NORCO COLLEGE
ANNUAL INSTRUCTIONAL PROGRAM REVIEW

Discipline/Unit: Chemistry

(If applicable) **Program or Certificate Chemistry**

Please give the full title of the discipline or department. You may submit as a discipline or department as is easiest for your unit

Contact Person: Dr. Stanley C. Tyler

Due: April 20, 2016

Please send an electronic copy in a word document to:
programreview@norcocollege.edu

Form Last Revised: March 2016

Norco College

Web Resources: http://www.rccd.edu/administration/educationalservices/ieffectiveness/Pages/ProgramReview.aspx

Annual Instructional Program Review Update
Instructions

***Please retain this information for your discipline's/department's use (or forward to your chair).**

The Annual Self-Study is conducted by each unit on each college and consists of an analysis of changes within the unit as well as significant new resource needs for staff, resources, facilities, and equipment. It should be **submitted by April 20** or the first working day following the 20th in anticipation of budget planning for the fiscal year, which begins July 1 of the *following* calendar year.

For Program Review data, please go to the following link:
http://www.norcocollege.edu/about/president/strategic-planning/programreview/Pages/index.aspx

The questions on the subsequent pages are intended to assist you in planning for your unit.

The forms that follow are separated into pages for ease of distribution to relevant subcommittees. **Please keep the pages separated** if possible (though part of the same electronic file), **with the headers as they appear**, and be sure to include your unit, contact person (this may change from topic to topic) and date on each page submitted. Don't let formatting concerns slow you down. If you have difficulty with formatting, Nicole C. Ramirez can adjust the document for you. Simply add responses to those questions that apply and forward the document to nicole.ramirez@norcocollege.edu with a request to format it appropriately.

If you cannot identify in which category your requests belong or if you have complex-funding requests please schedule an appointment with your college's Vice President for Business Services right away. They will assist you with estimating the cost of your requests. For simple requests such as the cost of a staff member, please e-mail your Vice President. It is vital to include cost estimates in your request forms. Each college uses its own prioritization system. Inquiries regarding that process should be directed to your Vice President.

Norco:	**VP Business Services**	**951-372-7157**

Mission

Norco College serves our students, our community, and its workforce by providing educational opportunities, celebrating diversity, and promoting collaboration. We encourage an inclusive, innovative approach to learning and the creative application of emerging technologies. We provide foundational skills and pathways to transfer, career and technical education, certificates and degrees.

Vision

Norco – creating opportunities to transform our students and community for the dynamic challenges of tomorrow.

Strategic Plan: Goals and Objectives 2013-2018

Goal 1: Increase Student Achievement and Success

Objectives:

1. Improve transfer preparedness (completes 60 transferable units with a 2.0 GPA or higher).
2. Improve transfer rate by 10% over 5 years.
3. Increase the percentage of basic skills students who complete the basic skills pipeline by supporting the development of alternatives to traditional basic skills curriculum.
4. Improve persistence rates by 5% over 5 years (fall-spring; fall-fall).
5. Increase completion rate of degrees and certificates over 6 years.
6. Increase success and retention rates.
7. Increase percentage of students who complete 15 units, 30 units, 60 units.
8. Increase the percentage of students who begin addressing basic skills needs in their first year.
9. Decrease the success gap of students in online courses as compared to face-to-face instruction.
10. Increase course completion, certificate and degree completion, and transfer rates of underrepresented students.

Goal 2: Improve the Quality of Student Life

Objectives:
1. Increase student engagement (faculty and student interaction, active learning, student effort, support for learners).
2. Increase frequency of student participation in co-curricular activities.
3. Increase student satisfaction and importance ratings for student support services.
4. Increase the percentage of students who consider the college environment to be inclusive.
5. Decrease the percentage of students who experience unfair treatment based on diversity-related characteristics.
6. Increase current students' awareness about college resources dedicated to student success.

Goal 3: Increase Student Access

Objectives:
1. Increase percentage of students who declare an educational goal.
2. Increase percentage of new students who develop an educational plan.
3. Increase percentage of continuing students who develop an educational plan.
4. Ensure the distribution of our student population is reflective of the communities we serve.
5. Reduce scheduling conflicts that negatively impact student completion of degrees and programs.

Goal 4: Create Effective Community Partnerships

Objectives:
1. Increase the number of students who participate in summer bridge programs or boot camps.
2. Increase the number of industry partners who participate in industry advisory council activities.
3. Increase the number of dollars available through scholarships for Norco College students.
4. Increase institutional awareness of partnerships, internships, and job opportunities established with business and industry.
5. Continue the success of Kennedy Partnership (percent of students 2.5 GPA+, number of students in co-curricular activities, number of students who are able to access courses; number of college units taken).
6. Increase community partnerships.
7. Increase institutional awareness of community partnerships.
8. Increase external funding sources which support college programs and initiatives.

Goal 5: Strengthen Student Learning

Objectives:
1. 100% of units (disciplines, Student Support Service areas, administrative units) will conduct systematic program reviews.
2. Increase the percentage of student learning and service area outcomes assessments that utilize authentic methods.
3. Increase the percentage of programs that conduct program level outcomes assessment that closes the loop.
4. Increase assessment of student learning in online courses to ensure that it is consistent with student learning in face-to-face courses.
5. Increase the number of faculty development workshops focusing on pedagogy each academic year.

Goal 6: Demonstrate Effective Planning Processes

Objectives:
1. Increase the use of data to enhance effective enrollment management strategies.
2. Systematically assess the effectiveness of strategic planning committees and councils.
3. Ensure that resource allocation is tied to planning.
4. Institutionalize the current Technology Plan.
5. Revise the Facilities Master Plan.

Goal 7: Strengthen Our Commitment To Our Employees

Objectives:
1. Provide professional development activities for all employees.
2. Increase the percentage of employees who consider the college environment to be inclusive.
3. Decrease the percentage of employees who experience unfair treatment based on diversity-related characteristics.
4. Increase participation in events and celebrations related to inclusiveness.
5. Implement programs that support the safety, health, and wellness of our college community.

I. Norco College Annual Instructional Program Review Update

Unit: _____Chemistry_____
Contact Person: _____Dr. Stanley C. Tyler_____
Date: _____April 15, 2016_____

Trends and Relevant Data

1. **How does your unit support the mission of the College?**

2. **Have there been any changes in the status of your unit? (if not, please indicate with an "N/A")**

   a. Has your unit shifted departments?
      No.

   b. Have any new certificates or complete programs been created by your unit?
      Not this year.

   c. Have activities in other units impacted your unit? For example, a new Multi Media Grant could cause greater demand for Art courses.
      Not this year.

3. **List and discuss your retention and success rates as well as your efficiency. Please be aware that the data have been disaggregated for your analysis. Please list online, hybrid and face-to-face-data separately.**

	Success Rate (%)	Retention Rate (%)	Average Efficiency*
2011-2012	64.5	81.6	657.18
2012-2013	59.9	78.1	625.62
2013-2014	68.9	85.0	543.10
2014-2015	69.6	85.4	561.46

What are the changes or significant trends in the data, including differences among gender, age and ethnicity? To what do you attribute these changes?

