Chemistry PUR 2020-2021

Chemistry:

- Physical Sciences (Chemistry) 2020-21 PUR Self-Study

SI Section Templates: 1.A. Program or Unit Description, 1. B. Program or Unit Mission, 1.C. Program Learning Outcomes, 2.A. Progress on Previous Findings and Recommendations, 3. A. Technical Programs (AAS degrees and Certificates; Allied Health Programs only), 3.B. Transferability, 3.C. Student-centered Offerings, 3.D. Accessibility of Instructional Materials, 4.A. Curriculum Mapping, 4.B.1 Evidence of Program Learning Outcomes Assessment, 4.C. General Education Outcomes Assessment, 4.D. Five-year Course Assessment Cycle, 5.A. FTE, Section Count, Course Fill Rate, and Unsuccessful Enrollment Attempts, 5.B. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, and Age Range, 6.A. Course Completion, 6.B. Graduation and Transfer, 7.A. Faculty Achievement, 7.B. FT/PT Faculty and Student Credit Hours Taught, 7.C. Support Staff, 7.D. Facilities and Technology, 8.A. Five Year Plan, 9.A. Resource Requests, Academic Standards and Assessment Committee Findings and Recommendations, Dean's Findings and Recommendations, Vice President of Academic Affairs' Findings and Recommendations

Date: 09-07-2022

Sorted by: Section

1.A. Program or Unit Description

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Briefly describe the program/unit, including but not limited to the following: academic division that the program/unit belongs to, the academic area(s) represented, degrees/certificates offered, average student enrollment, number of full-time faculty, type of curriculum or pedagogical approaches, and any other pertinent aspect of the program/unit.

The Chemistry program at Truckee Meadows Community College is part of the Physical Sciences department in the Division of Math and Physical Sciences. The program offers an Associates of Science degree in Chemistry which transfers to most American Chemical Society (ACS) programs across the country, including at the University of Nevada, Reno (UNR). Chemistry enrollment averages around 250 FTE per year, with many of the students fulfilling their general education requirements or completing prerequisites for programs in allied health, engineering, biology, and the environmental sciences. Currently, the program employs three tenure-track faculty to

maintain a rigorous curriculum that encourages scientific problem solving, data analysis, and the development of lab skills. In the Chemistry program, the same instructor teaches both the lecture and lab sections of the course, allowing for the integration of lecture content in the lab and more one-on-one interaction between the student and instructor to help address misconceptions and develop problem-solving strategies for individual students.

1.B. Program or Unit Mission

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

State the department's or unit's mission. Describe how it aligns to the College's Mission, and how program learning outcomes (PLOs) for degrees and certificates offered, or for the unit, align to the department/unit mission. If your department or unit does not currently have a mission statement, please discuss among your colleagues and develop one.

The Chemistry program falls under the mission of the Physical Sciences department:

The mission of the Physical Sciences Department is to provide students the basic principles of modern astronomy, physics, chemistry, environmental science, geology, geography, and engineering to establish a foundation for those pursuing degrees in the natural sciences and engineering fields, as well as the prerequisite courses for students seeking degrees in biology and the allied health professions. As such, the Physical Sciences Department supports student success and academic excellence by offering college transfer courses in all areas, providing prerequisite classes for allied health and pre-professional programs, and supporting TMCC's general education requirements in the natural sciences.

Our department mission statement aligns with the college mission statement to provide accessible and innovative hands-on learning for students in courses taught by faculty rather than teaching assistants. Our PLOs meet the national guidelines as set by the American Chemical Society (ACS) and we assess the course content along those guidelines to ensure that when a student completes our program and courses that they can transfer to most colleges and universities in the country and continue their education.

