Basic Program Information

Department Name:

Chemistry

Division Name:

Physical Sciences Math and Engineering

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.

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

Name	Department	Position
Kathy Armstrong	Chemistry	Instructor
Richard Daley	Chemistry	Instructor
Mary Holland	Chemistry	Instructor
Londa Larson	Chemistry	Instructor
Rosa Nguyen	Chemistry	Instructor
Sandhya Rao	Chemistry	Instructor
Peter Murray	PSME	Division Dean
Victor Tam	Chemistry (Sabbatical)	Instructor
Anna Wu	Chemistry	Laboratory Technician
Sherman Lee	Chemistry	Laboratory Technician

Total number of Full Time Faculty:	7
Total number of Part Time Faculty:	16

Please list all existing Classified positions:
Laboratory Technician Day Program
Laboratory Technician Night Program

List all Programs* covered by this review & check the appropriate column for program type:

Program Name	Certificate of Achievement Program	Associate Degree Program	Pathway Program
AS Chemistry		X	
General Studies Science AS		X	

*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 (i.e. Integrated Reading and Writing, Math My Way, etc.) You will only need to address those data elements that apply.

Section 1: Data and Trend Analysis

a. Program Data:

Data will be posted on http://foothill.edu/staff/irs/programplans/programreviewdata.php for all measures except non-transcriptable completion. You must manually copy data in the boxes below for every degree or certificate of achievement covered by this program review.

Transcriptable Programs	2010-2011	2011-2012	2012-2013	% Change
AS Chemistry	0	0	?	?
General Studies Science AS	?	?	?	?

Please provide any non-transcriptable completion data you have available. Institutional Research does not track this data; you are responsible for tracking this data.

Non-Transcriptable Program	2010-2011	2011-2012	2012-2013	% Change
Example: Career Certificate				
NONE				

b. Department Level Data:

	2010-2011	2011-2012	2012-2013	% Change
Enrollment	2819	3080	3192	+3.6
Productivity (College Goal 2012-13: 535)	579	496	473	-4.6
Success	74%	73%	71%	-2.7%
Full-time FTEF	5.4	6.4	6.5	+1.6%
Part-time FTEF	9.2	8.9	10.4	+16.9%

c. Associate Degree Transfer (ADT)

There is a fall 2014 legislated deadline for approval of ADTs (AA-T/AS/T degrees). **If there Is a Transfer Model Curriculum (TMC) available in your program, you are *required* to offer an approved AA-T/AS-T.** Indicate the status of your program's ADT:

Check one	Associate Degree Transfer Status
X	**State Approved**
	Submitted to CCCC
	Submitted to Office of Instruction
	In Progress with Articulation
	Planning Stage with Department
	Not Applicable

If you are required to offer an approved ADT and it has not been state-approved, please comment on the program's progress/anticipated approval date.

Using the prompts and the data from the tables above, provide a short, concise narrative analysis for each of the following indicators. If additional data is cited (beyond program review data sheet), please indicate your data source(s).

d. 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.

n 2012-13 our unduplicated head count was 2119 (+9.1%); enrollment was 3192 (+3.6%); sections offered 119, (+3.5%); WSCH 25629 (+3.3%); FTEF 18, (+8.2%). All these trends are up from the previous three years excluding WSCH. Chemistry continues in a growth mode, however productivity has slipped slightly 473 (-4.6%). We expect further growth as the PSEC becomes better known within the community.

e. Student Demographics: Please comment on the enrollment data, comparing the program-level data with the college-level data. Discuss any noticeable differences in areas such as ethnicity, gender, age and highest degree.

The ethnic breakdown in chemistry enrollments shows three disparities compared to the general Foothill population:
Asian are 43% of chemistry enrollment compared to 26% general (+65%)
Latino are 15% of chemistry enrollment compared to 20% general (-25%)
White are 26% of chemistry enrollment compared to 33% general (-21%)
Others are 16% of chemistry enrollment compared to 21% general (-24%)
These disparities are not uncommon in the physical sciences. The Asian population tends to focus on science pathways. The lower numbers for the remaining groups are the result of the high percentage of Asian students. The relative % enrollments excluding Asians are: 26% Latino, 46 % white, and 28% other. This matches the relative general population: 27%, 45%, and 28% respectively.

f. Productivity: Although the college productivity goal is 535, there are many factors that affect productivity, i.e. seat count/facilities/accreditation restrictions. Please evaluate and discuss the productivity trends in *your program*, relative to the college goal and any additional factors that impact productivity. If your productivity is experiencing a declining trend, please address strategies that your program could adopt to increase productivity.

Productivity (473) has dipped slightly over the past year (-4.6%). As we made the transition into the PSEC buildings scheduling of courses was completely remapped. This rescheduling may have resulted in optimal times for the students, hence a drop in productivity. Since we are a lab based curriculum, an overall productivity goal of 535 in unrealistic. A productivity increase to 500 would be terrific and may probably be achievable if enrollments continue to rise.

Section 2: Student Equity and Institutional Standards

As part of an accreditation requirement, the college has established institution-set standards across specific indicators that are annual targets to be met and exceeded. Please comment on how these indicators compare at your program level and at the college level. (For a complete description of the institutional standard, please see the instructional cover sheet)

a. Institutional Standard for Course Completion Rate: 55%

Please comment on your program's course success data, including any differences in completion rates by student demographics as well as efforts to address these differences.

Our course success rate average of 71% is well above the institutional completion rate of 55%. This may seem good, but in chemistry we generally have more mature and prepared students, so 71% seems reasonable. However, targeted groups (about 20% of our students) succeed at only 59%, well below our average. The department would like to get our average to 80% and the targeted groups to 70% using better screening criteria for the 1A course. We have requested resources/research be directed in this area.

b. Institutional Standard for Degree Completion Number: 450

Has the number of students completing degrees in your program held steady or increased/declined in the last three years? Please comment on the data, analyze the trends, including any differences in completion rates by student demographics.

We have had no AS Chemistry degrees awarded in the last three years. Is this Correct????

c. Institutional Standard for Certificate Completion Number (Transcriptable): 325

Has the number of students completing certificates in your program held steady, or increased/declines in the last three years? Please comment on the data, analyze the trends, including any differences in completion rates by student demographics.

We do not offer a certificate in chemistry

d. Institutional Standard for Transfer to four-year colleges/universities: 775

Based on the transfer data provided, what role does your program play in the overall transfer rates? Please comment on any notable trends or data elements related to your program's role in transfer.

Where do we find the data????

Section 3: Core Mission and Support

The College's Core Missions are reflected below. Please respond to each mission using the prompts below.

a. Basic Skills: (English, ESLL and Math): For more information about the Core Mission of Basic Skills, see the Basic Skills Workgroup website: http://foothill.edu/president/basicskills.php
If your program is categorized as a basic skills program, please discuss current outcomes or initiatives related to this core mission and analyze student success through the core mission pathway.

Chemistry does not offer any basic skills courses.

If your program is NOT categorized primarily as a basic skills program, comment about how your program/classes supports Foothill's basic skills mission and students.