- Regarding the dip in success rate and retention rate for 2012-2013 from the previous academic year: In Spring 2012 we offered only the Introductory Chemistry Course Chem 2A because of the Secondary Effects taking place from our Measure C funds. We moved our chemistry lab to the JFK Middle College School at the far end of our Norco College Parking lot and cut class size for only two full Chem 2A sections down to 56 students in each section. We offered no General Chemistry courses. This cut back in providing classes for our students while the upstairs of Humanities Building was reconfigured into a new Organic Chemistry/General Chemistry Lab (Chem 12A/B and Chem 1A/B) and a refurbished Introductory Chemistry lab (Chem 2A) probably had the effect of slowing a trend in growth or status quo in preceding years as measured by previous upward trends in retention, efficiency, and success. Fall 2013 we were back to our normal course offerings but it will take a full academic year after this one to see if our success rate is back to previous levels.
- Regarding Improved Retention and Success Rates in 2013-2014 and virtually identical numbers in 2014-2015 compared to 2013-2014: The improvements we are seeing probably are due to two factors. First, the inclusion of STEM Supplemental Instruction, which started in Spring 2014 for the chemistry 2A courses, has had a positive influence on the chemistry 2A courses. My colleagues have expressed similarly good experiences that seem to result from the Stem Supplemental Instruction.
- It is important to note that class sized for Chem 1B and particularly Chem 12A (first semester Organic Chemistry) which we began offering in Spring 2014 can vary quite a bit and are not always filled at the course capacity level for students even at the start of a given semester. So for some comparisons, the sample size from semester to semester changes drastically and can affect the statistical trends. For example, in four consecutive semesters staring in Spring 2014, Chem 12A has had class size at start of semester vary from 15 to 12 to 20 to 19, while the number finishing with a grade has correspondingly varied from 12 to 8 to 15 to 18.
- The Efficiency rates are generally strong. These rates as is true for success and retention rates, are driven by the Introductory Chem 2A courses we offer. Nearly every semester we have 192 students enrolled in Chem 2A whereas only 64 are enrolled in Chem 1A, anywhere from 25 to 32 enrolled in Chem 1B, and only 15 to 20 enrolled in Chem 12A. The chemistry sequence from 2A to 1A to 1B to 12A gets tougher with each succeeding course. It should be noted also that as with any sample group measured without a corresponding control group that varies from year to year (i.e., not the exact same students from year to year) some changes in retention, success, and efficiency will be due to changes in level of preparedness, overall aptitude, and determination for a given incoming group as compared to another.
- The following bullet points are comments regarding success rates based on ethnicity, age, and gender. These are prefaced here by noting that the data breakdown for the next three bullets in available on the Norco College website but is not presented here as a spreadsheet or table.
- The trends in overall success rate for chemistry by ethnicity are remarkably similar for groups based on ethnicity over the 2010-11 through 2014-15 time span. It is noted that "asian" and "white" have the highest success by about 10% more than "Hispanic/latino" or "two or more races" while the latter two groups average about 5% higher success rate than "black/African American" over the time span from 2010-11 to 2014-15. It is possible that the latter three groups overall are disadvantaged historically with respect to education in some way compared to "asian" and "white", such as having a lower income or less cultural emphasis on higher education by circumstances beyond their control but that is something that requires more study to say with certainty and is beyond the scope of data I have been given to work with.
- Age does not appear to factor into our student success rate in chemistry much at all.
- With respect to gender, our "non respondent" students seem to be doing somewhat better in the two most recent academic years that their counterparts that actually identify themselves as either "male" or "female". I do not know what to make of this.
- All Chemistry courses are face-to-face; the chemistry discipline has no distance education component or hybrid component.

4. List the resources that you received in the last year as a result of program review. How did the resources impact student learning? If you requested resources and did not receive them, how did it impact your unit?

Under equipment in program review last year we requested $5922 for replacement and repair equipment to keep existing introductory and general chemistry laboratory courses running both safely and with a proper set of equipment for students. The biggest single item on the list detailed in Appendix B in program review as 2015 equipment requested was a corrosive cabinet for the chemical prep room (i.e. a cabinet to safely store corrosive chemicals). This was budgeted at $2599. We were able to purchase it thus making a big difference in the chemicals we could choose to use for experiments to provide the best lab learning experience for our students. Several other items fall under the description of replacement of broken glassware. These replacements allowed our students enough proper equipment to perform the laboratory experiments we choose to optimize our program with respect to student learning and transfer of our students' chemistry courses to other colleges.

Under equipment in program review last year we requested a budget increase to a total of $20341 for all chemistry courses offered as laboratory courses. Much of this budget increase was eventually obtained as a result of program review last year as well as many meetings with administration and staff. It was a one-time budget increase that was essential to allow us to offer nearly double the number of lab courses we were offering a few years ago. Even more important, it was a new accounting of dollars needed if we were ever to have a proper set of chemicals, materials, and supplies (all consumables) that allow us to offer organic chemistry at Norco College. A single section of organic chemistry lab for a semester costs 4 to 5 times that of a general chemistry semester depending on the experiments chosen and cannot be compromised to "cheaper" lab experiments without lessening the quality of the organic chemistry program we offer our students.

Under equipment in program review last year we requested $4528 for a "third set of equipment needed to finish stocking the individual general chemistry lockers". This was essential as it allowed us to begin offering Chem 12B (2nd semester organic chemistry) in spring 2016. Various sources of funding were provided to allow us to purchase glassware and other student lab locker items.

We also requested $2250 for an Annual site license for Wavefunction, Inc.'s chemical modeling software program called SPARTAN. This is used each semester during several Chem 12A (1st semester organic chemistry) lab sessions and has proved to be an important instructional tool. We expect to develop chemical modeling laboratory experiments for Chem 12B in the near future which will future increase the value of having SPARTAN software as site license each year.

It will be very important to make a significant permanent increase in the chemistry budget to continue to support the organic chemistry program as well as the increasing number of total chemistry laboratory course offerings we provide students each semester (including winter and spring semesters). We expect some economy of scale to kick in to help mitigate costs of increasing number of sections by purchasing storable chemicals in bulk as well as careful conservation of consumables.

5. What annual goals does your unit have for 2016-2017 (please list the most important first)? Please indicate if a goal is directly linked to goals in your comprehensive. How do your goals support the college mission and the goals of the Strategic Plan/Educational Master Plan?

List the goals of your unit for 2016-2017	Define activity(s) linked to the goal	Briefly explain the relationship of goal to mission and Strategic Plan/Educational Master Plan (see above)	Indicate if goal is limited to Distance Education
Obtain an increase in our chemistry supplies budget so that we may plan fiscally as well as pedagogically for our growing chemistry program.	Demonstrate to the administration the cost of offering these extra courses (added general chemistry and added organic chemistry courses) via itemized costs for equipment and supplies.	**Goal 6: Demonstrate Effective Planning Processes** **Ensure that resource allocation is tied to planning**.	Not part of a Distance Education plan.
Become approved for Chemistry ADT	**Apply for the Chemistry ADT** We began this process in Spring 2015 by planning for Chem 12B (2nd semester organic chemistry) and outlining its lecture/lab/exam schedule as well as a syllabus. This course completes the curriculum we need to have a chemistry ADT at Norco College. We began offering Chem 12B this Spring 2016 semester. We filled out the paperwork for the ADT in Chemistry ADT that is now in the pipeline for approval.	**Goal 1**: Increase student achievement and success by improving transfer preparedness. **Mission**: We provide foundational skills and pathways to transfer, career and technical education, certificates and degrees.	Not part of a Distance Education plan.
Introduce at least one of three new courses at Norco that are already in the course catalog for RCCD.	We plan to develop and offer Chemistry 3 (Intermediate General Chemistry with lecture and lab sections by Spring 2017).	**See Goal 1 and Mission statement listed directly above.**	Not part of a Distance Education plan.