1.C. Program Learning Outcomes

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Program Learning Outcomes (PSLOs or PLOs)
Chemistry
Associate of Science, Chemistry
PSLO1: Demonstrate a basic knowledge of General Chemistry in topics such as stoichiometry, nomenclature, acids and bases, gas laws, equilibrium, kinetics, thermochemistry, and electrochemistry. (Active from Fall 2010)
PSLO2: Demonstrate a basic knowledge of Organic Chemistry in topics such as stoichiometry, organic nomenclature, acids and bases, organic synthesis, reaction mechanisms, and spectroscopy. (Active from Fall 2010)
PSLO3: Demonstrate knowledge of scientific methods and the relationship of theory, experiment, and data analysis. (Active from Fall 2010)
PSLO

2.A. Progress on Previous Findings and Recommendations

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Describe your progress on the major findings and recommendations for the program/unit from the last PUR, any annual progress reports (APRs), and if applicable, external reviews, (e.g. advisory boards, articulation committees, and program accreditors).

- **Which findings and recommendations have the program/unit addressed?**
- **Which have yet to be accomplished? Which are no longer relevant, and why?**
- **Has the program/unit undergone any major changes as a result or that would impact the findings and recommendations since the last PUR?**

The Chemistry program last underwent a program/unit review in 2012 – 2013 as part of the Physical Sciences department PUR. The following recommendations for the entire department were made:

1. Successfully complete faculty tenure-track searches and put in place mentoring programs for new hires.
2. Develop specific faculty advisement strategies by discipline for students in 200-level physical science courses seeking an emphasis in a department discipline to increase transfer and graduation numbers.
3. Continue to monitor low transfer data and develop solutions to increase transfer rate. Implement strategies to increase graduation rates, including a co-admission program with UNR and reverse transfers.
4. With constrained resources, design and implement programs to recruit more women and minorities into the physical science disciplines.
5. Set specific goals and monitor increased external funding for innovative STEM programs designed to meet the needs of students and employers within Nevada.
6. Review and revise Student Learning Outcomes and Measures as required by the Office of Assessment
7. Develop an annual process within each discipline to use data to develop and analyze strategies for improving student success in retention, transfer, and graduation.
8. Within institutional space planning study, identify and implement solutions to lab and storage space inadequacies.

The last annual progress report (APR) on record was completed in 2016 – 2017. At that time, the following results were reported:

1. The two tenure-track chemistry positions in chemistry were filled with the hire of Dr. Matt Leathen and Ms. Olga Katkova. Both started in the fall 2014 semester. Dr. Katie Kolbet and Dr. Dan Loranz have both served as mentors to the new faculty.
2. This is an ongoing discussion within the department. Informal advising associated with the program continues on a one-on-one basis with students and faculty.
3. At last report, the Dean of Sciences was leading this effort.
4. The department continued with outreach activities at various recruitment functions.
5. Physical Sciences as a whole continued to pursue external funding. For the Chemistry program specifically, this was not as relevant as the Chemistry program is primarily a transfer program rather than one leading to direct employment.
6. All chemistry courses were revised and successfully submitted to CRC in the 2016 – 2017 academic year. Program learning outcomes were revisited but left unchanged as they still meet the program goals.
7. In the chemistry courses, formalized assessment has been in place since 2008. Course assessment reports were submitted annually until the most recent changes to the assessment cycle.
8. There was continued advocacy for the renovation of the RDMT 303 lab

space and additional lab space for chemistry.

Since the last APR, there have been some additional developments that were not formally reported with regards to several of the recommendations.

1. An additional tenure-track position was acquired for chemistry. Mr. Perry Mitchell was hired and began as a tenure-track faculty in the fall 2017 semester, but left the college in the fall 2020 semester. This leaves one open position in chemistry which cannot be filled under the current hiring freeze.
2. No changes.
3. In fall 2017, a transfer agreement was put into place with TMCC and UNR for the AS, Chemistry to seamlessly lead into the different BS, Chemistry programs at UNR.

1. No changes.
2. No changes.
3. No changes as related to programs.
4. No changes.
5. No changes.
6. In the fall 2020 semester, the Chemistry Program applied for and received $1.14 million funding from the Pennington Foundation for the renovation of RDMT 303 and the construction of two new labs in RDMT 325. Construction is slated to begin in the summer of 2021 with a completion date by the end of October 2021. The construction of the new labs will allow for an expansion of general chemistry sections at peak times, safer labs for the organic chemistry course, additional shared lab space with other programs within the department, and additional storage for equipment.

