SLO implemented:** 2011-2012 **PL-SLO Status:** Active	**Assessment Method:** Students will be tested on six core topics in chemistry that correlate to topics used in later assessments (specifically Chem 1C or Chem 12A/B/C). Special end-of-quarter projects involving presentations on how current events relate to chemistry theory may also be utilized. **Assessment Method Type:** Exam - Standardized		
Program (PSME - CHEM) - Chemistry AS - 3 - An enhanced ability to communicate effectively, both orally and in writing, for the purpose of conveying information. **Year PL-SLO implemented:** 2011-2012 **PL-SLO Status:** Active	**Assessment Method:** Evaluation of student's laboratory notebook that will contain safety information, step-by-step procedures and clear presentation of data. Additionally, lab reports will be assessed for clear, concise presentation of experimental findings. Group presentations of lab data may also be utilized. **Assessment Method Type:**		

PL-SLOs	Means of Assessment & Target / Tasks	Assessment Findings	Action & Follow-Up
	Essay/Journal		
Program (PSME - CHEM) - Chemistry AS - 4 - Facility in the safe handling of chemicals and the execution of common laboratory techniques **Year PL-SLO implemented:** 2011-2012 **PL-SLO Status:** Active	**Assessment Method:** Laboratory safety quizzes will be administered at the beginning of the quarter; or a checklist of laboratory skills demonstrating successful completion of key experiments will also be recorded. **Assessment Method Type:** Observation/Critique **Target:** 80% success rate in passing both safety quiz and satisfying experiment checklist.		