**Your unit may need assistance to reach its goals. Financial resources should be listed on the subsequent forms. In addition you may need help from other units or Administrators. Please list that on the appropriate form below, or on the form for "other needs."*

Norco College Annual Instructional Program Review Update

Unit: _____Chemistry_____
Contact Person: _____Dr. Stanley C. Tyler_____
Date: _____April 15, 2016_____

Current Human Resource Status

6. Complete the Faculty and Staff Employment Grid below. Please list full and part time faculty numbers in separate rows. Please list classified staff who are full and part time separately:

Faculty Employed in the Unit		
Teaching Assignment (e.g. Math, English)	Full-time faculty or staff (give number)	Part-time faculty or staff (give number)
Chemistry Courses – One full-time instructor taught 2 double sections of Chem 2A (introductory chemistry) and two sections of Chem 12A (organic chemistry); the other taught 2 single sections of Chem 2A and a section each of Chem 1A and Chem 1B; part time instructors each taught either a double section of Chem 2A or a single section of Chem 1A or Chem 1B	2 full-time tenured instructors	5
For Spring 2016 we had a full-time temporary one semester instructor. That person taught a section of Chem 12B (organic chemistry) and a double section of Chem 2A.	1 full-time temporary un-tenured instructor for one semester	
We also had one of our Spring 2016 courses, Chem 10 (non-science, non-allied health majors) with no lab and a single large section, taught by a visiting full-time tenured professor from Riverside Community College, a sister college in RCCD. This is unlikely to happen again because of the logistics and teaching loads involved for full-time instructors at RCC.		

Classified Staff Employed in the Unit		
Laboratory Technician – There is one full-time Lab Technician who is primarily dedicated to chemistry lab preparation and ordering of equipment, materials, and supplies. He also oversees equipment repair and replacement and supervises a junior chemistry lab technician. Furthermore, he has responsibility for all night-time labs in biology and physics. A second full-time lab technician was hired last year as a chemistry stockroom technician. Her responsibilities are primarily lab set-up and chemical lab prep for all the introductory chemistry lab sections whether day or night labs. Two other lab techs in biology and physics occasionally help set-up introductory and general chemistry as needed by timing constraints. However, both chemistry lab techs also assist in bio and physics lab set-ups as needed in return.	**Full-time staff (give number)** 2	**Part-time staff (give number)** Chemistry had a work-study student work as a chemistry stockroom assistant for 2014-2015 for the full academic year. This year, 2015-16, a second student worked during spring semester. Each of these students averaged about 10 hours/wk. Both students are leaving Norco College for 2016-17 academic year. We hope to replace them for 2016-2017 with at least one new part-time work-study student. Funding for these students is paid for by Student Serviees rather than through our Math-Science budget.

Unit Name: _____*Chemistry*_____

7. Staff Needs

NEW OR REPLACEMENT STAFF (Administrator, Faculty or Classified)[1]

List Staff Positions Needed for Academic Year_____ **Please justify and explain each faculty request as they pertain to the goals listed in item #3.** Place titles on list in order (rank) or importance. Please state if the request impacts Distance Education.	**Indicate (N) = New or (R) = Replacement**	**Number of years requested**	**Annual TCP***
1. Full-time tenure track chemistry instructor. Justification: Chemistry full-time faculty member. A tenure track full-time chemistry professor position to keep up with the expanded program of instruction. Ideally this professor would be able to teach any of our chemistry courses with equal proficiency and be capable of helping develop new chemistry courses at Norco (which are already course-listed in the RCCD catalog but have not been taught at Norco College yet. These include Chem 2B (introductory organic chemistry for allied health majors with lecture and lab sections); Chem 3 (intermediate general chemistry with lecture and lab sections); and Honors Chem 1A and 1B (general chemistry with lecture and lab including project based or service learning type lab sections). Our immediate target for a new course to offer is Chem 3. Any one of the courses described in this paragraph would help increase our student success and retention as well as efficiency. Either Chem 2B or Chem 3 would be of particular value for the following reasons. Chem 2B is currently offered at RCC. By offering it at Norco we would retain many of our students who have taken Chem 2A from us, thereby increasing retention. Students taking Chem 3 from us would be better prepared to take our Chem 1A and Chem 1B courses, thereby increasing our student success and efficiency.	**N**	**1**	**$ 123,881+ $4,000 for office.**

* TCP = "Total Cost of Position" for one year is the cost of an average salary plus benefits for an individual. New positions (not replacement positions) also require space and equipment. Please speak with your college Business Officer to obtain accurate cost estimates. Please be sure to add related office space, equipment and other needs for new positions to the appropriate form and mention the link to the position. Please complete this form for "New" Classified Staff only. All replacement staff must be filled per Article I, Section C of the California School Employees Association (CSEA) contract.
Requests for staff and administrators will be sent to the Business and Facilities Planning Council. Requests for faculty will be sent to the Academic Planning Council.

[1] If your SLO assessment results make clear that particular resources are needed to more effectively serve students please be sure to note that in the "reason" section of this form.

Unit Name: _____*Chemistry*_____

8. Equipment (including technology) Not Covered by Current Budget[2]

List Equipment or Equipment Repair Needed for Academic Year_____ Please list/summarize the needs of your unit on your college below. Please be as specific and as brief as possible. Place items on list in order (rank) or importance. Please state if the request impacts Distance Education.	*Indicate whether Equipment is for (I) = Instructional or (N) = Non-Instructional purposes		Annual TCO*			
		Number of years requested	Cost per item	Number Requested	Total Cost of Request	EMP GOALS
1. Chemical resistant countertop for Intro Chemistry Lab in HUM 204, 72 feet by 32 inches, $400/5 ft., total materials cost $6000.00 does not include installation (labor and shipping); est. $2000.00 for 20 man-hours labor at $100.00/hour Justification: Chemicals are necessarily set out each week as common use items for multiple students along outside perimeter countertops in lab; some lab work is also done on these countertops, yet they are not acid, fire, or chemical resistant as currently constituted;	**Instructional**	**1**	**$8000**	**1**	**$8000.00**	**Goal 1 Obj. 1 and 6; Goal 7 Obj. 5**
2. Melting Point instrument, Bibby Scientific, sold through VWR, catalog #470003-816, for use in Organic Chemistry 12A and 12B Justification: Taking melting points of products at end of a long organic chemistry synthesis experiment is essential for identification of product. This procedure is often the bottle-neck step in finishing a lab for our students and can prolong time spent in lab past the session end time while waiting for availability. We currently have 7 melting point instruments for a lab capped at 18 students. It would be ideal to add a minimum of 2 instruments per year until we get a 1 for every students. Several o-chem programs that we know of (e.g. Mt. Sac, RCC) have 1 instrument per student.	**Instructional**	**2**	**$1165**	**10**	**$11650**	**Goal 1 Obj. 1 and 6**
3. Analytical Balance, Organic Chemistry Lab HUM 208, Mettler Toledo Model # TLE104E, VWR catalog # 10031-596 Justification: All balances available to our students in HUM 208 were	**Instructional**	**1**	**$2604**	**1**	**$2604.00**	**Goal 1 Obj. 1 and 6**

[2] If your SLO assessment results make clear that particular resources are needed to more effectively serve students please be sure to note that in the "reason" section of this form.