3.A. Technical Programs (AAS degrees and Certificates; Allied Health Programs only)

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Describe how your program(s) are meeting labor market demands and industry curriculum needs by answering the accompanying questions. The following are potential resources for labor market data, though other sources may be referenced.
Nevada Department of Employment Training and Rehabilitation (DETR) (https://detr.nv.gov/)
Economic Development Authority of Western Nevada (EDAWN) (http://edawn.org/)

U.S. Bureau of Labor Statistics (http://www.bls.gov/)

- **What is the evidence for the regional need for the program (DETR and EDAWN data)?**
- **What is the evidence that program curriculum meets the latest industry trends or workforce needs?**

Not applicable because we do not have an AAS or Certificate, nor are we an Allied Health Program.

3.B. Transferability

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

- **Which Bachelor's degrees(s), especially within the Nevada System of Higher Education, does the program's AA or AS degree(s) align?**
- **Does the AA or AS transfer seamlessly in a 2+2 agreement without a loss of credits or a substantial amount of courses counting only as general electives? Please reference the appropriate transfer agreement in the receiving institution’s catalog and explain.**

The Chemistry, AS, has a transfer agreement for the Chemistry (General Emphasis), BS in Chem at UNR. The other chemistry programs at UNR refer to the general Associate of Science programs at TMCC, though will accept the Chemistry, AS. These include:

- Chemistry (Environmental Chemistry Emphasis), BS in Chem
- Chemistry (Pre-Medical Emphasis), BS in Chem
- Chemistry (Professional Chemistry Emphasis), BS in Chem

Completion of the Chemistry, AS with the appropriate electives will allow a student to seamlessly transfer to any of these programs except for CHEM 345L, the two-credit organic chemistry lab. TMCC does not have the same level of instrumentation as UNR so most students looking to pursue those programs will back-transfer CHEM 345L in place of CHEM 241L and CHEM 242L.

For institutions outside of NSHE, the program laid out for the Chemistry, AS, meets the standard ACS guidelines for the first two years of a Chemistry, BS.

3.C. Student-centered Offerings

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

- **Is the program Information In the catalog up-to-date?**
- **Does the program's suggested course sequence in the catalog allow for completion of degrees within 2 years and/or certificates within 2 semesters for full-time students? Is there a recommended sequence for part-time students?**
- **Describe how courses are scheduled and faculty teaching schedules are assigned. How does the department/unit schedule its course offerings in a student-centered manner that meets student demand and allows for efficient completion? How are teaching assignments determined so that they are equitable for faculty?**

Except for one course that needs to be deactivated (CHEM 242), the program catalog is up-to-date.

Provided that students are ready to enter MATH 181 (Calculus I) when starting the program, the program can be completed within 2 years. MATH 181 is a prerequisite for PHYS 180, which is required for the program and transfer to other institutions, so to complete the program within 2 years, a student must complete MATH 181 within their first two semesters.

Courses are scheduled to maximize the use of the lab rooms, meet student demand at peak times, and allow instructor flexibility to cover multiple sections of the same course. The scheduling includes both day and night sections for most courses, with lab sections scheduled immediately following the lecture section. Current Covid-19 restrictions have forced the face-to-face sections to be held either entirely online or in a hybrid mode for labs. However, the following represents the scheduling in a normal, non-Covid-19 situation.

- CHEM 100: 1 - 2 course sections are offered online each semester with four at-home labs involving common household items. Two sections are offered face-to-face each spring for the TMCC High School. With the expansion of lab space, additional course sections will be offered on campus.
- CHEM 121: 10 – 12 course sections are offered face-to-face each semester. To maximize the current space in RDMT 303, lectures are offered at 8:00 am, 12:30 pm, and 5:30 pm for M/W and T/Th sections with the three-hour labs scheduled to follow the lecture sections (starting at 9:30 am, 2:00 pm, and

7:00 pm). Two lecture sections run at the same time (for example there are two M/W lecture sections) with labs on opposite days (one M/W lecture would have a lab on M, the other the lab on W).

