NORCO COLLEGE
COMPREHENSIVE INSTRUCTIONAL PROGRAM/UNIT REVIEW

Discipline/Unit/Department: Chemistry/Science-Kinesiology

Program(s) or Certificate(s) Associated: *Chemistry*

Contact Person: Stanley Tyler, Virgil Lee, Jody Tyler

Due: April 20, 2017

Please send an electronic copy as a Word document (avoid PDF)
programreview@norcocollege.edu

Form Last Revised: November 2016

Norco College

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

Comprehensive Instructional Program/Unit Review Update
Instructions

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

The Comprehensive Program Review is conducted by each unit at Norco College and consists of an analysis of changes within the unit as well as significant nev resource needs for staff, resources, facilities, and equipment for the next four years, while reflecting on the changes within the last four years. This documer serves as a long-term strategic planning document This planning document should reflect the period since the last Comprehensives submitted by your unit an should also cover the planning for the next four years. In the year submitted, an annual program review will not be submitted.

For Program Review data, please go to the following link:
http://www.norcocollege.edu/about/president/strategic-planning/programreview/Pages/Comprehensive-Instructional-Program-Review.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 th 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 eac page submitted. Don't let formatting concerns slow you down. If you have difficulty with formatting, Nicole C. Brown can adjust the document for you. Simpl add responses to those questions that apply and forward the document to nicole.brown@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 Vic 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 membe 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 regardin 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.

Educational Master Plan and 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 Comprehensive Instructional Program Review Update

Unit: _____
Contact Person: _____
Date: _____

Trends and Relevant Data

1. Have there been any changes in the status of your unit in the last four years? What are the anticipated changes for the next four years?

Question:	Prior Four Years	Next Four Years
Has your unit shifted departments?	The Chemistry discipline has been in the Math, Sciences, and Kinesiology Department for the last several years. It is now part of Sciences and Kinesiology Department after Math split off to form its own department.	The Chemistry discipline is now in the newly formed Sciences and Kinesiology Department i expected to remain as part of the Sciences and Kinesiology Department for the foreseeable future.
Have any new certificates programs been created by your unit? For example, did your unit develop an ADT? If not, discuss if you are in process or have future plans to do so.	The Chemistry discipline has had an ADT agreement with all the Cal State University campuses since 2016.	No new certificate programs are expected to be offered during the next four years.
Have you made any substantial modifications to certificates/degrees (e.g. unit requirement changes, inclusion of an industry certificate, etc.). If not, discuss if you are in process or have future plans to do so.	The Chemistry discipline has not made any substantial modifications to certificates/degrees.	The Chemistry discipline does not have plans to make any substantial modifications to certificates/degrees in the foreseeable future.
Have activities in other units impacted your unit? For example, a new Multimedia grant could cause greater demand for Art courses or a new ADT may require resources such as supplemental courses for another unit's ADT.	The increased number of total science classes offered in succeeding years and the growth in other departments has made it increasingly difficult to get properly equipped lecture rooms (e.g., rooms with periodic tables, adequate white board space, adequate projector space, etc.). This has forced the Chemistry faculty to teach lectures in ill-equipped lecture rooms and in lab rooms where students have to work around chemicals.	The Chemistry discipline looks forward to the administration providing better teaching facilities for chemistry classes. Improvement of instruction includes having proper lecture room design and equipment in a comfortable viewing platform that enhances student learning.

2. List your retention and success rates as well as your efficiency for the previous four years. Please include Distance Education, retention, success and efficiency separately. Discuss any changes or significant trends in the data.

Table 1

	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
2015-2016	68.1	81.9	554.30

Success Rates and Retention Rates

The Success Rates and Retention Rates for the past five years are presented in **Table 1**. The dip in the Success Rate and the Retention Rate for 2012-2013 from the succeeding and preceding years is almost certainly due to the lab renovations that occurred during that academic year. In Spring 2012, the Chemistry discipline offered only two, 56-student sections of the Introductory Chemistry Course CHE 2A in the chemistry labs of the JFK Middle College School while the upstairs of the Norco College Humanities building was being reconfigured into new lab space. Not surprisingly, this extraordinary circumstance resulted in a onetime dip in the annual Success Rate and Retention Rate for the 2012-2013 academic year. However, the Chemistry program was back to its normal course offerings in Fall 2013, and both the Success Rates and the Retention Rates recovered to better than their 2011-2012 levels in the subsequent three academic years.

Excluding the 2012-2013 data, the Success Rates and the Retention Rates have been fairly consistent since 2011. The four-year average for the Success Rate is 67.8 ranging from 64.5 (-4.8%) to 69.6 (+2.7%), while the four-year average for the Retention Rate is 83.5 ranging from 81.6 (-2.2%) to 85.4 (+2.3%). While the slight decreases in Success Rate and Retention Rate of 2015-2016 from the previous two years is thought to be statistically insignificant, this situation will be closely monitored in the coming years.

Efficiency

The Efficiency Rates for the past five years are also presented in **Table 1**. The sharp decrease in the average Efficiency after the 2012-2013 academic year can be explained by two changes in the discipline's course offerings. The first was the introduction of Summer and Winter CHE-2A classes. Like Success Rates and Retention Rates, CHE-2A enrollment is the key driver for Efficiency rates since 60-70% of the department's students are in CHE-2A classes. This high enrollment led to several Fall and Spring CHE-2A classes being taught as double lecture sections, which are lecture classes in which

one professor teaches twice the number of students. Since Efficiency is defined as weekly student hours divided by full-time equivalent faculty, these double sections have the effect of increasing the Efficiency numbers. However, the Chemistry discipline started offering single sections of CHE-2A classes in the Summer and Winter terms of the 2013-2014 academic year, and has continued offering single sections of CHE-2A classes in every Summer and Winter term since that time. Since these single sections have lower average efficiencies than those offered in Fall and Spring, they have contributed to the decrease in average Efficiency in the 2013-2014 academic year and beyond.

The second item that contributed to the decrease in average Efficiency after the 2012-2013 academic year was the beginning of an Organic Chemistry program at Norco College. In Spring 2014, the chemistry department began offering CHE-12A, which is the first semester of Organic Chemistry. One section of CHE-12A was taught during the 2013-2014 academic year, and two sections were taught in both the 2014-2015 and 2015-2016 academic years. CHE-12A has a small capacity of just 17 students, which is limited by the maximum lab size. Thus, these CHE-12A class offerings also contributed to the decrease in average Efficiency in the 2013-2014 academic year and beyond.

All Chemistry courses are face-to-face; the chemistry discipline has no distance education component or hybrid component.

3. Include program-specific data and discuss any changes or significant trends in the data. Include the number of graduates in the discipline/program/certificate, as well as the number of students who have declared the program(s) of study, that your unit supports. Discuss any changes or significant trends in the data.

Table 2 presents data for the Chemistry course offerings at Norco College over the past four academic years. These courses are divided into two categories: non-majors-level chemistry courses and majors-level chemistry courses. The non-majors-level course offerings include both CHE-2A and CHE-10, while the majors-level course offerings include both CHE-1A/1B and CHE-12A/12B. During the past four years, all of these courses were taught in the Fall and/or Spring terms except for CHE-2A, which was taught every term. The data in **Table 2** show that both the number of non-majors-level chemistry courses and majors-level chemistry courses have steadily increased from 2013 to present. The projected chemistry class offerings for the 2017-2018 academic year are also included in **Table 2**, which show that these trends are expected to continue in the foreseeable future.