As with all physical sciences, we only serve those students that have moved past basic skills in math. Students that are near or at basic skill level in English are at a disadvantage since the language of chemistry is complex. Many of these students find difficulty, especially in lab where the understanding of the procedural and safety directions has to be precise. With an advisory of concurrent enrollment in ESLL 25 or ENGL 209, any basic skills english student should defer until their English skills have improved.

b. Transfer: For more information about the Core Mission of Transfer, see the Transfer Workgroup website: http://foothill.edu/president/transfer.php
If your program is classified as a transfer program, please discuss current outcomes or initiatives related to this core mission and analyze student success through the core mission pathway.

The Chemistry Program core courses are designed to articulate to the UC and CSU systems for students transferring in chemistry, biological sciences, physics, engineering and other physical science majors. The only exception is CHEM 70. Our transfer rate to 4-year institutions is very high for students finishing the 1A-1C sequence and/or the 12A-12C sequence.

If your program is NOT categorized primarily as a transfer program, please comment about how your program/classes support Foothill's transfer mission and students.

c. Workforce: For more information about the Core Mission of Workforce, see the Workforce Workgroup website: http://www.foothill.edu/president/workforce.php
If your program is classified as a workforce program, please discuss current outcomes or initiatives related to this core mission and analyze student success through the core mission pathway.

Chemistry is not a workforce program.

If your program is NOT categorized as a workforce program, please comment about how your program/classes support Foothill's workforce mission and students.

Chemistry 30A and 30B support programs preparing students to pursue careers in the allied health fields. We have a dedicated full-time faculty that oversees and coordinates the 30A/30B sequence making sure we are serving the needs of the CTE programs. Our enrollment in these courses is 27% of our total with good productivity (500). Our success rate in 30A over the last three years is average, 69%, with 30B being well above average, 82%.

Section 4: Learning Outcomes Assessment Summary

a. Attach 2012-2013 Course-Level – Four Column Report for CL-SLO Assessment from TracDat, please contact the Office of Instruction to assist you with this step if needed.

b. Attach 2012-2013 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.

Section 5: SLO Assessment and Reflection

Based on your assessment data and reflections, please respond to the following prompts.

a. **What curricular, pedagogical or other changes have you made as a result of your CL-SLO assessments?**

We continually make changes to our curriculum to address SLO's that do not meet our targets. This process may involve one or several changes including: rewrites of laboratory experiments; adding new experiments; introducing new equipment and technologies; as well as changing the emphasis of instruction during lecture and/or lab. Many of these changes in the 1A-1C courses are driven by feedback from the organic instructors. We routinely incorporate new strategies within each course to improve student learning and success

b. How do the objectives and outcomes in your courses relate to the program-level student learning outcomes and to the college mission?

Essentially all of our courses are intended to meet 2 of the 3 core missions of the college: transfer and/or workforce. All the course objectives and outcomes are designed to accomplish our program level SLO of providing a solid chemical foundation for transfer or acceptance into an allied health program. We offer only one course that does not transfer or meet a workforce requirement, CHEM 70. This year we added CHEM 20 "Green Chemistry" to our course offerings as a standalone GE course or as a prerequisite to chemistry 1A

c. How has assessment of program-level student learning outcomes led to certificate/degree program improvements? Have you made any changes to your program based on the findings?

While we conclude that our core level course sequences and the Chemistry AS Program are successful in preparing students for future coursework and careers there are a few areas within the program, identified in the CL-SLOs assessments, where student learning can be improved. Ongoing discussions within the department will focus on what skills and knowledge are most useful for students in their future coursework and careers, targeting areas where student learning can be bettered.

d. If your program has other outcomes assessments at the program level, comment on the findings.

No other outcomes assessed in 2012-13.

e. What do faculty in your program do to ensure that meaningful dialogue takes place in both shaping and evaluating/assessing your program's student learning outcomes?

Student learning outcomes are first discussed between faculty teaching within the same course sequence, e.g., 30A-30B, 1A-1C or 12A-12C. These faculty then determine an action plan and follow-up response based on the assessment and reflections for each course SLO. In spring quarter, we meet as a department to share and discuss the course SLO's as well as go over our program SLO's for the year. This process has served us well the past two years.

Section 6: Program Goals and Rationale

Program goals address broad issues and concerns that incorporate some sort of measurable action and connect to Foothill's core missions, Educational & Strategic Master Plan (ESMP), the division plan, and SLOs. Goals are not resource requests.

List Previous Program Goals from last academic year: check the appropriate status box & provide explanation in the comment box.

Goal	Completed? (Y/N)	In Progress? (Y/N)	Comment on Status
1. Expand course offerings to match enrollment growth	Yes	Yes	We continually open sections to meet student demand by increasing our part-time pool.
2. Develop new courses and student research program addressing general education	Yes	Yes	Chemistry 20 is now offered. Green Chemistry. A course in "Food Chemistry" is being developed by Dr. Tam for next years catalog.
3. Develop certificate training program to help meet needs of current employers	No	No	No evidence certificate programs are needed in the workforce at this time.

New Goals: Goals can be multi-year (in Section 7 you will detail resources needed)

Goal/Outcome (This is NOT a resource request)	Timeline (long/short-term)	How will this goal improve student success or respond to other key college initiatives?	How will progress toward this goal be measured?
A. Increase student enrollment to maximize use of the laboratory facilities.	Ongoing	Provide an increase in WSCH as well as increase efficiency in laboratory room usage.	Increase in course offerings on a year over year basis.
1. Increase student success in chemistry 1A.	1-3 years	Current success rate in chemistry 1A is ≈ 70%. We believe this could be increased with a more effective screening/advising process in place.	By measuring success rates after implementation of a new screening process.
2. Have a trained safety coordinator on staff. (Sherman Lee)	1 yr	Provides a single resource for, safety and hazmat training for students, faculty and staff in chemistry.	By meeting all city, local, regional, sate and federal safety training regulations in a timely fashion.

3. Maintain laboratory equipment in good working order.	Ongoing	The lab component of each core course requires student instruction on specific equipment to maintain accreditation.	Maintaining an inventory of the necessary equipment in good working order on a quarterly basis.

Section 7: Program Resources and Support

Using the tables below, summarize your program's unfunded resource requests. Refer to the Operations Planning Committee website: http://foothill.edu/president/operations.php for current guiding principles, rubrics and resource allocation information.