bought for General Chemistry labs, which require only 3 decimal digit precision. Our microscale Organic Chemistry lab experiments often require a 4th digit of precision. We request one balance to be shared among all students doing our microscale org. chem. labs.						
4. Chemical Resistant Analytical Balances for Chemical Stock and Preparation rooms in HUM 202 & HUM 209, Mettler Toledo, model # MS104TS, VWR catalog #10753-566 Justification: Current balances, in both rooms HUM 202 and HUM 209, are corroded from constant use. These are heavy duty workhorse instruments used every day to prepare all chem lab experiments for each section and level of laboratory chemistry courses that we offer. They are corroded and less accurate and precise because of that and need to be replaced.	**Non-Instructional**	**1**	**$4910**	**3**	**$14730**	**Goal 1 Obj. 1 and 6**
5. Annual site license for Wavefunction, Inc. chemical modeling software program called SPARTAN Student Model. This is being listed as technology because it is neither a consumable material or supply good nor capital equipment. Justification: We currently have a one-year site license for this program. It is a valuable addition to laboratory organic chemistry and contrasts chemical modeling (calculations of energy states, stability, physical traits, reactivity, etc.) for virtually any compound as opposed to more traditional chem lab experiment that are performed to learn about handing equipment, chemicals, understand basic reactions and syntheses while working with real chemicals. By having some lab sessions be about chemical modeling, the cost of chemicals can be held down some with no loss in the students' learning opportunities.	**Instructional**	**3**	**$2250**	**1**	**$2250.00**	**Goal 1 Obj. 1 and 6**
6. Self-Close Adapter Kit, Steel, for Chemical Stockroom Corrosive Cabinet. Justification: We are required by OSHA to retrofit our current cabinets to comply with updated OSHA standards. During 2015-2016 we failed to pass the Corona Fire Marshall Test for safety because our corrosive cabinet did not have self-closing doors.	**Non-Instructional**	**2**	**$800.00**	**2**	**$800.00**	**Goal 7. Obj. 5** Chemistry stockroom employees deserve a safe work environment.

7. Annual replacement glassware cost for Organic Chemistry lab sections of Chem 12A and Chem 12B (one section of each during both Fall and Spring semesters). Increase annual supply budget to include consumable glassware materials breakage or used up (e.g. disposable Pasteur Pipets, capillary tubes for melting point apparatus, etc.) Justification: Our organic chemistry budget is sufficient to provide for replenishment of materials and supplies, with the vast majority of it applied to consumable chemical purchases. However have no budget for glassware breakage and replacement in individual student lockers or common shared stockroom glassware items brought out for student use during specific experiments is included. This is a necessary budget line for teaching labs with inexperienced students learning to work with specialized glassware for the first time. Much of the funds requested here would go toward replacing unique items in each student's microscale glassware kits in their assigned lab drawers as these parts get broken.	**Non-Instructional**	**3**	**$3000.00**	**1**	**$3000.00**	**Goal 1 Obj. 1 and 6**
8. 3-in-1 Canon Color Inkjet printer with printing, scanning, and copying ability for each Full-time Professor of Chemistry in the Chemistry Discipline **Justification:** Professor Tyler's Lexmark inkjet printer is no longer supported by the company Lexmark. It is becoming nearly impossible and will soon be impossible to obtain replacement ink cartridges. Furthermore, Tyler, like many professors, scans many textbook figures, handwritten answer keys, handwritten notes, and the like to make copies for distribution to students. Each of the full-time chemistry faculty at Norco will need a new printer with scanning capability at the start of Fall 2016 semester.	**Non-Instructional**	**1**	**$100.00**	**3**	**$300.00**	**Goal 1 Obj. 1 and 6**

*** Instructional Equipment is defined as equipment purchased for instructional activities involving presentation and/or hands-on experience to enhance student learning and skills development (i.e. desk for student or faculty use).**
Non-Instructional Equipment is defined as tangible district property of a more or less permanent nature that cannot be easily lost, stolen or destroyed; but which replaces, modernizes, or expands an existing instructional program. Furniture and computer software, which is an integral and necessary component for the use of other specific instructional equipment, may be included (i.e. desk for office staff).
**** These requests are sent to the Business and Facilities Planning Council.**

Unit Name: _____*Chemistry*_____

9. Professional or Organizational Development Needs Not Covered by Current Budget*[3]

List Professional Development Needs for Academic Year_____. Reasons might include in response to assessment findings or the need to update skills to comply with state, federal, professional organization requirements or the need to update skills/competencies. Please be as specific and as brief as possible. Some items may not have a cost per se, but reflect the need to spend current staff time differently. Place items on list in order (rank) or importance. Examples include local college workshops, state/national conferences. Please state if the request impacts Distance Education.	**Annual TCO***			
	Cost per item	**Number Requested**	**Total Cost of Request**	**EMP Goals**
1. Request that full-time professors receive support to attend a professional development workshop or conference on green chemistry. Justification: Green chemistry is a rapidly advancing field of chemistry that applies to both organic and inorganic (the general chemistry) curriculum as well as commercial, private, and government workplaces. The training is vital because it will enable the faculty to deliver the environmentally responsible values that are now being adopted nationwide: that less toxic chemicals and smaller quantities of chemicals, can be used effectively in college-level instruction (and in industrial processes). The adoption of this philosophy will reduce waste products and costs and contribute to a healthier environment in the classroom and the workplace. Currently, only a small fraction of textbooks have adopted this philosophy. Short courses are available to a limited number of attendees each year at places such as the University of Oregon under the sponsorship of NSF. ACS sponsored courses are offered at various venues throughout the year. Attendance at one of these conferences would quickly pay dividends (financially as well as environmentally) to our chemistry program.	**(N) $1500 Per person**	**3 people**	**$4500.00**	**Goal 1 Obj. 1 and 6**

*It is recommended that you speak with the Faculty Development Coordinator to see if your request can be met with current budget.
** These requests are sent to the Professional Development Committee for review.

[3] If your SLO assessment results make clear that particular resources are needed to more effectively serve students please be sure to note that in the "reason" section of this form.

Unit Name: _____*Chemistry*_____

10. Student Support Services, Library, and Learning Resource Center (see definition below*) Services needed by your unit over and above what is currently provided by student services at your college. Requests for Books, Periodicals, DVDs, and Databases must include specific titles/authors/ISBNs when applicable. Do not include textbook requests. These needs will be communicated to Student Services at your college[4]

List Student Support Services Needs for Academic Year_____ Please list/summarize the needs of your unit on your college below. Please be as specific and as brief as possible. Not all needs will have a cost, but may require a reallocation of current staff time. Please state if the request impacts Distance Education.	**EMP GOALS**
1. No student support services needed for chemistry discipline at this time. Justification:	
2. Justification:	
3. Justification:	
4. Justification:	
5. Justification:	
6. Justification:	

*Student Support Services include for example: tutoring, counseling, international students, EOPS, job placement, admissions and records, student assessment (placement), health services, student activities, college safety and police, food services, student financial aid, and matriculation.

** These requests are sent to the Student Services Planning Council and the Library Advisory Committee.

[4] If your SLO assessment results make clear that particular resources are needed to more effectively serve students please be sure to note that in the "reason" section of this form.

Unit Name: _____*Chemistry*_____

11. OTHER NEEDS AND LONG TERM SAFETY CONCERNS not covered by current budget[5]
** For immediate hazards, contact your supervisor **

List Other Needs that do not fit elsewhere. Please be as specific and as brief as possible. Not all needs will have a cost, but may require a reallocation of current staff time. Place items on list in order (rank) or importance.	**Annual TCO***			
	Cost per item	**Number Requested**	**Total Cost of Request**	**EMP Goals**
1. Justification:				
2. Justification:				
3. Justification:				
4. New, annual "regular supply" cost. Increase annual supply budget. **Filters: PreSystem PAK** **PROGARD TL1 CL2 W/O** **PE TANK MILLIPAK FILTER** Justification: These filtration packs are necessary for the proper functionality of the distilled water system recently purchased. The filters are supposed to be changed twice per year. Without properly filtered DI/RO water, many chemistry experiments in all chemistry courses (except CHE-10, course without a lab component) would not work.	**409.75** **455.50** **175.25**	**3** **3** **3**	**$3171.50**	**Goal 1 Obj. 1 and 6**

[5] If your SLO assessment results make clear that particular resources are needed to more effectively serve students please be sure to note that in the "reason" section of this form.