These data show that the Chemistry discipline has experienced tremendous growth in the number of courses offered of 65% from 2013-14 to 2016-17 (20 to 33 courses). Moreover, if we include 2017-18 projected growth then the five-year growth will be 90% (20 to 38 courses).

Table 2

Academic Year	Non-Majors Chemistry Courses				Majors Chemistry Courses				
	CHE-2A		CHE-10	Total Non-Majors-Level Chemistry Courses	CHE-1A	CHE-1A	CHE-12A	CHE-12B	Total Majors-Level Chemistry Courses
	Fall/Spring Only	All Year							
2013-2014	10	12	1	13	4	2	1	0	7
2014-2015	12	14	1	15	4	2	2	0	8
2015-2016	12	15	1	16	4	2	2	0	8
2016-2017	17	22	1	23	5	2	2	1	10
2017-2018 (projected)	*16*	*23*	*1*	*24*	*6*	*4*	*2*	*2*	*14*

4. In the table below, state your goals from your previous comprehensive unit reviews. List the most important first.

State your goals from your previous comprehensive unit reviews (NOTE: The last comprehensive program review for chemistry was made in 2010-2011 academic year!)	**List activity(ies) linked to the goal**	**Indicate progress made towards the goal**	**Discuss relationship of goal to College mission and Strategic Planning Goals/Ed Master Plan**
Increase student access	Design and build a new hybrid General Chemistry/Organic Chemistry lab in HUM 208.	HUM 208 was converted to a new chemistry lab that became operational in Spring 2013.	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3**
Improve student learning outcomes	SLO analyses for each lab section of every Chemistry course taught is conducted every semester. The data are aggregated for each course and are entered into annual program review on a four-year cycle. In addition, SLOs in the CORs for each Chemistry course that was offered have been revised as of 2014.	SLO Assessments have been made and entered into program review for CHE-2A (2011, 2012, 2013, 2014), CHE-1A (2012, 2014), CHE-1B (2012), CHE-10 (2014), and CHE-12A (2014, 2015, 2016). Since 2015, data for CHE-2A and CHE-10 have also been entered into TRACDAT.	**Goal 1, obj. 1, 4, 6**
Improve the quality of the student learning experience	Expand our Chemistry program to include the 1st and 2nd semesters of Organic Chemistry (i.e. CHE-12A and CHE-12B).	We expanded our chemistry program to include courses in 1st and 2nd semesters of Organic Chemistry. CHE-12A was initiated in SPR 14, while CHE-12B was initiated in Spring 2016. Both classes are now offered every semester.	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3**
Link comprehensive enrollment program to the STEM chemistry program	The Chemistry discipline has had a full-time chemistry faculty member (S. Tyler) participate in summer STEM programs each year they were offered (i.e. 2012, 2013, 2015, 2017).	The Chemistry discipline now has three full-time chemistry faculty members willing to participate in STEM programs (e.g., J. Tyler participated in a STEM panel discussion in 2017).	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3** **Goal 4, obj. 1**

In the table below, we state additional goals added from the two most recent annual program reviews.

State your goals 2014-15 and 2015-16 annual reviews. (NOTE: The last two annual program reviews have been used to update goals for the chemistry program.)	List activity(s) linked to the goal	Indicate progress made towards the goal	Discuss relationship of goal to College mission and Strategic Planning Goals/Ed Master Plan
Obtain an increase in our chemistry supplies budget so that we may plan fiscally as well as pedagogically for our growing chemistry program.	Convince the administration of the increased costs associated with both offering more sections of existing courses (including CHE-2A, CHE-1A, and CHE-1B sections) and offering new courses (including CHE-12A and CHE-12B).	The Chemistry discipline received an increase in its annual chemistry budget, raising the combined Introductory and General Chemistry budget from $7,600/yr. to $10,000/yr. and the Organic Chemistry budget from zero to $10,000/yr.	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3** **Goal 6, obj. 3**
Offer organic chemistry CHE-12B for the first time at Norco College (as we had done for organic chemistry CHE-12A in SPR 14 semester).	CHE-12B was offered during the Spring 2016 semester and again in Spring 2017 semester.	The Chemistry discipline plans to offer CHE-12B in both the Fall and Spring semesters beginning in the 2017-2018 academic year.	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3**
Become approved for the chemistry ADT (associate degree of transfer).	In Spring 2015, the Chemistry discipline applied for the ADT in Chemistry at Norco College as it applies to the Cal State University system.	The ADT application was approved, and there is now an ADT in Chemistry at Norco College.	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3**
Introduce at least one new chemistry course at Norco College that is already in the course catalog for RCCD and is currently taught only at RCC.	Begin a study of textbooks that would be appropriate for CHE-3 (Introductory Chemistry for science majors) and CHE-2B (the second semester of Organic Chemistry and Biochemistry for allied health majors).	The Chemistry discipline now has a firm target start date for these courses. CHE-2B will be introduced in Fall 2018, and CHE-3 will be introduced in Fall 2019.	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3**
Get the annual cost of maintaining the reverse osmosis (RO) filtration system for the	Norco College now has two RO water purification systems for its two chemistry teaching labs (HUM-	The Chemistry discipline has thus far been unsuccessful in getting the on-going maintenance costs of	**Goal 1, obj. 1, 4, 6, 7** **Goal 3, obj. 2, 3**

chemistry labs to be part of the annual chemistry budget, separate from the cost of annual replacement of consumable items such as chemicals, supplies, and replacement glassware. These filtration packs are required for the proper functioning of the deionized (DI)/RO water system that was recently purchased, and these filters need to be changed twice per year. DI/RO purified water is required for all of the lab courses taught at Norco College.	204 and HUM-208). Each system has annual maintenance costs, the bulk of which are due to the replacement cost for: • PreSystem PAK filters • Progard TL1 CL2 W/O • PE tank Millipak filters The total costs associated with the above items was $3172 in the most recent year. Each year, the Chemistry discipline requests that the funds for the purchase of these items be a permanently new line item in the Chemistry budget.	the RO system listed as a line item in the Chemistry budget, and the funds for these maintenance items have come from unspecified (and perhaps unreliable) sources. However, since these items are crucial for the operation of Chemistry labs, the Chemistry discipline believes it is imperative to have them listed as an on-going, annual, maintenance expense.	**Goal 6, obj. 3**

5. Please list the resources that you have received in the last four academic years as a result of program review. How did the resources impact student learning? If you requested resources but did not receive them, how did that impact student learning? If no resource requests were made, please indicate by typing N/A

Resources obtained from the 2012-2013, 2013-14, 2014-15, and 2015-16 Annual Program Reviews

Item	Cost	Item Purchased?	Impact on Student Learning
New, annual "regular supply" cost. Increase annual supply budget. • PreSystem PAK filters • Progard TL1 CL2 W/O • PE Tank Millipak Filter These filtration packs are required for the proper functioning of the DI/RO water system that was recently purchased, and these filters need to be changed twice per year. DI/RO purified water is required for all of the lab courses taught at Norco College.	**$3,123** **($410 x 3 $456 x 3 $175 x 3)**	Yes	Having a steady supply of DI/RO water for all chemistry labs is one of the backbones of our experimental chemistry program for students. Without DI/RO water, aqueous standard solutions and other reagent solutions for chemical reactions cannot be made, which would be crippling problem for the Chemistry program since these solutions are required in nearly every Introductory, General, and Organic Chemistry lab experiment conducted each semester. Upgrading the filtering system with this purchase increased the rate at which our tap water can be purified for use in chemical experiments.
Six VIS spectrophotometers for General Chemistry (CHE-1A/1B) that allow for sweep mode or single wavelength absorbance/transmittance determinations.	$12,000	Yes	These spectrophotometers replaced very old Spec20 model instruments, many of which were in need of repair. Also, the Spec20 instruments have no printable read-out and no sweep mod for running multiple wavelengths in an automated manner.
A set of microscale equipment for CHE-12B to supply second semester Organic Chemistry lab drawers for each student.	$19,000	Yes (from a variety of sources)	Purchased in time to launch second semester Organic Chemistry (CHE-12B) in the Spring 2016 semester.
Replacement and repair equipment for the Introductory and General Chemistry curricula	$5,922	Yes	Students had the proper equipment to provide for a safe and enhanced learning environment for lab instruction.