Full Time Faculty and/or Staff Positions

Position	$ Amount	Related Goal from Table in section 5 and how this resource request supports this goal.	Was position previously approved in last 3 years? (y/n)
1. Fulltime Faculty	$65k + benefits	A. Expand Course Offerings. Any future expansion in chemistry will be on the backs of adjunct faculty. We do not have enough FT faculty to cover even 50% of our sections. Additional FT faculty are needed to meet demand and maintain consistency between the FT and PT instruction.	Yes

Unbudgeted Reassigned Time (calculate by % reassign time x salary/benefits of FT)

Has the program received college funding for reassign time in the last three years? (y/n) If yes, indicate percent of time.	
Has the program used division or department B-budget to fund reassign time? (y/n)	

Indicate duties covered by requested reassign time:

Responsibility	Estimated $	Related Goal from Table in section 6 and how this resource request supports this goal.	Est hours per month	% Time

One Time B Budget Augmentation

Description	$ Amount	Related Goal from Table in section 6 and how this resource request supports this goal.	Previously funded in last 3 years? (y/n)

Ongoing B Budget Augmentation

Description	$ Amount	Related Goal from Table in section 5 and how this resource request supports this goal.	Previously funded in last 3 years? (y/n)
Service Contracts for large Instrumentation: NMR, AES, IR, GC-MS, HPLC, etc.	$10-15k	3. Maintain laboratory equipment in good working order. Required to meet accreditation standards.	Yes
Lab Consumables – Chemicals, breakables and minor equipment restocking.	$12k	A. Increase student enrollment to maximize use of the laboratory facilities.	Yes

Facilities and Equipment

Facilities/Equipment Description	$ Amount	Related Goal from Table in section 5 and how this resource request supports this goal.	Previously funded in last 3 years? (y/n)
Organic chemistry equipment – Colbrick detectors, microscale kits, evaporators, pumps and polarimeters.	$14.25k	Required to perform the necessary laboratory experiments to insure transfer status to the CSU/UC schools.	No
Laptop Computers in 4 Labs = 24 units + Networked Printer	$30k	Needed for data analysis and processing.	No
Local wireless LAN in the 4800 building to network our instruments and especially the student's hand-held LabQuest work stations.	$5k	Needed for data analysis and processing.	No

Section 8: Program Review Summary

Address the concerns or recommendations that were made in prior program review cycles, including any feedback from Dean/VP, Program Review Committee, etc.

Recommendation	Comments
1. Hire new FT faculty.	Accomplished this year, however, over 50% of our students will still be taught by part-time faculty. The oversight required by the full-time faculty to train and ensure standards are meet is overwhelming. New lab curriculum, instrumentation and technology have made this much more time intensive then in the past. We will have increased or FT faculty count by only two in the past 7 years, not nearly enough to keep up with the growth of the program. I would recommend that dedicated, willing part-time faculty assume some of these responsibilities if stipend money is available. A more involved part-time faculty will raise the level of instruction for everyone.
2. Hire a new lab coordinator.	This was accomplished and has provided much needed help for Anna in the stockroom. In addition, Sherman, the new hire, will have an expanded role in coordinating the night program, equipment maintenance and departmental safety. This will relieve the FT faculty from some of their oversight responsibilities and free them to focus on instructional improvements and course curriculum.
3 & 4.Expansion and new courses.	This was accomplished for CHEM 20 by Mary Holland and is also being done by Victor Tam while on sabbatical. In general, new course development either requires adequate release time or sabbatical leave. Both in short supply. New courses that are just GE serviceable have very small enrollments – an area of concern considering the amount of effort required to provide them.
5. B-budget augmentation	Some monies for equipment maintenance have been provided. It is unclear if present funding will be adequate.
6. Professional Development	No movement in this area. Faculty have little time to coordinate professional development opportunities
7. PSME Center	The coordination between the PSME center and the faculty may best served through the part-time faculty. The part-time faculty can provide workshops and extra tutoring hours using NCBS load. This is a win-win since many part-time faculty use the NCBS load to reach their yearly 30 hour instructional limit.

a. After reviewing the data, what would you like to highlight about your program?

The chemistry program at Foothill College offers students an exceptional experience in undergraduate chemistry instruction. The lab facilities and support staff are the best in the bay area, complementing our instructional pedagogy perfectly. We have room for expansion, administrative support for new technologies, and a superior full-time staff that strives to put the students first.

Section 9: Feedback and Follow Up

This section is for the Dean to provide feedback.

This section is for the Dean/Director to provide feedback.

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

The Chemistry Program has a consistent student success rate of 71% and a two year growth rate of 13.2%. Some reasons are:

1. The faculty are very collegial within the department and outside.
2. Many of the PT Faculty are seasoned faculty and provide adequate level of instruction and testing. The FT provide the PT faculty example syllabus and directions on lab procedures. This includes in many cases afully populated website they can start from. Each FT has responsibility for a class/lab in the sequence.
3. Have acquired new technology to be compatible or better than the 4 year UG programs.
4. The faculty support the new Chemistry workshops in the PSME Center.
5. They actively meet with four year colleges such as Stanford and SJSU. Also shared FH's Chem Labs with De Anza to implement.
6. The faculty update their course and lab materials on a regular basis.
7. The labs have had exemplary hazmat reports (Mona Voss). Faculty share in the weekly checking and verification.
8. FT Chemistry Faculty are the leads for the NSF S-STEM grant. They are also lead in PSME Student Mentor program.

a. Areas of concern, if any

1. The student population is changing to less prepared level of student. This refers both the domestic and International students. This will require more support from the PSME Center to fill the gaps.
2. There is a decrease in the number of freshman registered for Chem 1A in fall quarter. This has a longitudinal impact on the chemistry transfer sequence as well as Biology that require Chem 1A as a prerequisite.
3. The growth in Chemistry has required a number of new PT faculty to be hired. The number of PT Chemists is at a new low. Because our labs are more advanced than other CC, the PT need additional training. To fill the fall and winter quarter demand, many PT have reached their 67% and will not be able to teach in spring.
4. FT Faculty have little spare time for professional development.
5. FHDA has discontinued providing annual faculty Hazmat training and certification.

c. Recommendations for improvement:

1. Foothill needs outreach to local high schools to encourage STEM students to register at Foothill. If this does not occur, 2014Fall will have a lower enrollment in Chemistry courses.
2. Need to have additional FT support to recruit and train new PT Faculty.
3. Provide quarter incentive to identify meaningful PD for the chemists.
4. Need FT Chemist to take responsibility for annual Hazmat training and certification.
5. There may be an issue with if FHDA or PSME will need to pay for the PSEC DI Water System.

d. Recommended next steps:

_X_ Proceed as planned on program review schedule

___ Further review/Out of cycle in-depth review

Upon completion of section 9, the Program Review should be returned to department faculty and staff for review, then submitted to the Office of Instruction and Institutional Research for public posting. See timeline on Program Review Cover Sheet.