- CHEM 122: 3 course sections are offered face-to-face each semester. For ease of lab set-up for the Prep lab, the labs for these sections are scheduled on Tuesdays and Wednesdays, with one lecture section on M/W and two, including a night section on T/Th.
- CHEM 220: 2 – 3 course sections are offered face-to-face each semester. Night sections are offered every other semester. The lecture and lab time varies by student demand and instructor availability.
- CHEM 341/342: the current plan is to offer one section of each course each semester, varying the schedule between day and night sections based on student needs.
- CHEM 241L/242L: the current plan is to offer one section of each course each semester, varying the schedule between day and night sections based on student needs.

The average fill rate for chemistry sections is 84%, above the average rate of 71% for TMCC and 81% for the Division of Math and Physical Sciences.

For the general chemistry courses (CHEM 100, CHEM 121, CHEM 122), Ms. Ogla Katkova and Dr. Katie Kolbet rotate in who has the first pick of the course sections.

The organic chemistry courses (CHEM 220, CHEM 341/342, and CHEM 241L/242L) are taught by Dr. Matt Leathen. As he is the only full-time instructor for those courses, he has the first pick of the course sections.

3.D. Accessibility of Instructional Materials

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

What is the department/unit currently doing or planning to help ensure that instructional materials are accessible to students with disabilities? For example, have all full-time faculty attended accessibility workshops? Have full-time faculty used the accessibility purchase checker when purchasing new curricular materials? Has the department/unit taken steps to ensure part-time faculty are using accessible instructional materials?

Currently, the only chemistry faculty who has attended the “Creating Accessible Content” workshop offered by TMCC Professional Development is

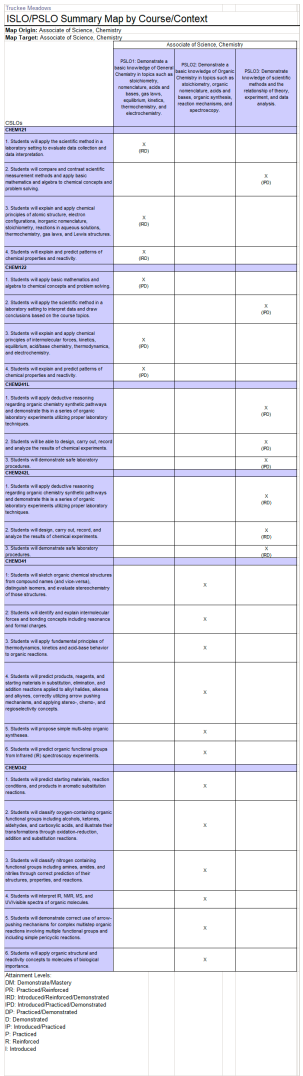
Dr. Katie Kolbet. At this time, she has created Canvas course shells for CHEM 100 and CHEM 122 that meet the accessibility standards. She is also the author of the current workbooks for CHEM 121 and CHEM 122, both of which are in the re-design process to meet accessibility standards.

The textbook used for CHEM 100 has been checked with an accessibility purchase checker and passed. However, the textbooks for other courses have not been checked, nor have any of the other course materials for other courses been revised to meet accessibility standards.

4.A. Curriculum Mapping

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study



Truckee Meadows

ISLO/PSLO Summary Map by Course/Context

Map Origin: Associate of Science, Chemistry
Map Target: Associate of Science, Chemistry