Item	Cost	Item Purchased?	Impact on Student Learning
Corrosive Storage Cabinet	$2,599	Yes	Allowed for the safe storage of corrosive chemicals. It also provided Chemistry faculty access to a greater variety of chemicals for experiment selection for our students.
Overall Budget Increase	Increase from $7,600 to $20,341 starting Fall 2015	Yes	Allowed more than a doubling of Chemistry course offerings in just a few years.
Third set of equipment to supply General Chemistry lab drawers	$4,528	Yes (from a Variety of Sources)	Allowed General Chemistry students to have their own glassware for lab courses instead of sharing their glassware with other students.
SPARTAN software site license	$2,250	Yes	Chemical modeling software is useful in Organic Chemistry curricula. In fact, it was used for CHE-12A in 4 of the 6 semesters that the course was offered at Norco College. (The two semesters it was not used stemmed from problems that Chemistry faculty encountered RCCD HelpDesk personnel to install the software on student lab computers).
New balances for Introductory Chemistry CHE-2A in room HUM 204	$3,000	Yes	Modern, more precise balances for general use in Introductory Chemistry labs replaced older lower precision instruments (including some in need of repair).
A set of microscale equipment to supply second semester Organic Chemistry lab drawers	$4,500	Yes (from a Variety of Sources)	Purchased in time to launch second semester of Organic Chemistry (CHE-12B) in Spring 2016 semester.

6. In the table below, please list your long term goals for your unit. How do your goals support the College mission and the goals of the <u>Educational Master Plan/Strategic Plan</u>? **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."*

List the long term goals of your unit for the next four years.	**List activity(s) linked to the goal**	**Anticipated timeline for completion**	**Discuss relationship of goal to College Mission & Strategic Planning Goals/ Ed. Master Plan**
Improve the CHE-2A lab curriculum to increase success rates for the course and enhance the student learning experience. This will include introducing more Green Chemistry principles and modifying or changing existing lab experiments. It will also allow key concepts to be better reinforced and practiced and make the lab environment safer and healthier for our students.	• Update and alter current 1st semester Introductory Chemistry (CHE-2A) experiments to increase clarity and minimize waste and hazardous chemicals. • Incorporate pre-lab and post-lab questions so that students are better prepared for the lab (safety, conceptual, and procedural questions). • Align the lab content with lecture content to increase student understanding and success.	Ongoing for the next 4 years.	**Goal 1, obj. 1, 4, 6** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
Improve the CHE-1A lab curriculum to increase success rates for the course and enhance the student learning experience. This will include introducing more Green Chemistry principles and modifying or changing existing lab experiments. It will also allow key concepts to be better reinforced and practiced and make the lab environment safer and healthier for our students.	• Update and alter current 1st semester General Chemistry (CHE-1A) experiments to increase clarity and to minimize wastes and hazardous chemicals. • Incorporate pre-lab and post-lab questions so that students are better prepared for the lab (safety, conceptual, and procedural questions). • Align the lab content with lecture content to increase student understanding and success.	Ongoing for the next 4 years.	**Goal 1, obj. 1, 4, 6** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
Improve the CHE-1B lab curriculum to	• Update and alter current 2nd semester General	Ongoing for the next 4	**Goal 1, obj. 1,**

increase success rates for the course and enhance the student learning experience. This will include introducing more Green Chemistry principles and modifying or changing existing lab experiments. It will also allow key concepts to be better reinforced and practiced and make the lab environment will also be safer and healthier for our students.	Chemistry (CHE-1B) experiments to increase clarity and to minimize wastes and hazardous chemicals. • Incorporate pre-lab and post-lab questions so that students are better prepared for the lab (safety, conceptual, and procedural questions). • Align the lab content with lecture content to increase student understanding and success.	years.	**4, 6** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
Offer the CHE-3 lecture and lab course for the first time at Norco College and continue offering it in succeeding years. This means developing both lecture and lab curricula appropriate for science majors in need of a one-semester Chemistry Fundamentals course to prepare them for the 1st semester of General Chemistry (CHE-1A). The lab will include Green Chemistry principles whenever possible to save costs and provide a safer and healthier environment for students.	Develop and design experiments incorporating Green Chemistry principles at a level appropriate for Chemistry Fundamentals, an introductory chemistry course for science majors (rather than allied health plus science majors like CHE-2A) to address a student population that has been neglected at the Norco Campus. CHE-3 is for students who want to pursue a science degree. (These students are now forced to take CHE-2A, which is designed for Allied Health majors.)	Beginning Fall 2018	**Goal 1, obj. 1, 4, 6** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
Decrease the class sizes of all Introductory and General Chemistry labs to the ACS guideline limit. According to *ACS Guidelines for Chemistry*, lab classroom sizes should not exceed 25 students per lab section for General Chemistry courses. **(See 12.)**	Convince the administration of the necessity of limiting lab classroom sizes to those recommended by *ACS Guidelines for Chemistry*. This is a safety issue as well as a student learning experience issue.	The Chemistry discipline needs to start discussions with college administrators concerning safety and enhanced student learning based on smaller class size as soon as possible.	**Goal 1, obj. 1, 4, 6** **Goal 6, obj. 3** **Goal 7, obj. 5**

Offer CHE-2B at Norco College. (While CHE-2B is currently taught in RCCD, it is not offered at Norco College.) This means developing both lecture and lab curricula appropriate for Allied Health students in need of the second semester of Organic Chemistry and Biochemistry Fundamentals (CHE-2B) for their career paths. The lab will include Green Chemistry principles whenever possible to save costs and provide a safer and healthier environment for our students.	Develop and design experiments incorporating Green Chemistry principles at a level appropriate for 2nd semester Organic Chemistry and Biochemistry Fundamentals (CHE-2B). This will address a neglected student population at Norco College, those students needing a full-year (two-semester) course in introductory chemistry for their Allied Health program (i.e. nursing, dental technician, physical education, emergency medical technicians).	Beginning Fall 2019	**Goal 1, obj. 1, 4, 6** **Goal 3, obj. 1, 3, 5** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
Offer the 1st semester General Chemistry as an honors course (CHE-1AH) within the next few years. (While CHE-1AH is currently taught in RCCD, it is not offered at Norco College.) This course will include advanced lecture and lab content relative to CHE-1A. The Chemistry discipline anticipates offering one section of this course per semester.	As with other chemistry classes offered at Norco College, CHE-1AH will feature experiments based on Green Chemistry principles. This class will address a neglected student population (i.e. advanced science major students with a strong background in chemistry and a high level of prior achievement).	Beginning Fall 2020 or later	**Goal 1, obj. 1, 4, 6** **Goal 3, obj. 1, 3, 5** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
Develop a series of videos that teach lab techniques to enhance the student learning experience and provide increased instruction in key aspects of experimental chemistry. These videos will span a range of difficulty to accommodate students with different levels of lab experience and expertise. They will also stress safety, lab techniques, and experimental methodology.	• Determine the most important lab techniques to demonstrate by course. • Film the demonstration by professional videographers. The videos will be made available to all Norco College chemistry instructors for their use and will also be posted to a secured site for more wide-spread viewing outside of classes.	Ongoing for the next 4 years.	**Goal 1, obj. 1, 4, 6** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**