5. New, annual "regular supply" cost. Increase annual supply budget. **UltraHighPurity (UHP) Nitrogen Gas tank (280 cu. ft.)** **UltraHighPurity Hydrogen Gas tank (ca. 280 cu. ft.)** Justification: The chemistry instrument room in HUM 208 has a new SRI Instruments Gas chromatograph. It will be used in a wide variety of General Chemistry lab experiments, particularly with respect to water quality themed experiments. It requires UHP nitrogen as a carrier gas for sample injection and as a counting gas for an Electron Capture Detector. It requires UHP hydrogen as a flame gas for a Flame Ionization Detector.	**$268** **$307**	**1** **1**	**$575.00**	**Goal 1 Obj. 1 and 6**
6. New, annual "regular supply" cost: GC WIPE test – increase annual supply budget. Justification: Comply with federal regulations. New equipment has been purchased and this equipment requires annual maintenance. Two radioactivity tests are required per year, for the new Gas Chromatograph, as one of the detectors is a sealed radioactive source. The GC cost $19,184; proper maintenance costs $108.	**$54**	**2**	**$108.00**	**Goal 1 Obj. 1 and 6; and Goal 7 Obj. 5**

These requests are sent to the Business and Facilities Planning Council, but are not ranked. They are further reviewed as funding becomes available.

Rubric for Annual Instructional Program Review - Part I only

Discipline: Contact Person:

Reviewer: Average Score:

Area of Assessment	0 No attempt	1 some attempt	2 good attempt	3 outstanding attempt
1. Retention, success, and efficiency rates have been identified and reflected upon.	No attempt to list retention, success, or efficiency data	Limited attempt to identify or discuss identified data	Clear attempt to identify and discuss identified data	Substantial attempt to identify and discuss/interpret identified data
2. Previous recourse requests stated and impact discussed.	No resource requests discussed	Limited discussion of resource requests or limited attempt to link to student learning.	Resources discussed and clear attempt to identify student impact	Resources discussed and substantial attempt to identify student impact OR No resources were requested.
3. There are annual goals for refining and improving program practices.	No annual goals stated	Limited/generic statement made regarding goal(s), lacks clarity or details	Clear statement made regarding goal(s), includes details	Well-defined statement made regarding goal(s), includes details, reasoning
4. Activities identified that support annual goals; connections made between goals/activities and Retention, Success, Enrollment, and Efficiency data.	No attempt made to identify activities	Limited/generic statement about activities; very limited attempt to connect to data from question 2 (where logical)	Clearly stated activities that support the goal(s); clear connection made to data from question 2 (where logical)	Well-defined activities that logically support the goal(s); definitive connections made to data from question 2 (where logical)
5. The annual goals are linked to the Mission and Educational Master Plan (EMP) of NC.	No link between the annual goals and the Mission or EMP	Limited attempt to link goals to Mission and EMP	Clear attempt to link goals to Mission and EMP	Well defined connection made between goals and Mission and EMP
6. Resource requests have reasons identified and completed data fields, including estimated dollar amount.	No reasons identified and incomplete data fields; or reasons identified, but incomplete or empty data field	Limited/generic/basic reasons provided, data fields completed	Clear requests for resources, all data fields fully completed	Well defined reasons for resources, all data fields fully completed
7. Linkages made between EMP/Strategic Plan Goals (SPG) with reasons for resource requests.	No linkage made between resource requests and EMP/SPG	Limited/generic/basic connection made between resource requests and EMP/SPG	Clear connection made between resource requests and EMP/SPG	Strong connection made between resource requests and EMP/SPG
Column scores				

Additional comments:

II. Norco College - Annual Assessment Update
USE ASSESSMENT DATA FROM fall 2014-spr 15

Purpose –An annual review provides an opportunity for reflection on all that has been accomplished and learned from your efforts in assessment. The annual review is a time to take stock of which courses and programs have undergone some scrutiny, and subsequently should help with planning for the upcoming years. Things we might learn in one cycle of assessment might actually help us to plan assessments in the next cycle, or might facilitate changes in other courses that weren't even included in the initial assessment. To this end, please complete the following with as much detail as possible. If you have any questions, please contact either Sarah Burnett at sarah.burnett@norcocollege.edu, or Greg Aycock at greg.aycock@norcocollege.edu, or talk to your NAC representative.

1. Identify where you are in the cycle of SLO assessment for each course you assessed in ***fall 2014 - spring 2015***. Each response will be individualized; this means each completed column might look a little different. You may have a course in which you are implementing improvements to close the loop on an initial assessment that was completed in a different year. You might also have a course that only has an initial assessment and you haven't yet completed any follow-up or improvement activities. (Add rows to the chart as needed.)

Course number	SLO **Initial Assessments** Indicate which specific SLOs were assessed in the identified course	Semester assessed	Entered into TracDat fields Yes or No	SLOs with **Changes Made** to course Identify which SLOs for had Changes Made identified, & simple reasoning	Plan for completing identified **Changes** Identify semester & basic plan of action	SLOs not needing Changes (assumed loop-closed) Provide clear reasoning as to why loop closed	SLOs involved in **Loop-Closing** assessment Indicate semester initial assessment was started and semester when loop was closed. Provide rationale for why you consider the assessment loop is closed
Chem 12A	SLO1, SLO2, SLO3, SLO4, SLO5	Spr14, Fall14, Spr15	No as of yet	A detailed in-class worksheet of FTIR spectra immediately following the FTIR lecture was added to class beginning Fall14 to implement student learning of SLO5. A	**See Appendix A for a complete version of the assessments of all five SLOs for Chem 12A for Spr14, Fall14, and Spr15.**	Limited data at hand (limited because of small class size each semester as well as constantly shifting student population and no control group) indicates some slight improvement in assessment-type test	Class size for students finishing semester with a grade varied from 12 to 8, to 15 for the three assessed semester Spr14, Fall14, Spr15. Small class sizes of changing cohorts with no control group makes it

				worksheet with in-class problems to be solved was added to lecture beginning Fall14 to enhance student learning of SLO2.		questions for SLO2 and SLO5 answered by students in successive semesters.	difficult to attribute much statistical significance to small variations in student scores on any given SLO.

2. a) How many Program Level Outcome **initial** assessments were you involved in **fall 2014 - spring 2015**? Indicate a total number per column. Name the AOE, ADT, GE and/or Certificate program.

   To provide you with supportive information for this section, the following GE and AOE assessments were conducted in 2014-15:
   Initial assessment for GE PLO Information Competency and Technology Literacy
   Closing Loop for GE PLO Self Development and Global Awareness
   A Closing the Loop Assessment for AOE in Humanity, Philosophy and The Arts
   A Closing the Loop Assessment for AOE in Social and Behavioral Sciences

AOE (Area of Emphasis)	ADT (Associate for Transfer)	GE (General Education)	Certificate
1 for Chem 12A	None available for Chemistry	Not applicable for Chem 12	Not applicable for Chem 12

   b) How many Program Level Outcome **loop-closing** assessments were you involved in **fall 2014 - spring 2015**? Indicate a total number per column. Name the AOE, ADT, GE and/or Certificate program.