Unit Course Assessment Report - Four Column

Foothill College

Department - Chemistry (CHEM)

Mission Statement: The mission of the Chemistry Department is to provide undergraduate education founded on a rigorous, applied treatment of chemistry fundamentals coupled with application of modern analytical equipment and techniques to prepare students for transfer to a four-year university or allied-health program.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Chemistry (CHEM) - CHEM 12A - ORGANIC CHEMISTRY - Organic Molecule Structure - Predict the thermodynamic stability of Organic Compounds based on their structure (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** Rank the stability of six organic compounds. Assign equal credit for each successive pair of compounds (five relative comparisons for six compounds) **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 78% average class score		
	Assessment Method: Rank the stability of five different cationic intermediates. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Over 70% of the class can correctly rank at least four out of the five intermediates correctly.	01/11/2013 - For a class of 52 students, 39 (75%) were able to rank at least four of the five cationic intermediates correctly. For the 13 students that did not achieve this target, many failed to recognize the stabilizing effect of an adjacent oxygen. This is in line with the proportion of students that have difficulty with the concept of resonance. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	01/11/2013 - Since having a strong understanding in resonance is required to successfully answer this question, further emphasis will be placed on the movement of electrons and resonance hybrids at the beginning of the course. This topic is a common complaint of students annually.
Department - Chemistry (CHEM) - CHEM 12A - ORGANIC CHEMISTRY - Acidity - Utilizing theories that affect product stability, predict the relative acidity/reactivity of organic compounds with similar molecular structure and/or functional groups. (Created By Department - Chemistry (CHEM)) **Start Date:** 09/26/2011 **End Date:** 12/13/2011	**Assessment Method:** Embedded ranking question on final exam: For a series of five organic compounds, rank their relative acidity in decreasing order. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 50% of student perfectly rank all 5 compounds **Related Documents:**		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Course-Level SLO Status: Active	Fall 2011 - Chem 12A SLO 01		
Department - Chemistry (CHEM) - CHEM 12A - ORGANIC CHEMISTRY - Reactivity - Predict the products of reactions involving organic compounds (Created By Department - Chemistry (CHEM)) **Start Date:** 09/26/2011 **End Date:** 09/24/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Embedded question on Final exam: Ask students to rank the reactivity of several organic compounds with reference to a specific reaction (ie acid-base or Nucleophilic Substitution) Assign equal credit to each successive ranking comparison. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% overall score		
	Assessment Method: Embedded series of open-ended questions on final exam: A series of 7 complex organic reactions where students must predict the product, taking into account stereochemistry and other considerations. Each question is worth 5 points (total of 35 points), with simple mistakes (usually with stereochemistry) results in only 3 points being awarded. Evidence of no understanding of the reaction or mechanism resulted in 0 points being awarded. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 70% overall average (24.5 points out of 35 points). **Related Documents:** Fall 2011 - Chem 12A SLO 02	01/11/2013 - Out of a class of 52 students, an average score of 26.13 points (74.7%) was achieved with a standard deviation of 8.2. Considering the complexity of reactions examined, this result reflects an overall satisfactory understanding of reaction mechanisms, stereochemistry and reactivity **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	01/11/2013 - Additional exercises and worksheets with increasingly difficult reactions will be developed in order to assist students in exam preparation and better understanding of reaction mechanisms.
Department - Chemistry (CHEM) - CHEM 12B - ORGANIC CHEMISTRY - Stereochemical Reaction - Determine the stereochemical outcome of a chemical reaction based on its mechanism. (Created	**Assessment Method:** Imbedded multiple choice question on the final exam asking students to determine if an alkene results in a racemic mixture after being subjected to 5 different reagents.	04/22/2013 - Out of 47 students, 18 students correctly identified all 5 reactions, while 20 students identified 4 out of 5 reactions correctly. This is a success rate of 80.9%. Based on these findings, most students are comfortable and	04/22/2013 - Including stereochemistry in reaction prediction questions requires students to go beyond memorization and to focus on the mechanism and