The chemistry program is in critical need of additional classroom space to allow for projected growth. In particular, the Norco's Chemistry program needs more lab classroom space to: 1. accommodate expansion in the number of all chemistry lab sections, 2. allow for separate labs for organic (CHE-2A/12A/12B) and general chemistry (CHE-1A/1AH, CHE-1B, CHE-3), and 3. increase the amount of space needed for chemical reagents, chemical preparation, and chemical waste storage.	The two primary ways to obtain additional space for chemistry lecture and lab sections are the following: 1. convert existing rooms in the Humanities building or nearby buildings to more student labs and smart classrooms, 2. build new dedicated chemistry lab (with accompanying chemistry stock rooms) and lecture rooms in new buildings on campus. The Chemistry discipline plans to support Norco College efforts in this regard with attendance at meetings, writing and/or speaking activities, and any other endeavors Norco undertakes to increase classroom space on campus.	Ongoing for the next 4 years.	**Goal 1, obj. 1, 4, 6** **Goal 3, obj. 1, 3, 5** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
Identify 400 sq. ft. of storage space for chemical wastes and increase the frequency of chemical waste pickups. Chemical waste is currently stored in the HUM 204 lab, which is lab classroom for Introductory Chemistry (CHE-2A). Having waste in this room is a major health hazard. The frequency of hazardous waste pickup also needs to be increased to a monthly basis. An additional 400 sq. ft. of storage space in a chemical stockroom is needed to properly accommodate the waste generated by the college's current course offerings and more storage will be required as Chemistry course offerings increase.	The College needs to provide additional storage for chemical waste from our teaching labs. The two main ways to obtain additional space for chemistry lab sections and the accompanying chemistry stockroom space are the following: 1. convert existing rooms in the Humanities building or nearby buildings to more student lab experiment rooms and chemical lab preparation and storage areas, and/or 2. build new dedicated chemistry lab and chemistry stock rooms in new buildings on campus. The Chemistry discipline plans to support Norco College efforts in this regard with attendance at meetings, writing and/or speaking activities, and any other endeavors Norco College undertakes to increase classroom space on campus. In the meantime, the administration is strongly encouraged to provide a temporary solution to increased storage needs for chemical waste.	The timeline is highly dependent on budget allocations for modifying existing rooms in Humanities and other campus buildings as well as procuring the necessary funding for new buildings (such as the proposed Music and Arts Building). College staff and administrators must work closely with the lab technicians and faculty to find additional space for the Chemistry program.	**Goal 1, obj. 1, 4, 6** **Goal 3, obj. 1, 3, 5** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**

Increase the number of properly designed lab rooms for students to perform chemistry experiments. **The chemistry discipline will not be able to increase its course offering \ beyond its Fall 2018 targets unless additional chemistry lab space is identified.**	As noted in section 3 of this Comprehensive Program Review, chemistry lab course offering have grown at a phenomenal pace. Over the past five years including the projected 2017-18 academic year, this growth will be 90%: 1. CHE-2A lab sections will have increased from 12 to 23, 2. majors-level chemistry lab sections will have increased from 7 to 14 sections, and 3. overall lab sections will have increased from 19 to 37.		**Goal 1, obj. 1, 4, 6** **Goal 3, obj. 1, 3, 5** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**

Course Outlines of Record (COR)

An important part of comprehensive program review is a review of the course outlines of record that are associated with a unit. Please list all of the courses in your unit as listed in the Norco College Catalog and the date that they were last updated. If they have not been updated in the last four years, you must update them before submitting your program review, e.g., making sure the edition of the textbook is current. Please do not submit the actual COR. Add to the table as needed

Course Number	Date Last Updated	Last Editor (name)	If not current, where is the COR in the review process	Was the last update a major or minor modification?
CHE-1A	10/15/2014	Paul Richardson	Draft; pending approval	minor
CHE-1AH	10/15/2014	Paul Richardson	Draft; pending approval	minor
CHE-1B	10/15/2014	Paul Richardson	Draft; pending approval	minor
CHE-1BH	4/8/2015	Diane Marsh	Draft; pending approval	minor
CHE-2A	10/15/2014	Paul Richardson	Draft; pending approval	minor
CHE-3	10/15/2014	Paul Richardson	Draft; pending approval	minor
CHE-10	10/15/2014	Paul Richardson	Draft; pending approval	minor
CHE-12A	10/15/2014	Paul Richardson	Draft; pending approval	minor
CHE-12B	10/15/2014	Paul Richardson	Draft; pending approval	minor

Norco College Comprehensive Instructional Program Review Update

Unit: _____
Contact Person: _____
Date: _____

Current Human Resource Status

7. Complete the Faculty and Staff Employment Grid below. Please list full and part time faculty numbers in separate columns. 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 (give number)**	**Part-time faculty (give number)**
Each full-time Chemistry instructor is assigned at least one upper level class each semester (e.g. in Fall 2017 the three full-time instructors will teach either CHE-1B, CHE-12A, and CHE-12B) and usually one introductory-level chemistry class (e.g. in Fall 2017 the three full-time instructors will each teach CHE-2A). The adjunct instructors teach the balance of the Chemistry discipline's course offerings (i.e. 2 CHE-2A classes, 3 CHE-1A classes, 1 CHE-1B class). These assignments can change each semester (e.g. in Spring 2018 one full-time instructor will teach CHE-1A and CHE-12A, both upper-level courses).	The Chemistry discipline has one, full-time, tenured instructor and two, full-time, tenure-track instructors. Each is assigned a teaching load of either 1.0 or 1.2 each Fall and Spring semester. A 1.2 teaching load in Chemistry means a lecture section with two lab sections for two different course listings. Lectures are usually (170 minutes total) twice a week and labs are twice a week (190 minutes each lab) for each course listing.	The Chemistry discipline has six adjunct (part-time) instructors at the following work levels: • four are assigned a 0.6 teaching loads, • one is assigned a 0.2 teaching load, and • one is assigned a 0.4 teaching load. The number of adjunct faculty and their teaching loads are subject to change each semester, but they cannot exceed a 0.6 teaching load. A typical 0.6 load for an adjunct member is a lecture section once or twice a week and two lab sections each week.

Classified Staff Employed in the Unit		
Staff Title	**Full-time staff (give number)**	**Part-time staff (give number)**
Laboratory Technician – There are two full-time Lab Technicians who are primarily dedicated to chemistry lab setup and the ordering of equipment, materials, and supplies. • The senior Lab Technician also oversees equipment repair and replacement and supervises a junior Chemistry Lab Technician. While his primary duties are to oversee all lab operations in HUM 208 (the lab used for General Chemistry and Organic chemistry), he also has responsibility for all night-time labs in Biology and Physics and aids in prepping for the labs taught in HUM 204. • The second, full-time Lab Technician also serves as the chemistry labs. Her primary responsibilities are the preparation and set-up of all the Introductory Chemistry lab sections taught in HUM 204. She also helps set up Physics labs in HUM 201. Two other Lab Technicians assigned to Biology and Anatomy help set up Physics labs and occasionally help set-up Introductory and General Chemistry labs as needed by timing constraints.	Two, full-time lab technicians with primary responsibility to oversee all chemistry labs. Each has partial responsibility for Physics and Biology labs also.	There are no part-time staff members at this time.