AOE (Area of Emphasis)	ADT (Associate for Transfer)	GE (General Education)	Certificate
1 for Chem 12A			

3. Please describe any **Changes** you made in a course or a program in response to an assessment. Reflect on the impact you determine the changes may have had on student learning, student engagement, and/or your teaching. (Add rows as needed)

Course	**Changes Made** **Please click on "Choose an item & select from the drop down menu – content can be modified to suit your needs. Type in "other" approach taken**	**Impact of changes on student learning, engagement,** **and/or teaching**
Chem 12A	A detailed in-class worksheet of FTIR spectra immediately following the FTIR lecture was added to class beginning Fall14 to implement student learning of SLO5. SLO5 is "Analyze infrared and nuclear magnetic resonance to determine structures of organic molecules.	Slight changes to test scores on questions regarding FTIR spectra was seen in succeeding semesters. In aggregating mid-term and final exam scores on FITR-type questions each semester, scores varied from 78.4% in Spr14, to 83.1% in Fall14, to 80.5% in Spr15. Latter two scores occurred after introduction of FTIR worksheet in class indicating slight improvement over first semester of the three. Changes in data are probably not significant due to small sample size. (I did not run significance test to check on this.)
Chem 12A	Choose an item. A worksheet with in-class problems to be solved was added to lecture beginning Fall14 to enhance student learning of SLO2. SLO 2 is "apply the reactions, methods of preparation, and nomenclature for each of the families of reactions studied.	An in-class worksheet on "reactions and methods of preparation" was introduced after Spr14 semester. It replaced a quiz on the same subject matter. The worksheet represents the first two parts of SLO2, i.e. detailed reaction mechanisms and methods of preparation. Again, aggregating the mid-term and final exam scores on tests for each semester led to the following trends in scores: For SLO 2 (detailed reaction mechanism) Spring 2014 – 73.2%. Fall 2014 – 67.4%, Spring – 65.5% For SLO 2 (methods of preparation) Spring 2014 – 65.0%, Fall 2014 – 66.8%, Spring –2015 71.3%. For the first SLO 2 the trend was slightly downward with time while for the second the trend was slightly upward.

4. Identify any assessments that indicate a modification should be made to the Course Outlines of Record (COR), the Student Learning Outcomes (SLO), or Program Level Outcomes. State the modification.

Identify COR, SLO or PLO to modify	State Suggested Modification	Reasoning
Nothing identified at the time to suggest a change in COR, SLO, or PLO for Chem 12A.		

5. Have you shared your assessments, outcomes, improvements etc. with your discipline? How? If not, how do you plan to do so in the future? (For a more complete answer, please include any meeting dates, agenda, and/or minutes, emails between faculty members, conversations captured in college, department, or discipline meetings – include these data as an Appendix at the end of this document)

   As of Spr16 semester, I am the only Norco College chemistry discipline instructor to teach Chem 12A and the only one with any interest in developing the organic chemistry program on our campus. Following this spring our other full-time chemistry instructor will be leaving. I think we have been offering a high quality first semester organic chemistry lecture and lab from the beginning. This Spr15 we also had a full-time temporary instructor of chemistry who taught Chem 12B for the first time on our campus. He used my suggested outline for lecture and text schedule and my suggested second semester organic chemistry lab experiments schedule. I have tested nearly all of the labs to be done by students in Chem 12B myself and look forward to continuing the success of our organic chemistry program.

   Unfortunately, I have received very little feedback on how the inaugural semester of Chem 12B went from the full-time temporary instructor. He is not returning in the fall semester and I do not expect to get any help from him regarding assessing the Chem 12B part of our program before he leaves. However, I will be teaching Chem 12B in the fall, breaking in a new instructor to teach Chem 1A in the fall, and continuing to develop our relatively new program in organic chemistry. Altogether we will have two new full-time tenure-track faculty in the chemistry discipline. It is expected that these instructors will take part in future Organic Chemistry program progress.

6. Did any of your assessments indicate that your discipline or program would benefit from specific resources in order to support student learning, and/or faculty development? If so, please explain.

Resources State the resources identified to support student learning and/or faculty development	**Assessment** Name the assessment(s) that indicated resources are needed Identify course, SLO & semester	**Reasoning** Briefly explain what you learned in the assessment that indicates the resource might be beneficial
Each year I have requested a Chemical Modeling Program called SPARTAN Student Model. The first four semesters Chem 12A was offered (i.e. Spr14 through Fall 15) my students did hands-on computer modeling of organic reactions using this program. It is a nice change of pace from doing hands-on wet lab chemistry each week and is an essential part of a modern organic chemistry program. However, this Spr16, a renewal site license for this software was not completed in time for the semester. I think we need to make sure this is a regular part of our chemistry budget and that it gets renewed on time with a 1-year site license each academic year.	SLO 2 and SLO 5 would benefit greatly from continued use of SPARTAN Student Model by Wavefunction, Inc. (Irvine, CA). SPARTAN lets students do computer chemical modeling (calculations of energy states, stability, physical traits, reactivity, etc.) for virtually any compound as opposed to more traditional chemistry lab experiment that are performed to learn about handing equipment, chemicals, understand basic reactions and syntheses while working with real chemicals.	Assessments of SLO2 and SLO5, as well as SLO1 (which is not detailed in this part of program review but appears in Appendix A). SLO1 is "identify the factors affecting the structure, physical properties, and chemical reactivity of the aliphatic hydrocarbons".

7. What additional support, training, etc. do you need in the coming year regarding assessment?

We should report our assessment solely either in TRACDAT or in Program Review but not both. We should not have to work with two different formats to report assessment data. TRACDAT training, assuming it is the reporting format of choice, should continue to be offered several times a semester. Most professors are getting their full load toward salary through teaching assignments and do not have the time, especially during the semester, to report assessment data, and especially lack time to keep up with changes (whether subtle, nuanced, or blatantly different than before) with reporting formats. Even if we routinely assess our courses, and come up with new and different methods to increase student learning in our classes, the majority of us only think about assessment reporting once a year, necessitating learning all the finer points of fitting our data into the program review or TRACDAT for a few days rather than continuous thinking about assessment reporting year round.

Appendix A – Student Learning Outcome for Chem 12A – Organic Chemistry I – prepared by Stanley Tyler

Chem 12A was taught at Norco College for the first time during Spring 2014 semester. Before that, it had not been taught at Norco although it is a course in the curriculum of Riverside Community College District and had previously been taught at Riverside Community College and Moreno Valley College. In subsequent semesters, Chemistry 12A was offered again in Fall 2014, and is currently being offered in Spring 2015. Enrollment for Spring 2014 was 18 students with 12 finishing the course for a grade, followed by enrollments of 12 with 8 finishing for a grade in Fall 2014, and 20 enrolled for Spring 2015 in the semester not yet completed as of this writing.

The course outline of record for Chem 12A includes the following course description:

A discussion of aliphatic hydrocarbons that focuses on their structure, reactivity, methods of synthesis, physical properties, and reaction mechanisms. Laboratory work emphasizes techniques used to identify, separate, and purify substances. 54 hours lecture and 108 hours laboratory. (Letter Grade, or Pass/No Pass option.)

To summarize the course, this is a course providing fundamental information on the structure and reactivity of the compounds of carbon for pre-professional programs and science majors. It is a required course for nearly every chemistry, biology, biochemistry and chemical engineering degree offered at 4-year colleges and universities and is also taken by a large percentage of science majors in other fields such as physics and other engineering disciplines.

At Norco College, Chemistry 12A and 12B, first semester and second semester Organic Chemistry, will both be required for the Associate Transfer Degree in Chemistry along with Chem 1A and 1B (General Chemistry).