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	Question; Which of the following reactions would result in a racemic mixture when combined with (E)-3-methylpent-2-ene? (Circle ALL that apply). a. catalytic hydrogenation (H2/Pd catalyst) b. epoxidation followed by acid hydrolysis (i. mCPBA; ii. H+, H2O) c. hydroboration (i. BH3, ii. 3 NaOH, 3 H2O2) d. ozonolysis (i. O3, ii. Zn, AcOH) e. dihydroxylation (i. OsO4, ii. NaHSO3, H2O) **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 80% of the class scores either a perfect or chooses 4 out of 5 reactions correctly.	proficient with how reagents can affect the stereochemical outcome of reactions. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	spatial arrangement of atoms and electrons. Testing (despite how the material is presented in the book) should conform to standards where memorization is limited.
Department - Chemistry (CHEM) - CHEM 12B - ORGANIC CHEMISTRY - Chemical Reaction Outcome - Effectively write an electronic mechanism accounting for the outcome of a chemical reaction. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** Embedded final exam question; open-ended where the student must provide a detailed, stepwise mechanism to account for the synthesis of BPA from acetone and two equivalents of phenol. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Due to the extreme difficulty of this question, the target for success will be if a student earns at least 50% of the available points (20 points).	04/22/2013 - The average score (out of 20 points) for 47 students was 11.83 (59.2%). Considering the difficult nature of the mechanism question, the target was met and demonstrates above average proficiency in mechanism writing. The median score was 14 points with at least 8 students scoring a perfect (17%). Most students provided answers that included basic mechanism writing skills but not enough to complete the question. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	04/22/2013 - To avoid encouraging memorization, these open-ended type questions are best at assessing true understanding of electron movement and reactivity. Going forward, more of these higher-order reactions should be included in testing and lecture discussions.
Department - Chemistry (CHEM) - CHEM 12B - ORGANIC CHEMISTRY - Themodynamics and Kinetics - Understand the role thermodynamics and kinetics plays in the outcome of a chemical reaction. (Created By Department - Chemistry (CHEM))	**Assessment Method:** Final exam question addressing Kinetic vs Thermodynamic control in 1,2 vs 1,4 addition to conjugated dienes **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	**Target for Success:** 80% of students correctly answer question		
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)) **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	08/07/2013 - (NOTE: For this year's assessment, the question was out of 26 possible points. A score of 18 points would be considered proficient since 4 points were deducted for each error). For a class of 47 students, the average was 20/26 (77%) with a standard deviation of 4.9 points. Ten students scored 100% on this question with 34 students scoring above 18 points. Most errors were minor with only one student scoring in single digits. These results suggest students are comfortable combining reactions from various chapters for use in synthesis questions. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	08/07/2013 - A new, more rigorous textbook is being adopted in Fall 2013 with more difficult synthesis questions than the current textbook. These additional problems will help students practice and hopefully solidify critical thinking skills required for this type of problem-solving.
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)) **Start Date:** 04/04/2011 **End Date:** 06/24/2011 **Course-Level SLO Status:** Active	**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 **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	08/07/2013 - With a class size of 47 students, the average score was 24.6/30 (82%) with a standard deviation of 5.7 points. Due to the complex level of questions and range of reactions used, students are relying heavily on electronic mechanisms in order to correctly predict the product. Many of the point deductions were due to minor mistakes. Over 36% of the class scored 100% on this assessment. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	08/07/2013 - Starting in Fall 2013, we will be adopting a new, more rigorous textbook that includes additional physical data tables in order to reinforce reaction trends and energetics. The new book will also have more difficult end-of-chapter problems. This switch will further discourage any memorization and helps students focus on the electronic mechanism, stereochemistry, bond energetics/equilibria.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Chemistry (CHEM) - CHEM 1A - GENERAL CHEMISTRY - Graphing and Data Analysis - A student who successfully masters the material in Chemistry 1A at Foothill College will be able to read and interpret graphs and data. (Created By Department - Chemistry (CHEM)) **Start Date:** 01/09/2012 **End Date:** 03/30/2012 **Course-Level SLO Status:** Active	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format.Three questions were assessed. Two questions involved differentiating between physical and chemical properties/changes using given experimental descriptions/data. One question required students to read and interpret an Enthalpy Diagram. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Average score of 80% with 90% participation.		
	Assessment Method: Two MasteringChemistry online HW questions were used to assess students' ability to interpret data. Question #1 had students reason about a set of experimental data to determine whether a physical or chemical change had taken place. Question #2 had students analyze a set of density data and reason about precision and accuracy of the datasets. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** A average score of 80% was targeted with a participation rate of 90%.	10/11/2013 - For question #1: 100% of students (N=67) were able to get the right answer using the number of attempts allotted. The average score was 97.4% For question #2: 100% of students (N=67) were able to get the right answer using the number of attempts allotted. The average score was 96.8% **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	10/11/2013 - This assessment was made using the online HW system very soon after the concepts were covered in class. It would be interesting to see how students retained these concepts over the course of the quarter by assessing the same concepts on the final exam. Then, the performance could be compared to assess retention of the ideas.
Department - Chemistry (CHEM) - CHEM 1A - GENERAL CHEMISTRY - Applying Scientific Method - A student who successfully masters the material in Chemistry 1A at Foothill College will apply the scientific method in lab experiences to interpret information and draw conclusions. (Created By Department - Chemistry (CHEM))	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format. Three questions were assessed. Two questions involved differentiating between physical and chemical properties/changes using given experimental descriptions/data. One question required students to determine the amount of liquid contained in two		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Start Date: 01/09/2012 **End Date:** 03/30/2012 **Course-Level SLO Status:** Active	different graduated cylinders to the correct precision of the device. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Average score of 80% with 90% participation.		
	Assessment Method: In one of the laboratory experiments in Chemistry 1A, the density of 7up and Diet 7up was investigated. Students were asked at the beginning of class to write down their hypothesis as to which had the greater density. During the end of the data analysis period on day 2, a class discussion was held to interpret results. Students were subsequently asked to write down on the report sheet how their resulting data matched with their initial hypothesis. **Assessment Method Type:** Discussion/Participation **Target for Success:** The quality of discussion was assessed to gauge student understanding. The written lab work was assessed to see if students successfully evaluated their hypothesis. A success rate of 90% was targeted for the written lab work.	10/11/2013 - Compared to past quarters when I taught this course, I found the quality of discussion to be much higher this quarter. Students were engaged in discussing their hypotheses. I took a class poll on their initial hypotheses and we explored in-depth the reasons why one type of soda might be more dense than another. Afterwards, students again seemed engaged and interested in the outcome. After discussing the results, students answered the lab question which had them reevaluate their initial hypothesis in writing. In past quarters, usually a handful of students incorrectly answered this (either from a lack of understanding or from careless mistakes). However, this quarter, all but 2 students (out of 58) evaluated their hypothesis correctly. Overall, students got an average of 90.0% on the lab. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	10/11/2013 - I would like to think of a way to more formally evaluate "discussion". I could perhaps develop some sort of rubric or set of guidelines on the types of things I am looking for in regards to class participation.
Department - Chemistry (CHEM) - CHEM 1A - GENERAL CHEMISTRY - Critical Thinking Skills - A student who successfully masters the material in Chemistry 1A at Foothill College will demonstrate the ability to think critically and employ critical thinking skills. (Created By Department - Chemistry (CHEM)) **Start Date:** 01/09/2012 **End Date:**	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format. Seven different questions were used. The questions chosen addressed a variety of critical thinking skills. Students were required to correctly record a measurement and access its precision, to complete a multistep dimensional analysis problem, to interpret and draw conclusions from diagrams, to interpret and draw conclusions		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
03/30/2012 **Course-Level SLO Status:** Active	from videos/animations and to correctly describe/interpret energy transfer. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Average score of 80% with 90% participation.		
	Assessment Method: Scores on written questions administered during in-class midterm and final exams were used to assess students' critical thinking skills. Questions were chosen that pushed students' analytical reasoning skills. Question #1 was from the second midterm and asked students to reason and calculate all species present in a final solution. This was a complex problem and involved reasoning skills in a limiting reagent problem. Students had to analyze each of four species, and keep track of quantity reacted and state of matter, performing concentration calculations. Question #2 was from the final exam and students applied their knowledge of thermochemistry to an applied context of a scientist designing a new product, a cold pack. Students had to reason with the experimental design limited by the supplied parameters. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** All students participated in the in-class exams. An average score of 80% was targeted for each item.	10/11/2013 - Question #1: 58 students completed the item. The average score was 75.4% Question #2: 58 students completed the item. The average score was 81.8% **Result:** Target Not Met **Year This Assessment Occurred:** 2012-2013	10/11/2013 - The thermochemistry problem (Ave=81.8%) was administered at the end of quarter, and I presume students had more time to synthesize concepts and practice with the calculations. It would be interesting next year to have this same assessment administered during midterm 2 and then again at the final exam to judge progress or growth. Question #1 (Ave=75.4%) was given during the middle of the quarter, and it was the first time students were assessed on these calculations. It is hypothesized that a similar item on the final exam would give a higher success rate.