Unit Name: _____

Long Term Resource Planning

This section should be completed with your long term goals in mind. However, as you will not be filing an annual program review this academic year, you may need to include some of your short-term resource requests as well.

8. Staff Needs

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

List Staff Positions Needed **Please justify and explain each faculty request as they pertain to the goals listed in item #6.** 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 request has been made**	**Annual TCP***	**EMP Goals**	**Short Term Goal (S) Long Term Goal (L)**

[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.

1. **Full-time chemistry lab technician.** Since hiring a second chemistry Laboratory Technician two years ago, our Chemistry lab sections have grown from 22 to 32 (a 45% increase!). Justification: There is currently more work required than can be done by the two, full-time, chemistry Lab Lechnicians. Moreover, the Chemistry discipline is expecting to expand of its program in the 2017-2018 academic year to beyond that offered in 2016-2017. Specifically, 37 chemistry lab sections are expected to be offered in 2017-2018, a 68% increase from when the last Laboratory Technician was hired. The work load is currently split between a day-shift Laboratory Technician (who works from approximately 10:30 AM to 7:00 PM and helps set up Physic labs and Anatomy), and the sole night lab tech (who works from approximately 1:30 PM to 11:00 PM who handles set up, break down, and clean-up for all night labs in Biology and Physics in addition to his Chemistry lab duties). Student work-study help has been sporadic, with 2 semesters in the last four aided by a work-study student tech working approximately 10-12 hours per week. Chemistry Laboratory Technicians spend a considerable portion of their time preparing solutions and other chemical reagents, apportioning smaller aliquots of these chemicals out of large stock supplies; restocking and replacing equipment, materials, and supplies; and ordering consumables. These efforts take far more time for Chemistry labs than they do for Physics and Biology labs. A third Chemistry Laboratory Technician would help keep up with the work load and also help insure timely transitions between setting up/breaking down different lab experiments (sometimes within a 20-minute time frame from one lab ending to another beginning in the same room). Over the next two years, the Chemistry discipline expects to add two more types of chemistry courses, the second semester of Introductory Chemistry for non-majors (CHE-2B) and Introductory Chemistry for majors (CHE-3). These will allow our students to stay at Norco College to complete the first-two years of their chemistry education.	**N**	**2**	**$96,245 (II)**	**Goal 1, obj. 1, 4, 6 Goal 3, obj. 1, 3, 5 Goal 7, obj. 5 Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**	**S**

2. Full-time tenure track chemistry instructor: The Chemistry discipline believes it is necessary to hire another full-time, Chemistry faculty member to support the college's Chemistry course offerings in the 2018-2019 academic year and beyond. Justification: The anticipated 2017-2018 Chemistry course offerings have far outpaced the hiring of new Chemistry faculty members. For example, the Chemistry discipline had two faculty members for the 9 Chemistry classes it offered in the Fall 2013 semester, while it will have three faculty members for the 16 classes it will offer in the Fall 2017 semester. This represents a 50% increase in full-time faculty for a 78% increase in the number of class offerings. The need for a new Chemistry faculty member is even better illustrated by considering the percentage of Chemistry classes that are taught by full-time faculty members. In the Fall 2017 semester, for example, 7.0 Full-Time Equivalents (FTEs) of chemistry courses will be taught at Norco College based on the following breakdown: • 1 x CHE-2A single section (1 x 0.4 FTE = 0.4 FTE) • 4 x CHE-2A double sections (4 x 0.6 FTE = 2.4 FTE) • 3 x CHE-1A single sections (3 x 0.6 FTE = 1.8 FTE) • 3 x CHE-1B single sections (2 x 0.6 FTE = 1.2 FTE) • 1 x CHE-12A single section (1 x 0.6 FTE = 0.6 FTE) • 1 x CHE-12B single section (1 x 0.6 FTE = 0.6 FTE) If each full-time faculty member teaches the targeted 1.0 FTE in that semester, then the current three full-time faculty members in the Chemistry discipline will teach 43% (3.0/7.0) of the FTEs that will be offered in the discipline. This percentage will likely be lower when the Spring 2018 semester is factored into the calculation since the number of chemistry courses offered in Spring have consistently been greater than those offered in Fall of a given academic year. Also, this analysis does not take into account the CHE-2A classes that are taught in the Winter and Summer terms, and it does not factor in any growth in the Chemistry discipline's course offerings beyond the 2017-2018 academic year. Thus, the actual percentage of FTEs that will be taught by full-time faculty at Norco College will likely be far lower than the 43% value during the 2017-2018 academic year and beyond until a fourth Chemistry faculty member is hired.	**N**	**2**	**$ 123,881+ $4,000 for office.**	**Goal 1, obj. 1, 4, 6 Goal 3, obj. 1, 3, 5**	**S**

* 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.

Unit Name: _____

9. Equipment & Technology Not Covered by Current Budget[2]

List Equipment, Technology, Software 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. Provide the Asset Tag Number(s) for replacement requests. In the Justification, include how the item addresses the department's goals, and if it assists in remaining competitive with comparable institutions (if applicable). Please state if the request impacts Distance Education.	*Indicate whether Equipment is for (I) = Instructional or (N) = Non-Instructional purposes	How many students/Staff/ departments will directly benefit from this equipment/ technology?	Number of years requested	Use this link for Annual TCO* Cost per item	Number Requested	Total Cost of Request	EMP GOALS
1. Increase in supply budget to meet current growth Justification: The Chemistry discipline received an increase in its supply budget to $20,341 for the start of Fall 2015. Since that time, 15 new sections of Chemistry classes (9 x CHE-2A, 2 x CHE-1A, 1 x CHE-1B, 2 x CHE-12B, and 1 x CHE-10) have been added. It is estimated that the lab portion of these classes cost $600/CHE-2A course, $1,100/CHE-1A course, $1,000/CHE-1B course, $5,000/CHE-12A course, and $5,000/CHE-12B course). Therefore, an increase of $18,600 is needed to address current growth.	**I**	**Initially 418 Students, with increased growth in lab sections, even more than 418**	**1 time perma-nent increase needed to address growth since F2015**	**$18,600**	**1**	**$18,600**	**Goal 1, obj. 1, 4, 6 Goal 7, obj. 5**
2. One-time increase in chemistry equipment funds to purchase glassware and other miscellaneous small tools for a third set of Introductory Chemistry (CHE-2A) lab drawers in HUM 204. Justification: There are currently two sets of student lockers in HUM 204. Each locker is shared with students from 4 or 5 different lab sections each week. Having a third set of lockers would decrease the sharing among student from different classes,	**I**	**All CHE-2A students each semester, approx. 288 to 320.**	**I**	**$3,000 For 1 set of 16 lockers.**		**$3,000**	**Goal 1, obj. 1, 4, 6 Goal 7, obj. 5**

[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.