The student learning outcomes are listed as follows for Chem 12A.

1. Identify the factors affecting the structure, physical properties, and chemical reactivity of the aliphatic hydrocarbons.

2. Apply the reactions, methods of preparation and nomenclature for each of the families of reactions studied.

3. Perform basic laboratory operations used to measure physical properties, purify organic substances, and separate mixtures.

4. Setup and carry out a synthetic operation through the final purification.

5. Analyze infrared and nuclear (proton) magnetic resonance to determine structures of organic molecules.

SLO Methodology Used Each Semester

Chemistry 12A has three midterms and a final exam. The final exam was a cumulative examine building on all that was learned in the first 15 weeks of regular instruction. Each midterm covered material from the most recent chapters studied up to that point in the course. Even so, each midterm depended on retaining prior knowledge gained from preceding chemistry learned. In a sense, all chemistry exams are cumulative. The lecture portion of the class including its exams is being used to assess student learning for SLOs 1, 2, and 5.

Chemistry 12A also has two lab sessions each week. The individual lab reports based on each completed experiment are being used to assess student learning for SLOs 3, and 4.

For lecture SLOs assessed by lecture/exam, I tracked the student scores of several individual test questions comprising a category of the SLOs listed in the course outline of record. Each type of question tracked was asked on more than one exam, including the final exam, to see how well students were remembering or learning to apply the information, rules, nomenclature, etc. None of the questions were asked verbatim on more than one exam during the semester but a similar question of the same type was asked for comparison on at least one midterm and the final. Each of the two completed inaugural semesters of organic chemistry has been tracked this was to look at student improvement over the course of the semester.

A comparison has also been made of the first two semesters of SLO results for Chem 12A to see if changes to instruction have resulted in any improvement in SLOs.

SLO Questions

SLO1 Question on Structure – MT1 and the Final Exam each had a question to identify functional groups and type of bonding in a drawing for a complex organic molecule.

SLO1 Question on Physical Properties – MT1 had two questions, one on basicity and one on solubility. MT2 had two questions, one on cation stability and one on chirality. The final exam had three questions, one each on acidity, radical stability, and boiling point.

SLO2 Question on Reactions – MT1, MT2, MT3, and the Final Exam had questions on detailed mechanisms for a simpe synthesis. Different reactions were used for each question but the tools used to interpret and describe the mechanisms were the same for all four of the tests (e.g., keeping track of electrons transferred).

SLO2 Question on Methods of Preparation (Substitution and Elimination Reactions) – MT2 had two questions on methods of preparation using basic substitution and elimination reactions. MT3 had four questions on methods of preparation using basic substitution and elimination reactions. The Final Exam had two questions on methods of preparation using basic substitution and elimination reactions.

SLO2 Question on Methods of Preparation (Addition and Acid-Catalyzed Reactions) – MT3 had nine questions on methods of preparation using addition and acid-catalyzed reactions. The Final Exam had three questions on methods of preparation using basic substitution and elimination reactions.

SLO2 Question on Nomenclature – MT1 had two questions on nomenclature of haloalkanes. MT2 had one question on Fischer projections and R/S nomenclature. MT3 had two questions on alkenes and alkynes nomenclature. The Final Exam had five questions on nomenclature on aromatics, alcohols, and alkenes.

SLO3 Question on basic laboratory operations used to measure physical properties, purify organic substances, and separate mixtures – Four different experiments in the lab section of the class required students to separate mixtures of compounds or purify an unknown compound and then identify it by determining physical values (i.e. melting pointing, boiling point, density, and refractive index). These experiments teach basic laboratory operations and are progressively more difficult throughout the semester.

SLO4 Question on setting up and carrying out a synthetic operation through the final purification – Two different experiments in the lab section of the class required students to perform a multi-step synthesis of an organic compound from starting reagents and solvents and then purify it and identifying using FTIR, uv-VIS spectroscopy, melting point, boiling point, and/or density.

SLO5 Question on Analyzing FTIR and NMR spectra to determine structures of organic molecules – MT2 and the Final Exam each had two questions on interpreting FTIR spectra. Different spectra were used for each question but the tools were the same for all four of them.

SLO Results for Spring 2014 Organic Chemistry

	short description of type of SLO being assessed by each question	MT1 % score on question	MT2 % score on question	MT3 % score on question	Final % score on question
SLO 1	structure	58.0 Q2	NA	NA	75.5 Q2
SLO 1	factors affecting physical properties	58.3 Q14, Q16	64.6 Q7, Q9	NA	62.5 Q7, Q8, Q9
SLO 2	detailed reaction mechanism	68.3 Q5	73.1 Q13	80.7 Q6, Q13	70.7 Q19, Q20, Q23, Q26, Q28, Q30
SLO 2	methods of preparation (substitution reactions, elimination reactions)	NA	61.5 Q12, Q14	55.2 Q5, Q9, Q10, Q11	62.2 Q19, Q22, Q23, Q30
SLO 2	methods of preparation (acid-catalyzed addition reactions)	NA	NA	70.9 Q7,Q17, Q22	75.0 Q24, Q28
SLO 2	nomenclature	72.9 Q12, Q13	60.9 Q5	74.5 Q2, Q8	67.4 Q3, Q6, Q17 Q21, Q27
SLO 3	experiment to purify and identify unknowns	84.9 wk 3, E2	86.4 wk 6, E9	86.1 wk 7, E8	83.9 w12, E10
SLO 4	experiment to synthesize, purify, and test compounds		89.1 wk5, E4	90.4 wk 10,	

MT1

				E7	
SLO 5	analyze infrared spectra	NA	69.2 Q1, Q2	NA	87.5 Q38

Interpretation of SLO Results for Spring 2014

SLO 1-1 improvement in recognizing bonding patterns and functional groups with practice as semester progressed

SLO 1-2 familiarity with several different physical properties and trends based on structure were tested; considerable variability throughout the semester; some concepts appeared to be easier to assimilate than others

SLO 2-1 ability to describe detailed reaction mechanisms using arrow pushing (keeping track of electron flow) depends on reaction complexity

SLO 2-2 as more rxn types are introduced, the earliest types introduced are forgotten, it is clearly hard to keep track of them all; stress relying on fundamentals rather than wrote memorization to improve this area

SLO 2-3 some improvement with time noted in working with the myriad types of reaction types introduced late in semester, possibly at the expense of retaining information on all the reaction types introduced earlier on (See SLO 2-2)

SLO 2-4 name-to-structure and structure-to-name knowledge of compounds depends a great deal on the complexity of the compound; try tying compound naming into the lab experiments so that students have some familiarity with the compounds on another level

SLO 3 lab scores on these types of experiments were very consistent throughout the semester; as labs got harder (used more complex operations) students' skills improved to keep pace

SLO 4 as in SLO 3, lab scores on these types of experiments were very consistent throughout the semester; as labs got harder (used more complex operations) students' skills improved to keep pace

SLO 5 much improvement as semester progressed with increased practice; spectra are also studied in lab throughout the semester thereby giving students additional practice

SLO Results for Fall 2014 Organic Chemistry

	short description of type of SLO being assessed by each question	MT1 % score on question	MT2 % score on question	MT3 % score on question	Final % score on question
SLO 1	structure	64.4 Q2	NA	NA	81.6 Q2
SLO 1	factors affecting physical properties	NM	NM	NA	64.3 Q7, Q8, Q9, Q14
SLO 2	detailed reaction mechanism	NM	NM	65.6 Q6	69.1 Q23, Q26, Q28, Q30
SLO 2	methods of preparation (substitution and elimination reactions)	NA	NM		61.2 Q15,Q22, Q23, Q30
SLO 2	methods of preparation (acid-catalyzed addition reactions)	NA	NM		72.4 Q24, Q28
SLO 2	nomenclature	NM	NM	75.0 Q13	70.0 Q3, Q6,