Department - Chemistry (CHEM) - CHEM 1A - GENERAL CHEMISTRY - Quantitative/Critical Thinking Skills in General Chemistry - A student who successfully masters the material in Chemistry 1A at Foothill College will	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format. Seven different questions were used. The questions chosen addressed a variety of skills. The questions included a multistep		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
demonstrate the quantitative skills needed to succeed in General Chemistry. (Created By Department - Chemistry (CHEM)) **Start Date:** 01/09/2012 **End Date:** 03/30/2012 **Course-Level SLO Status:** Active	dimensional analysis problem, unit conversions between mass/molecules/moles, stoichiometric calculations, calculations involving energy and problems related to quantum chemistry. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Average score of 80% with 90% participation.		
	Assessment Method: Scores on written questions administered during in-class midterm and final exams were used to assess students' quantitative and critical thinking skills. These questions were complex and highly mathematical, integrating varied concepts from the course. Question #1 was from the third midterm and dealt with the Bohr model of the Hydrogen atom, electron energy levels, and ionization energy, all parts consisted of varied quantitative calculations. Question #2 was from the final exam and consisted of determining an empirical formula from given combustion data. This involved many conversions and multi-part calculations. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** All students participated in the in-class exams. An average score of 80% was targeted for each item.	10/11/2013 - Question #1: 58 students completed the item. The average score was 78.2% Question #2: 58 students completed the item. The average score was 90.0% **Result:** Target Not Met **Year This Assessment Occurred:** 2012-2013	10/11/2013 - The Empirical Formula question (Ave=90.0%) was administered at the end of quarter, and I presume students had more time to synthesize concepts and practice with the calculations. It would be interesting next year to have this same assessment administered during midterm 1 and then again at the final exam to judge progress or growth. Question #1 (Ave=78.2%) was given during the middle of the quarter, and it was the first time students were assessed on these calculations. It is hypothesized that a similar item on the final exam would give a higher success rate.
Department - Chemistry (CHEM) - CHEM 1B - GENERAL CHEMISTRY - Graphing and Data Analysis - Global: Read and interpret graphs and data. (Created By Department - Chemistry (CHEM)) **Start Date:** 01/09/2012	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Average score of 80% with 90% participation.		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Course-Level SLO Status: Active	**Assessment Method:** Online homework through Mastering General Chemistry, by Pearson. **Assessment Method Type:** Departmental Questions **Target for Success:** Succes would be B-, 78% percentage score. This reflects the ability of an average 1B student.	10/11/2013 - We used a data base of 27 online questions with a participation of 74%. The average score for the 27 questions was 85%. This is much better than previous years, since we have made an effort to select those questions that are more closely aligned with our course content. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 1B - GENERAL CHEMISTRY - Quantitative Skills in General Chemistry - Global: Demonstrate the quantitative skills needed to succeed in General Chemistry. (Created By Department - Chemistry (CHEM)) **Start Date:** 01/09/2012	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Average score of 80% with 90% participation.		
Course-Level SLO Status: Active	**Assessment Method:** Online homework through Mastering General Chemistry, by Pearson. **Assessment Method Type:** Departmental Questions **Target for Success:** Succes would be B-, 78% percentage score. This reflects the ability of an average 1B student.	10/11/2013 - The results are based on 110 multiple choice questions covering multiple chapters. On average, the results were 89% correct with 78% participation. These questions are targeted at the concepts and skills necessary to progress to the next topic/chapter in chemistry. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 1B - GENERAL CHEMISTRY - Critical Thinking Skills - Global: Demonstrate the ability to think critically and employ critical thinking skills. (Created By Department - Chemistry (CHEM)) **Start Date:** 01/09/2012	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** Average score of 80% with 90% participation.		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Course-Level SLO Status: Active	**Assessment Method:** Online homework through Mastering General Chemistry, by Pearson. **Assessment Method Type:** Departmental Questions **Target for Success:** Succes would be B-, 78% percentage score. This reflects the ability of an average 1B student.	10/11/2013 - The results are based on 72 multiple choice questions covering multiple chapters. On average, the results were 79% correct with 67% participation. These questions give a good overview of students ability to process and utilize multiple skills learned throughout the course. The 79% could be a little higher but this SLO is probably the hardest for students, and one we make every effort to reinforce during the quarter. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 1C - GENERAL CHEMISTRY & QUALITATIVE ANALYSIS - Electrochemistry - Computation - A successful student will demonstrate the ability to think critically and employ computational skills in the analysis of redox reactions and chemistry. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** Online course homework. **Assessment Method Type:** Departmental Questions **Target for Success:** An average of 75% for the class.		
	Assessment Method: Chemistry 1C Final Exam - Multiple Choice Question. The standard emf for the cell using the overall cell reaction below is +2.20 V: 2Al(s)+3I2(s) ?> 2Al3+(aq)+6I-(aq) The emf generated by the cell when [Al3+] = 4.5 ! 10-3 M and [I-] = 0.15 M is ? V. A) 2.23 B) 2.39 C) 2.20 D) 2.10 E) 2.30 **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** This is a difficult problem. A 70% success rate would be terrific!		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Chemistry (CHEM) - CHEM 1C - GENERAL CHEMISTRY & QUALITATIVE ANALYSIS - Solubility of Salts - Critical Thinking - A successful student will demonstrate the ability to make connections between concepts across several areas of General Chemistry as applied to salt solutions. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** Online course homework. **Assessment Method Type:** Departmental Questions **Target for Success:** An average of 75% for the class.		
	Assessment Method: Chemistry 1C Final Exam - Multiple Choice Question. The Ksp for Zn(OH)2 is 5.0x10-17. Determine the molar solubility of this salt in a buffer solution with a pH of 11.50. A) 5.0x10-12 B) 5.0x10-17 C) 2.3x10?6 D) 1.6x10-14 E) 1.2x10-13 **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** An average of 70% correct for the class.		
Department - Chemistry (CHEM) - CHEM 1C - GENERAL CHEMISTRY & QUALITATIVE ANALYSIS - Nuclear Chemistry - A successful student will demonstrate an understanding of the impact of science on society in the area of nuclear chemsitry. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** Online homework. **Assessment Method Type:** Departmental Questions **Target for Success:** An average of 75% for the class.		
Department - Chemistry (CHEM) - CHEM 1C - GENERAL CHEMISTRY & QUALITATIVE ANALYSIS - Colligative Properties - Critical Thinking - A successful student must be able to recognize the types of salts presented as strong or non-electrolytes. Secondly, perform the required critical thinking/mathematical analysis of the experimental data to select the one salt that satisfies the conditions	**Assessment Method:** Chemistry 1C Final Exam - Multiple Choice Question. A 1.35 m aqueous solution of compound X had a boiling point of 101.4°C. Which one of the following could be compound X? The boiling point elevation constant for water is 0.52°C/m. A) C6H12O6		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
given. (Created By Department - Chemistry (CHEM)) **Start Date:** 06/26/2012 **Course-Level SLO Status:** Active	B) CH3CH2OH C) KCl D) CaCl2 E) Na3PO4 **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** 75% correct would be considered acceptable given the difficulty of the problem.		
Department - Chemistry (CHEM) - CHEM 1C - GENERAL CHEMISTRY & QUALITATIVE ANALYSIS - Laboratory Techniques - Students will demonstrate an understanding of how to execute common laboratory techniques. (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** End of Quarter **Course-Level SLO Status:** Active	**Assessment Method:** Students were asked the following question on an open lab notebook lab exam: You need to prepare 100 ±1 mL of a buffer that is 0.15 M acetic acid and 0.40 M sodium acetate. The reagents that you have available are 1.00-M HCl, and solid sodium acetate trihydrate. Write step by step instructions on how to prepare the buffer using appropriate lab equipment. (Note that students calculated the reagent amounts in a previous part of the question. Incorrectly calculated amounts of reagents did not impact grading of this part of the question.) **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** This question was assessed out of 4 points. Individual students were considered successful if they earned at least 3 out of the 4 points, or 75%. Target for success was 80% of the class earning a minimum of 3 out of the 4 points possible.	10/11/2013 - The overall findings were that 70% of the students scored a grade of 3 out of 4 points on the question. The most common mistake was choosing incorrect glassware for preparing the solution. The correct choice, given the precision indicated by the question, was a 100 mL graduated cylinder. A number of students choose to use a beaker, an inaccurate and imprecise device. This error resulted in a 2 point deduction. Other students choose to use a 100 mL volumetric flask, a device with much greater precision, and requiring more effort to use, than required. This resulted in a 1 point deduction. **Result:** Target Not Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** None **GE/IL-SLO Reflection:** The results indicate that, although students spend a good deal of time in Chemistry 1B and 1C in preparing laboratory notebooks (summarizing procedures, recording data, etc.) a rather large proportion of the students do not acquire the knowledge and judgement needed to determine the correct volumetric equipment needed to prepare a solution of known concentration from a set of given reagents.	10/11/2013 - To prepare for laboratory activities, students in Chemistry 1B and 1C are required to write a summary of each procedure in their notebook. The students are provided detailed procedures, written by faculty, to refer to as they prepare their notebook. The procedures provided include specifics about what equipment to use. The "Action Plan" recommended is that specifics about what equipment to use be slowly eliminated from experimental procedures provided as student progress through their studies in Chemistry 1B and into 1C. Thus, as students gain more experience, they will be required to think about the correct choice of equipment, such as glassware, when preparing their notebook. Doing so will encourage the students to be more independent and will help them develop a deeper, more complete understanding of proper lab techniques.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
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)) **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.		
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)) **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.		