which would help minimize the number of students finding broken, dirty, or missing glassware at the start of their experiment.							
3. Annual budget increase to replace broken glassware in Organic Chemistry lab sections of CHE 12A and CHE 12B (one section of each lab is taught during both the Fall and Spring semesters). Justification: The Chemistry discipline's 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, there are no funds in the budget for the replacement of broken glassware. This is a necessary budget line for teaching labs with inexperienced students learning to work with specialized glassware for the first time. Most of the requested funds would be used to replace unique items in each student's microscale glassware kits in their assigned lab drawers as these parts get broken.	**I**	**68**	**Annual Budget increase**	**$3,000**	**1**	**$3,000**	**Goal 1, obj. 1, 4, 6 Goal 7, obj. 5**
4. Vernier Instruments Data Acquisition System for General Chemistry lab experiments (including LabQuest Data Loggers, Temperature Probes, pH Sensors, Voltage Probes, Conductivity Probes, Colorimetry, and Drop Counters) Justification: Modern Chemistry labs use electronic data acquisition to enhance measurement capability of a variety of parameters during a chemical experiment. General Chemistry students need to be exposed to these techniques as soon as possible in modern chemistry.	**I**	**160 each semester**	**1 time perma-nent increase**	**$18,976**	**1**	**$18,796**	**Goal 1, obj. 1, 4, 6**
5. One-time budget increase in Chemistry equipment funds to purchase glassware and other miscellaneous small tools for a second set of 2nd semester General Chemistry (CHE-1B) lab drawers in HUM 208.	**I**	**All CHE-1B students each**	**I**	**$20,000 For 1 set of 16**	**1**	**$20,000**	**Goal 1, obj. 1, 4,**

Justification: There is currently only one set of student lockers in HUM 208 for CHE-1B student use. Each locker is shared with students from two different lab sections each week. However, CHE-1B experiment often require students to save intermediate products and solutions in glassware over a period of days to complete multiple-day lab experiments. These products take up space and require storage in the lockers between lab periods. A second set of lockers would also allow students to maintain and clean their own equipment without interference with another lab section sharing their lockers or ruining their equipment and/or intermediate products.		**semester, 128 in all.**		**lockers.**			**6 Goal 7, obj. 5**
6. 2 mL graduated pipets for CHE-1B lab lockers. Justification: Graduated pipets are essential for precise and accurate solution chemistry methodology such as making of solutions of a specified concentration and for diluting solutions.	**I**	**34 each semester**	**1 time perma-nent increase**	**$125**	**32**	**$4,000**	**Goal 1, obj. 1, 4, 6**
7. 125 mL separation funnels for CHE-12A/12B Organic Chemistry. Justification: Separation funnels are essential equipment for extraction procedures done in a majority of Organic Chemistry laboratory experiments.	**I**	**34 each semester**	**1 time perma-nent increase**	**$125**	**17**	**$2,125**	**Goal 1, obj. 1, 4, 6**
8. Gilson Micropipettes for Organic Chemistry lab. Justification: Micropipettes are one of our most frequently used items in Organic Chemistry lab classes. The Chemistry discipline currently has only three micropipettes for 17 students in both CHE-12A or CHE-12B lab sections. Six additional units are requested to give one micropipette for each fume hood so that these classes would have one micropipet for each pair of students.	**I**	**34 each semester**	**1 time perma-nent increase**	**$300**	**6**	**$1,800**	**Goal 1, obj. 1, 4, 6**
9. Purchase of a second IR spectrometer for Organic Chemistry lab experiments	**I**	**68 organic chemistry students**	**1 time perma-nent**	**$24,000**	**1**	**$24,000**	**Goal 1, obj.**

Justification: Infrared (IR) spectrometry is the workhorse spectrometry of Organic Chemistry. It is taught very early in the first semester of the Organic Chemistry sequence and is used as the major analytic technique in Organic Chemistry laboratory classes throughout the year. Norco College currently has an excellent Perkin Elmer IR spectrometry, which we are seeking to supplement with a second instrument. The addition of this second instrument would alleviate the bottleneck that often occurs in Organic Chemistry lab classes when all the students have to take IR spectra of their reagents and products. We would like to purchase this instrument in the summer 2018 so that we can begin using it during the 2018-2019 academic year.		**each year; more with continued growth**	**increase**				**1, 4, 6**
10. Purchase of a higher resolution, multi-probe NMR spectrometer Justification: Nuclear magnetic resonance (NMR) spectroscopy is one of the two dominant spectroscopy techniques (along with IR spectrometry) taught in Organic Chemistry. While the Norco College Chemistry program currently has a 45 MHz, single probe (hydrogen-1) NMR spectrometer, it has limited use in a classroom setting because it requires very large amounts of samples, offers very low resolution, and is not capable of analyzing carbon-13. (Both hydrogen-1 and carbon-13 spectroscopy are generally taught in the first-year Organic Chemistry curricula.) Thus, the Chemistry discipline is requesting the purchase of a higher resolution (60 MHz), dual-probe (hydrogen-1 and carbon-13) NMR spectrometer that can be used in the laboratory sections of both CHE-12A and CHE-12B. The Chemistry discipline would like to purchase this instrument in the summer 2019 so that we can begin using it during the 2019-2020 academic year.	**I**	**68 organic chemistry students each year; more with continued growth**	**1 time perma-nent increase**	**$60,000**	**1**	**$60,000**	**Goal 1, obj. 1, 4, 6**

11. Renewal of 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, supply good, nor a capital equipment item.) Justification: Norco College currently has a one-year site license for this program. It is a valuable addition to laboratory Organic Chemistry and enables chemical modeling (calculations of energy states, stability, physical traits, reactivity, etc.) of chemical compound, in contrast to the more traditional chemistry lab experiments that are performed to learn about handing equipment, chemicals, understand basic reactions and syntheses while working with real chemicals. It offers the added benefit of reducing the costs since SPARTAN lab activities require no chemicals and generate no waste. Since SPARTAN is also used to General Chemistry, the Chemistry discipline also anticipates using SPARTAN in General Chemistry (CHE-1A/1AH/1B) labs at Norco College.	**I**	**68 organic chemistry students each year; possibly 320 general chemistry students each year**	**1 time perma-nent increase**	**$2,250**	**1**	**$2,250**	**Goal 1, obj. 1, 4, 6**
12. Purchase of a Bellington and Stanley Model D7 Polarimeter Justification: This is the last piece of major equipment that a well-equipped Organic Chemistry lab needs for the routine analysis of organic compounds. Polarimetry is the only technique capable of determining chemical chirality (i.e. the left or right handedness in molecules), which is one of the key topics taught in Organic Chemistry lecture classes. Thus, including this technique in the Norco College Organic Chemistry lab curriculum would strengthen our students' understanding of the topic.	**I**	**68 organic chemistry students each year; possibly 320 general chemistry students each year**	**1 time perma-nent increase**	**$7,000**	**1**	**$7,000**	**Goal 1, obj. 1, 4, 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: _____

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

List Professional Development Needs. 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**
Support for each full-time Chemistry professor to attend one professional development workshop or conference each year. Justification: Attending meetings that discuss improvements in teaching techniques, lab curriculum changes (e.g. changing lab curriculum to minimize wastes and hazardous chemicals without compromising rigor), etc. will help keep the Chemistry faculty at Norco College up to date on current information in the Chemistry field. It would also help the Chemistry faculty to continue to develop and excel in their discipline and help defray costs to the college by implementing safe and effective lab instruction practices. Having Chemistry faculty attend professional development meetings would also benefit Chemistry students by ensuring that their instructors stay current on the ever-changing field of Chemistry.	**$2,500**	**3**	**$7,500**	