					Q17, Q21
SLO 3	experiments to purify and identify unknowns	89.8 wk 2, E2	88.5 wk 7, E8	89.1 wk 10, E9	
SLO 4	experiment to synthesize, purify and test compounds	90.1 wk 4, E4		88.4 wk12, E7	
SLO 5	analyze infrared spectra	NA	76.2 Q1, Q2	NA	90.0 Q38

Comparison of SLO Results for Spring 2014 and Fall 2014

Scores from spring to fall semester of 2014 for any one category (SLO#) assessment question type are very consistent between the two semesters. Keep in mind that the sample size for either semester is very small. The only trends between semesters that appear to be significant were slight improvements in lab score averages for either SLO3 or SLO4 and slight improvement in SLO5 on interpreting FTIR spectra. The lab score improvements in SLO3 and SLO4 may be in part due to the fact that for most of the fall semester only 8 students were in lab rather than the 12 that regularly attended spring semester thereby giving the instructor a chance to spend more lab time with each student. A change in the way FTIR was taught occurred between Spring 2014 and Fall 2014. After lecture in Spring 2014 the students were assigned homework problems. However, after lecture in Fall 2014, the students worked on an in-class worksheet on FTIR with opportunity for the instructor (me) to give assistance. This appears to have led to some improvement, especially in the midterm occurring soon after but also on the final exam. This worksheet on FTIR will be used in subsequent semesters. Overall, additions or changes to lecture instruction for Spring 2015 will include more in-class group work using the molecular model kits to study stereochemistry, in-class worksheets on nomenclature, in class-worksheets on reaction mechanisms and in-class worksheets on multi-step syntheses. During these times, students will essentially be working homework problems in class in groups or individually by their own choice as the instructor moves around and provides help to students.

SLO Results for Spring 2015 Organic Chemistry

	short description of type of SLO being assessed by each question	MT1 % score on question	MT2 % score on question	MT3 % score on question	Final % score on question
SLO 1	structure	59.7 Q2	NA	NA	66.1 Q2
SLO 1	factors affecting physical properties	63.2 Q14, Q16	78.6 Q7, Q9	NA	63.4 Q7, Q8, Q9
SLO 2	detailed reaction mechanism	58.8 Q5	56.5 Q13	76.1 Q6, Q13	70.7 Q19, Q20, Q23, Q26, Q28, Q30
SLO 2	methods of preparation (substitution reactions, elimination reactions)	NA	71.4 Q12, Q14	74.1 Q5, Q9, Q10, Q11	74.7 Q19, Q22, Q23, Q30
SLO 2	methods of preparation (acid-catalyzed addition reactions)	NA	NA	64.1 Q7,Q17, Q22	72.0 Q24, Q28
SLO 2	nomenclature	81.6 Q12, Q13	74.4 Q5	79.7 Q2, Q8	70.9 Q3, Q6, Q17 Q21, Q27
SLO 3	experiment to purify and	83.2	88.2	86.9	89.7

	identify unknowns	wk 2, E2	wk 9, E8	wk 11, E9	w12, E10
SLO 4	experiment to synthesize, purify, and test compounds		87.9 Wk 4, E4	89.4 wk 10, E7	
SLO 5	analyze infrared spectra	NA	76.8 Q1, Q2	NA	84.2 Q38

Comparison of SLO Results for Spring 2014, Fall 2014, and Spring 2015

In comparing results for Spring 2014, Fall 2014, and Spring 2015 one has to keep in mind that the sample size is very small and varies quite a lot from year to year. Class sizes for students finishing the semester with a grade were in order, 12, 8, and 15 students. Be that as it may, one can try to compare specific changes made between semester to improve instruction. For example, for SLO 5 an in-class worksheet was used to give students a chance to practice interpreting FTIR spectra beginning with Fall 2014. Aggregating the mid-term and final exam scores on tests for each semester led to the following trend in scores on FTIR questions: Spring 2014 – 78.4%, Fall 2014 – 83.1%, Spring 2015 – 80.5%. This shows a slight Improvement but it is difficult to attribute it the introduction of the worksheet given the class size variability. Another worksheet introduced after the Spring semester and worked on by students while in class under a group setting, replaced a quiz on the same subject matter. This worksheet is represented by two parts of SLO 2 including SLO 2 – detailed reaction mechanisms and SLO 2 – methods of preparation (with or without acid catalysis). Again, aggregating the mid-term and final exam scores on tests for each semester led to the following trends in scores: for SLO 2 (detailed reaction mechanism) Spring 2014 – 73.2%. Fall 2014 – 67.4%, Spring – 65.5%; and for SLO 2 (methods of preparation) Spring 2014 – 65.0%, Fall 2014 – 66.8%, Spring –2015 71.3%. For the first SLO 2 the trend was slightly downward with time while for the second the trend was slightly upward. Finally, during all three semester much time has been dedicated to nomenclature of organic compounds including an in-class worksheet all three semesters and some test questions on each midterm and final each semester. The trend in scores for students aggregated to include one score for each semester is upward, possibly indicating improvement in examples used or clearer presentation by the instructor. The trend for SLO 2 (nomenclature) is as follows: Spring 2014 – 68.9%, Fall 2014 – 76.6%, Spring 2015 – 76.7%.

Scoring Rubric for Annual Program Review of Assessment (Part II only)

Assessment Unit Name: _____ Average score _____

	0	1	2	3	Comments
Initial SLO assessments	No evidence provided 0	Limited evidence of on-going SLO assessment (1 incomplete assessment – Plan but no results) 1	Clear evidence of on-going SLO assessment (1 complete assessment) 2	Clear and robust evidence of on-going SLO assessment (2 or more complete assessments) 3	
Loop Closing Assessments	No evidence provided 0	Limited evidence of Loop-closing assessment (Course identified as "loop-closed", but no Change Plan identified, or reasoning provided) 1	Clear evidence of loop-closing (At least 1 Change Made plan in place, or clear reasoning of "loop closed" for at least 1 initial assessment) 2	Clear and robust evidence of loop-closing (Multiple Change Made Plans in place, or very clear justification for "loop closed" for multiple initial assessments) 3	
Assessment input into TracDAT	No assessments in TracDat format or Repository	Assessment completed are in word/pdf in Document Repository 1	Assessments identified have Assessment Plan, but not all have Results 2	All identified assessments have a complete report (Plan and Results) in TracDat data field) 3	
Attempts to improve student learning	No indication of any changes made to any courses, and no clarification provided 0	No attempts to change any courses, teaching approaches, and **no** clarification or reasoning as to why not 1	Evidence of an attempt to implement a change in a course or teaching approach provided, **or** simple clarifying statement regarding why no specific improvement is needed 2	Multiple attempts made to implement changes to courses or teaching approaches, **or** clear and supported clarification why no improvement is needed 3	
Dialogue across the discipline	No dialogue or attempt to communicate results 0	Limited demonstration of dialogue or communication within the discipline, department, college 1	Clear demonstration of dialogue and sharing of assessment within discipline, department, or college 2	Robust and systematic dialogue and communication demonstrated within discipline, department, or college 3	

Participation in PLO assessment (bonus points averaged into total score)		Engagement in at least 1 initial PLO assessment **and/or** Engagement in at least 1 PLO closing-the-loop assessment fall '14-spr '15 1			
Total for Each Column					