Department - Chemistry (CHEM) - CHEM 25 - FUNDAMENTALS OF CHEMISTRY - Mole and Avogadro's Number - The students will understand the meaning and uses of the mole and of Avogadro's number. (Created By Department - Chemistry (CHEM)) **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.	06/22/2013 - A multi-part exercise (Conversions involving moles) designed to assess the student's understanding of the concept of the law of conservation of mass and the mole to mass conversions necessary to use this law was selected for the assessment. The correct response rate for Foothill Chem 25 students was 96% for this exercise, compared with 90% for the Mastering Chemistry database. This suggests most students have a solid understanding of this concept and are able to perform the simple unit conversions necessary to complete the exercise. **Result:** Target Met	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
		Year This Assessment Occurred: 2012-2013 **GE/IL-SLO Reflection:** These are core concepts (Avogadro's number and the meaning and uses of the concept of moles) in chemistry and high performance on this exercise is critical for continued student success in chemistry courses. This assignment was competed near the middle of the term and indicated the students had successfully integrated these concepts.	
Department - Chemistry (CHEM) - CHEM 25 - FUNDAMENTALS OF CHEMISTRY - Comprehension of chemical reactivity and quantitative relationships in chemical equations - Students will be able to recognize basic patterns of chemical reactivity, express reactions in terms of balanced equations and be able to determine quantities of reactants and products in terms of moles, mass and volumes of solutions. (Created By Department - Chemistry (CHEM)) **Start Date:** 01/09/2012 **End Date:** 03/30/2012 **Course-Level SLO Status:** Active	**Assessment Method:** Performance on relevant homework exercises completed using Mastering Chemistry (online homework site) was assessed for all or selected sections of Chem 25 for the relevant term. Foothill performance was also compared to system data available for students that answered the specific problem from all institutions using the Mastering Chemistry system. **Assessment Method Type:** Departmental Questions **Target for Success:** At least 80% of students who completed the questions should be able tocomplete the selected exercises correctly. Foothill performance should be at least as good as the system data.	06/22/2013 - Students were required to complete two multi-part exercises on solubility and precipitation reactions (“PHET Simulation” and “Solubility and Precipitation Reactions”. The exercises included writing and balancing the relevant chemical equations, as well as predicting whether the solubility of the products would result in a precipitate as one of the products. The questions was answered correctly by 81 and 89% of the Foothill students compared with 79 and 88% correct response rates in the system database, indicating the target for success was met. The higher success on the second exercise is likely due to repetition of the concept within the homework assignment, since it one of the last problems in the homework assignment. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 30A - SURVEY OF INORGANIC & ORGANIC CHEMISTRY - Measurements and Equipment - Students will be able to use common laboratory equipment correctly and	**Assessment Method:** The following problem for SLO#2 is used in the online homework grading system (Mastering Chemistry) for students enrolled in Chemistry 30A. These homework	06/18/2013 - Data from the online homework for Chemistry 30A section 04 was used to assess this SLO. 96.8% of the 32 students enrolled in the course were able to correctly answer this homework problem in the online homework	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
report measurements to the correct significant figures with proper units. Equipment includes Bunsen burners, beakers, graduated cylinders, thermometers, top loading balances, rulers and burets. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	assignments are used as a pretest in preparation for course exams. Problem #90 from Chapter 1: Which choice best describes the uncertainty in the measurement 16.30 g? A. cannot be determined B. quantity is exact C. +/- 0.01 g D. +/- 0.10 g E. +/- 1.00 g **Assessment Method Type:** Pre/Post Test **Target for Success:** Students who are able to correctly answer this question have mastered SLO #2. Overall success is indicated by a minimum of 70% of students successfully completing this problem.	assignment. This shows that the target was met for this SLO. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 30A - SURVEY OF INORGANIC & ORGANIC CHEMISTRY - Matter Classification - Students will be able to classify matter correctly. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** The following problem for SLO#1 is used in the online homework grading system (Mastering Chemistry) for all students enrolled in Chemistry 30A. These homework assignments are used in preparation for course examinations (pretest). Prelab #2, Classifying Matter: Classify the following as an element, compound or mixture: Vitamin D, salt water, oxygen, maple syrup, fruit salad, water, gold **Assessment Method Type:** Pre/Post Test **Target for Success:** Students who are able to correctly classify the substances given in this problem have mastered SLO #1. Overall success is indicated by a minimum of 70% of students successfully completing this problem.	06/18/2013 - 78.1% of the 32 students enrolled in Chemistry 30A section 04 got this problem correct in the online homework. The most common error was that students sorted one out of the six choices incorrectly, which indicates that the majority of students to miss this problem still had a good understanding of how to classify matter correctly. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
Department - Chemistry (CHEM) - CHEM 30A - SURVEY OF INORGANIC & ORGANIC CHEMISTRY - Chemical Equations and Formulas - Students will be able to represent chemical changes correctly through balanced chemical equations with proper formulas for elements and compounds. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** The following problem for SLO#3 is used in the online homework grading system (Mastering Chemistry) for students in all sections of Chemistry 30A. Mastering Chemistry homework problems are used in preparation for course examinations (pretesting). Chapter 5, Problem #7: Which is the correct equation for the reaction of magnesium with hydrochloric acid to produce hydrogen and magnesium chloride? A. 2 Mg + 6 HCl → 3 H2 + 2 MgCl2 B. Mg + HCl ->H + MgCl C. Mg + 3 HCl ->3 H + MgCl2 D. Mg + 2 HCl -> 2 H + MgCl2 E. Mg + 2 HCl -> H2 + MgCl2 *Note: formatting for subscripts and arrows did not copy over to TracDat **Assessment Method Type:** Pre/Post Test **Target for Success:** Students who are able to successfully answer this problem have mastered SLO #3. Overall success is indicated by a minimum of 70% of students successfully completing this problem.	06/18/2013 - 100% of the 32 students enrolled in Chemistry 30A section 04 in spring 2013 got this problem right on the online homework practice. This indicates that students are learning how to write chemical formulas and chemical equations correctly. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 30B - SURVEY OF ORGANIC & BIOCHEMISTRY - Organic Compounds - Students will be able to name simple organic compounds and recognize and name functional groups in an organic compound. By recognizing a functional group, students will be able to determine general reactivity and write reactions to show that reactivity. (Created By Department - Chemistry	**Assessment Method:** The following question will be used in all Chem 30B courses as part of the assigned chapter homework in preparation for course examinations: Chapter 12, Problem #39: The name of the hydrocarbon with three carbon atoms and having only single bonds between carbon atoms is A. decane.	06/18/2013 - For the 24 students enrolled in Chemistry 30B at the start of spring 2013, the average score for this problem was 91.7%. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
(CHEM)) **Course-Level SLO Status:** Active	B. ethane. C. propane. D. butane. E. methane. **Assessment Method Type:** Pre/Post Test **Target for Success:** Average student score 70% or higher.		
Department - Chemistry (CHEM) - CHEM 30B - SURVEY OF ORGANIC & BIOCHEMISTRY - Bio-molecules - Students will be able to describe the general structure of carbohydrates, fatty acids, amino acids and proteins, nucleotides and nucleic acids. Students will know the roles of these bio-molecules in the body. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** All students will be assigned the following problem in homework in preparation for course exams. Chapter 25, Problem #22: The backbone of a nucleic acid molecule consists of A. alternating sugar and nitrogen base groups linked by amide bonds. B. alternating sugar and phosphate groups linked by phosphate ester bonds. C. complementary bases joined by hydrogen bonds. D. sugar molecules bonded from the #3 carbon of one molecule to the #5 carbon of the other by glycosidic linkages. E. alternating nitrogen bases and phosphate groups linked by amide bonds and strengthened by hydrogen bonds. **Assessment Method Type:** Pre/Post Test **Target for Success:** A student average of 70% or higher for this problem.	06/18/2013 - The average score for this problem was 85.3% for all Chemistry 30B students in section 1 for spring 2013. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 30B - SURVEY OF ORGANIC & BIOCHEMISTRY - DNA - Students will be able to describe DNA replication, transcription and translation. (Created By Department - Chemistry	**Assessment Method:** All students will be assigned the following homework problem in preparation for course exam: Chapter 25, Problem #45: The process in which information from DNA	06/18/2013 - In spring of 2013, section 1 had an average score of 93.6% for this problem. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
(CHEM)) **Course-Level SLO Status:** Active	is used to manufacture RNA is called A. replication. B. mutation. C. translocation. D. translation. E. transcription. **Assessment Method Type:** Pre/Post Test **Target for Success:** Average student score of 70% or higher.		
Department - Chemistry (CHEM) - CHEM 30B - SURVEY OF ORGANIC & BIOCHEMISTRY - Common Metabolic Processes - Students will understand the chemistry of common metabolic processes. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** All students will be assigned the following homework problem in preparation for course exam: Chapter 20, Problem #22: The common molecule produced from all foods at the second stage of catabolism is A. ADP. B. glucose. C. acetyl-SCoA. D. carbon dioxide. E. citric acid. **Assessment Method Type:** Pre/Post Test **Target for Success:** 70% or higher student average	06/18/2013 - In spring 2013, section 1 averaged 98.7% on this problem. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013	
Department - Chemistry (CHEM) - CHEM 70 - STUDY SKILLS & PROBLEM SOLVING STRATEGIES FOR CHEM 1A - Student Success - Students will master specific problem solving skills needed to succeed in Chemistry 1B and 1C. (Created By Department - Chemistry (CHEM)) **Assessment Cycles:** End of Academic Year **Start Date:** 09/20/2013 **End Date:**	**Assessment Method:** Students who completed Chemistry 70 during the WInter 2011, Spring 2011, Fall 2011, WInter 2012 and Fall 2012 quarter were asked to complete a survey. One of the questions asked was: Please choose the highest level of Chemistry you have successfully completed. Choices included Chemistry 1A, Chemistry 1B, Chemistry 1C **Assessment Method Type:** Survey	10/11/2013 - About one third of the total student population responded to the survey. Of those responding 100% indicated that they were successful in passing Chemistry 1A, 78% indicated that they were successful in 1B and 61% indicated that they were successful in 1C. **Result:** Target Met **Year This Assessment Occurred:** 2012-2013 **Resource Request:** Support to offer the material used in	10/11/2013 - Providing the materials used to a larger portion of the student population is recommended.