*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: _____

11. 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** 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.	**EMP GOALS**	**Distance Education**
1. Purchase an on-going, library subscription to the *Journal of Chemical Education (JCE)* published by the American Chemical Society Justification: *JCE* is the world's premier chemical education journal. We are requesting an on-going, library subscription to *JCE* that can be accessed by all Norco College faculty, staff, and students. The current annual cost this subscription is $612 for 2017 and $640 for 2018. The primary justification for this subscription are twofold. 1. *JCE* serves as the dominant means of communication among people across the world who are interested in the teaching and learning of chemistry. Thus, a subscription would help our faculty to stay current on successful chemistry pedagogy methods. 2. *JCE* also provides a large number and new and innovative experimental procedures. Thus, it would be an invaluable resource for faculty members who are looking to set up new laboratory curricula and will almost certainly aid and strengthen the laboratory curricula of the three new chemistry courses (CHE-1AH, CHE-2B, and CHE-3) that will be developed at Norco College over the next few years.	**Goal 1, obj. 1, 4, 6** **Goal 7, obj. 1**	Not part of a Distance Education plan.
2. Purchase standardized final exams published by the American Chemical Society for every CHM-1A/1AH/1B and CHM 12A/12B section at Norco College. Estimated Cost $100.00/yr.	**Goal 1, obj. 1, 4, 6** **Goal 7, obj. 1**	Not part of a Distance Education plan.

[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.

Justification: Accurate assessment of Chemistry courses is an important goal of the Chemistry faculty at Norco College. Fortunately, the Examinations Institute of the American Chemical Society supports this goal by providing exams for many college chemistry courses including General Chemistry (Norco courses CHE-1A/1AH/1B) and Organic Chemistry (Norco courses CHE-12A/12B). These tests are designed to be given as the final exam to students in these chemistry courses. The use of these standardized final exams at Norco College offer two primary assessment opportunities. 1. They would allow the performance of our students to be compared to the performance of comparable students who take the same courses at other colleges and universities throughout the country. 2. They would allow for improved assessment of the overall chemistry program at Norco College by being able to track the performance of students as they progress through the four-course, two-year General Chemistry/ Organic Chemistry sequence. The costs of these exams are approximately $2.00/exam for General Chemistry and $2.80/exam for Organic Chemistry. The Chemistry discipline would like to implement the use of these exams in all of our Organic Chemistry sections during the 2017-2018 academic year at a projected cost of $168 (60 students x $2.80/exam) and expand the use of these exams in all of our General Chemistry sections during the 2018-2019 academic year at a projected cost of $600 (300 students x $2.00/exam). Thus, the overall cost would be $168 in 2017-2018 and $718 ($168 + $600) in 2018-2019 and beyond at our current enrollment levels.		
3. Purchase a subscription (electronic on-line access to publications) to at least one ProQuest Historical Newspaper (preferably a current newspaper than can have future subscriptions added to the archives as they become "historical". Estimated Cost $500.00/yr. per paper. Justification: Any long-standing newspaper periodical such as the *New York Times*, *Washington Post*, or *Los Angeles Times* would be able to chronologically archive a history of scientific thought, major discoveries, trends in funding, philosophy, and public/federal perceptions of science for all branches or fields of research including chemistry. This is of high value to current chemical education programs as a means to learn from the past and apply all the above topics to current research and teaching of chemistry.	**Goal 1, obj. 1, 4, 6** **Goal 7, obj. 1**	Not part of a Distance Education plan.

*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

Unit Name: _____

12. 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. Please state if the request impacts Distance Education.	**Annual TCO***			
	Cost per item	**Number Requested**	**Total Cost of Request**	**EMP Goals**
1. Chemistry needs an estimated 400 sq. ft. of additional storage space for chemical waste from our chemistry labs. Justification: This additional storage space would provide a safe storage space for the waste that is generated in our teaching labs throughout the year (as noted in section 6 of this Comprehensive Program Review).	**unknown**	**unknown**	**unknown**	**Goal 1, obj. 1, 4, 6** **Goal 6, obj. 3** **Goal 7, obj. 5** **Note: Goal 7, obj. 5 is a safety issue affecting students, staff, and faculty.**
2. Reduce lab sizes to 25 students to meet the guidelines set by the American Chemical Society (ACS). Justification: As noted in section 6 of this Comprehensive Program review, *the ACS Guidelines for Chemistry in Two-Year College Programs* (Spring 2009) recommends that "no faculty member should be responsible for more than 25 students in a laboratory at one time." This statement reiterates the guidelines set in *Safety in Academic Chemistry Laboratories*, Vol. 2, ACS, 2003. Based on these recommendations and our Chemistry faculty observations, the Chemistry discipline seeks to reduce the enrollment capacities of General Chemistry and Introductory Chemistry labs from 32 to 25 students to provide a safer environment for our students. **See Appendix A for further comments.**	**unknown**	**unknown**	**unknown**	**Goal 1, obj. 1, 4, 6** **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.

[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.

Appendix A – Justification For Limits On Class Size Based On the American Chemical Society (ACS) Guidelines and Literature Findings.

The Chemistry discipline has significant concerns regarding the safety and quality of instruction due to overcrowding in our General Chemistry (CHE-1A/1B, which are taught in HUM 208) and Introductory Chemistry (CHE-2A, which is taught in HUM 204) lab classes with the current student capacities at 32 students (1). The American Chemical Society (ACS), the professional organization that sets the guidelines for chemical laboratory safety in academic labs, concludes that there should not be more than 25 students in any lab class due to safety concerns as well as providing optimum instruction to students (2,3). Moreover, Stephenson et al. (4) and West and Kennedy (5) found that larger lab class sizes significantly increase the number of accidents in secondary education. (This is considered a viable reference since Norco College's Introductory Chemistry labs are considered equivalent to high school chemistry.) Specifically, these authors found that the number of accidents in secondary chemistry classes increased by more than 300% when lab sizes are increased from 20-24 students to >24 students. ***Based on the ACS guidelines and the data presented in these references, the Chemistry faculty at Norco College recommends lowering the capacity CHE-1A, CHE-1B, and CHE-2A to 25 students.*** These changes would provide both an optimum safe environment for both students and faculty as well as an optimum education experience for our students by providing them with greater contact time with their lab instructors.

References

1. National Science Teachers Association, *Overcrowding in the Instructional Space*, http://static.nsta.org/pdfs/OvercrowdingInTheInstructionalSpace.pdf.; **2014**.
2. American Chemical Society. *Safety in Academic Chemistry Laboratories; Vol. 2, Accident Prevention for Faculty and Administrators,* 7th ed.; American Chemical Society: Washington, DC; **2003**.
3. American Chemical Society. *ACS Guidelines for Chemistry in Two-Year College Programs*, Fall 2015 ed.; American Chemical Society: Washington, D.C; **2015**.
4. Stephenson, A. L., West, S., and Westerlund, J. "An Analysis of Incident/Accident Reports from the Texas Secondary School Science Safety Survey, 2001;" *School Science and Mathematics* **2003**, *103(6)*, 293-303.
5. West, S. and Kennedy, L. "Safety in Texas Secondary Science Classrooms;" *Texas Academy of Science* **2014**, 58.