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
10/04/2013 **Course-Level SLO Status:** Active	**Target for Success:** A target of 75% for 1A and 56% for 1B. This was based upon a success rate of 75% in each course. Chemistry 1C is difficult to set a target for since a portion of students do not need Chemistry beyond 1B.	Chemistry 70 at the PSME Center on a more flexible schedule in order to provide the materials to a larger student population. The materials used would be best presented by a faculty member.	
Department - Chemistry (CHEM) - CHEM 70 - STUDY SKILLS & PROBLEM SOLVING STRATEGIES FOR CHEM 1A - Study Strategies for College Level Science - The student will develop and apply effective study strategies and skills for the study of college level science. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** Study strategies and skills discussed and applied in Chemistry 70 are designed to increase the success rate, defined as a grade of C or better, of students in college level science courses. To access the effectiveness of the Chemistry 70 curriculum, success rates in Chemistry 1A for the class at large were compared with success rates for students who were also concurrently enrolled in Chemistry 70. **Assessment Method Type:** Data **Target for Success:** A Chemistry 1A success rate for students enrolled in Chemistry 70 that exceeds the success rate of those not enrolled in Chemistry 70.		
Department - Chemistry (CHEM) - CHEM 70 - STUDY SKILLS & PROBLEM SOLVING STRATEGIES FOR CHEM 1A - Problem Solving Skills for Chemistry 1A - The student will demonstrate competency in quantitative problem solving skills related to Chemistry 1A. (Created By Department - Chemistry (CHEM)) **Course-Level SLO Status:** Active	**Assessment Method:** All questions were assessed online through Mastering General Chemistry in Quiz format. Average scores for each question were compared for the Chemistry 1A students at large and for for students who were also concurrently enrolled in Chemistry 70. The following questions were assessed. The questions included unit conversions and stoichiometric calculations. 1) A sample of the male sex hormone testosterone, C19H28O2, contains 3.68×10^21 atoms of hydrogen. a. How		

Course-Level SLOs	Means of Assessment & Targets for Success / Tasks	Assessment Findings/Reflections	Action Plan & Follow-Up
	atoms of carbon does it contain? b. How many molecules of testosterone does it contain? c. How many moles of testosterone does it contain? d. What is the mass of this sample in grams? 2) The complete combustion of octane, a component of gasoline, proceeds as follows: (Reaction given) a. How many moles of are needed to burn 1.35 mole octaneof ? b. How many grams of oxygen are needed to burn 12.0 g of octane? c. Octane has a density of 0.692 g/mL at 20°C. How many grams of oxygen are required to burn 19.0 gallons of octane? 3) Tartaric acid, has two acidic hydrogens. The acid is often present in wines and precipitates from solution as the wine ages. A solution containing an unknown concentration of the acid is titrated with. It requires 22.65 mL of 0.1500 M solution to titrate both acidic protons in 60.00 of the tartaric acid solution. Calculate the molarity of the tartaric acid solution. **Assessment Method Type:** Exam - Course Test/Quiz **Target for Success:** A higher average score for those students enrolled in Chemistry 70 compared to the Chemistry 1A students at large.		