Norco College – Program Review Committee

Spring 2015

Rubric for Comprehensive 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. Trends and status change, prior and next four years identified	Trends and status change section is blank	Only prior **or** next four years completed, not both		Prior and next four years section completed with clear information in both, or identified as N/A
2. Retention, success, and efficiency rates have been identified and reflected upon	No identification or discussion of retention, success, or efficiency data	Limited identification or discussion of retention, success, and efficiency data	Clear identification and discussion of retention, success, and efficiency data	Substantial identification and discussion/interpretation of success, retention and efficiency data
3. (If Applicable) Specific program/certificate data are included and discussed	Not addressed	Missing data but attempt was made	Data were present but not discussed	Data were present and commented upon OR No program or certificate

4. Goals from prior comprehensive identified, activities linked to the goal, progress stated	No goals from prior comprehensive identified	Limited/generic statement made regarding goal(s), lacks clarity or details and/or activities, and/or progress stated	Clear statement made regarding goal(s), activities, and progress	Well-defined statement made regarding goal(s), and activities, includes details & reasoning, progress stated in depth
5. Long term goals identified, activities and timeline stated	No attempt made to identify long term goals, activities, and timeline	Limited/generic statement made regarding goal(s), lacks clarity or details and/or activities, and/or timeline	Clear statement made regarding goal(s), activities, and timeline	Well-defined statement and justification made regarding goal(s), and activities, includes details & reasoning, suggested timeline
6. Long term goals aligned to mission and EMP	No link between the long term 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
7. Course Outline of Record section is completed	COR section is blank	COR section is partially completed, missing some courses from catalog		COR section is completed in its entirety – all courses in catalog identified
8. Linkages made between reasons for resource request and EMP/Strategic Plan Goals (SPG)	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	Substantial connection made between resource requests and EMP/SPG
Column scores **(If no programs of study are applicable, do not average in points from item #3)**				

Additional comments:

II. Comprehensive Program Review Assessment Update

Purpose –This comprehensive review should provide your unit with an opportunity to reflect and analyze any trends from the assessments you conducted **over the past four years**. Consider it a meta-analysis of your own work. This update is intended to facilitate discussion within your discipline regarding the types of assessments, the range of outcomes you have experienced with regard to increasing student success, and any changes, modifications, or improvements you have made to courses that seem to have supported student learning. It should also provide you with an opportunity to determine a plan of action for assessment for the next four years. Use data stored in TracDat, your Annual Program Reviews, and the Norco Assessment Rotation Plan to help you to complete this review. 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.

Please take some time to review assessment from the past four years and answer the following questions.

Section 1: Discipline Evaluation of Assessment Process

a. In the first column please identify each of the courses you assessed **in the past four years**. Then state if the assessments were implemented by an individual faculty (I), or as collaborative group (C). Identify the primary **modes of assessment** (embedded tests, assignments with rubrics, class projects etc.). In the final column, please explain why your discipline uses the modes identified (pedagogical reasoning). Add rows as needed.

Course	**Individual (I) Collaborative (C)**	**Primary Modes of Assessment** (Embedded tests, rubrics, projects, etc.)	**Pedagogical Reasoning** – why does your discipline use these methods for assessment

b. Please provide an overview of the types of **changes made** (updated test questions, revised PowerPoints, redesigned assignments, new assignments) in a course or a program in response to your assessments. Explain which changes led to either greater student success, or didn't make any impact on student learning (provide reasoned argument as to why you think this occurred). In the final column identify which assessments led to permanent modifications.

Program and/or Course Name	**Changes made** (Updated test questions, new rubrics, revised assignments, etc.)	**Identify if any changes had an impact (positive, negative, or neutral) on student success** (provide reasoning)	**Permanent modifications made to course in response to assessment** **Yes or No**

c. Please discuss any external variables that you think might have provided support or deterred from your ability to increase student success in your discipline. Indicate N/A if you determine that no external variables impacted student success. (add rows as needed)

External Variables

Course/Program	**External Variables that supported or deterred from increasing student success**

d. Please identify any **teaching approaches** (pedagogy) that you perceive to have had a positive impact on your student's ability to engage in the learning process. This might not specifically include elements that have been formally assessed, but rather may reflect on good teaching practices that you deem effective. It might relate to elements such as the way you might have restructured the class (e.g., small group vs. direct lecture), the way in which you disseminate information (e.g., lecture vs. flipped classroom or action based learning). It might include the manner in which you gain feedback from students (journals, or clickers).

e. On reflection, can you identify any specific **resources**, support, or training that your discipline, department, or the institution might need to provide on-going support for student learning? If so, please explain. Please also identify any trainings or support from NAC that has been helpful or useful in planning or conducting assessment in your unit.

Section 2: Overview of Completed Assessment from the past four years

Using TracDat, or your Annual Program Reviews from the past four years please fill in the following data **for each courses and program your discipline lists in the Norco College catalog**. Please identify any courses that are in the process of being removed from the catalog. Please list programs first then courses.

Program Name/ Course Number	**Total number of initial assessments conducted**	**Total Number of changes made to courses as a result of assessment**	**Total number of loop-closing assessments conducted**	**Total of all assessment activity for each course/program** (all columns combined)

Section 3: Plan for Assessment

Please provide a comprehensive plan for assessment in your unit for the upcoming four years. Please identify any loop closing assessments that are carrying over from the prior four years of assessment (e.g., type *loop-closing* after them) – you should not plan to include a loop closing before you conduct an initial assessment.

Include plans for:

- **all programs** in your sole control (certificates or ADTs)
- **all courses** in your discipline
- **all SLOs** in each course

Suggestions for possible formats:

- If you have an existing rotation plan for course offerings it might be simple to identify which SLOs and PLOs will be assessed in each of the semesters on the rotation plan. Please imbed that plan directly into this document below.
- You could use a curriculum mapping tool to track completed SLO assessment, and subsequently evidence for completed PLO assessment.

In either cases, it is critical to know when each program assessment is due so that you can plan when to do the SLO assessment. It might be helpful to create separate plans for each Program, especially in CTE. The Norco Assessment Rotation Schedule is posted on the Assessment website for you to use in planning for Program Level assessment.

Scoring Rubric for Comprehensive Program Review of Assessment – Part II only

Assessment Unit Name: _____ **Average score _____**

	0	1	2	3	Comments
Section 1 • **Modes of assessment & reasoning____** • **Changes Made to courses ____** • **Success indicators ____** • **Teaching approaches ____** • **Resources ____**	No attempt made to provide responses to any of the questions (1-4) 0	Answers are extremely limited, e.g., yes, no, none; inconsistent depth in some responses; barely any reflection or insight provided, limited attempt to use assessment to increase ***understanding*** of student success and learning in the classroom 1	Clear and consistent responses to each question, some indication the discipline has attempted to use discipline based assessment results to increase ***understanding*** of student success and learning in the classroom 2	Clear and in depth responses to each question, strong indication the discipline has utilized assessment as a tool to increase ***understanding*** of student success and learning in the classroom, and teacher development 3	
Section 2 • **# of initial, changes made, loop-closing activities for course and program**	Chart is blank 0	Does not include all courses or programs 1		All courses and programs in the discipline are listed on the chart, each box has a number (or a zero to indicate "nothing" or no assessment conducted) 3	
Section 3 **Plan for assessment in the coming 4 years** • **Programs** • **Courses** • **SLOs**	No Plan provided 0	Does not include all Programs ____ Courses ____ SLOs ____ 1		All programs, courses and SLOs are included in assessment plan for the next four years – rotation cycle considered in plan 3	
Column Totals					