	Associate of Science, Chemistry		
	PSLO1: Demonstrate a basic knowledge of General Chemistry in topics such as stoichiometry, nomenclature, acids and bases, gas laws, equilibrium, kinetics, thermochemistry, and electrochemistry.	PSLO2: Demonstrate a basic knowledge of Organic Chemistry in topics such as stoichiometry, organic nomenclature, acids and bases, organic synthesis, reaction mechanisms, and spectroscopy.	PSLO3: Demonstrate knowledge of scientific methods and the relationship of theory, experiment, and data analysis.
CSLOs			
CHEM101			
1. Students will apply the scientific method in a laboratory setting to evaluate data collection and data interpretation.	X (IRD)		
2. Students will compare and contrast scientific measurement methods and apply basic mathematics and algebra to chemical concepts and problem solving.			X (IRD)
3. Students will explain and apply chemical principles of atomic structure, electron configurations, inorganic nomenclature, stoichiometry, reactions in aqueous solutions, thermochemistry, gas laws, and Lewis structures.	X (IRD)		
4. Students will explain and predict patterns of chemical properties and reactivity.	X (IRD)		
CHEM122			
1. Students will apply basic mathematics and algebra to chemical concepts and problem solving.	X (IPD)		
2. Students will apply the scientific method in a laboratory setting to interpret data and draw conclusions based on the course topics.			X (IPD)
3. Students will explain and apply chemical principles of intermolecular forces, kinetics, equilibrium, acid/base chemistry, thermodynamics, and electrochemistry.	X (IPD)		
4. Students will explain and predict patterns of chemical properties and reactivity.	X (IPD)		
CHEM121L			
1. Students will apply deductive reasoning regarding organic chemistry synthetic pathways and demonstrate this in a series of organic laboratory experiments utilizing proper laboratory techniques.			X (IPD)
2. Students will be able to design, carry out, record and analyze the results of chemical experiments.			X (IPD)
3. Students will demonstrate safe laboratory procedures.			X (IPD)
CHEM241L			
1. Students will apply deductive reasoning regarding organic chemistry synthetic pathways and demonstrate this is a series of organic laboratory experiments utilizing proper laboratory techniques.			X (IRD)
2. Students will design, carry out, record, and analyze the results of chemical experiments.			X (IRD)
3. Students will demonstrate safe laboratory procedures.			X (IRD)
CHEM241			
1. Students will sketch organic chemical structures from compound names (and vice-versa), distinguish isomers, and evaluate stereochemistry of those structures.		x	
2. Students will identify and explain intermolecular forces and bonding concepts including resonance and formal charges.		x	
3. Students will apply fundamental principles of thermodynamics, kinetics and acid-base behavior to organic reactions.		x	
4. Students will predict products, reagents, and starting materials in substitution, elimination, and addition reactions applied to alkyl halides, alkenes and alkynes, correctly utilizing arrow pushing mechanisms, and applying stereo-, chemo-, and regioselectivity concepts.		x	
5. Students will propose simple multi-step organic synthesis		x	
6. Students will predict organic functional groups from infrared (IR) spectroscopy experiments.		x	
CHEM242			
1. Students will predict starting materials, reaction conditions, and products in aromatic substitution reactions.		x	
2. Students will classify oxygen-containing organic functional groups including alcohols, ketones, aldehydes, and carboxylic acids, and illustrate their transformations through oxidation-reduction, addition and substitution reactions.		x	
3. Students will classify nitrogen containing functional groups including amines, amides, and nitriles through correct prediction of their structures, properties, and reactions.		x	
4. Students will interpret IR, NMR, MS, and UV/visible spectra of organic molecules.		x	
5. Students will demonstrate correct use of arrow-pushing mechanisms for complex multistep organic reactions involving multiple functional groups and including simple pericyclic reactions.		x	
6. Students will apply organic structural and reactivity concepts to molecules of biological importance.		x	

Attainment Levels:
DM: Demonstrate/Mastery
PR: Practiced/Reinforced
IRD: Introduced/Reinforced/Demonstrated
IPD: Introduced/Practiced/Demonstrated
DP: Practiced/Demonstrated
D: Demonstrated
IP: Introduced/Practiced
P: Practiced
R: Reinforced
I: Introduced

Once your map is complete, please analyze the following:

- **PLOs: Do all PLOs still reflect what you want students to demonstrate once they complete the program? Are there any PLOs that need to be updated?**
- **Potential gaps and redundancies: Are there any PLOs that are not addressed in the curriculum? Are there any unwanted redundancies of PLOs in the curriculum?**
- **CLO alignment: Is there a need to modify any course learning outcomes so that courses better support PLOs?**
- **Course sequencing: Is there a need to modify the course sequencing, so students have a more seamless learning experience?**
- **Curriculum and learning opportunities: Is it necessary to introduce new learning opportunities to reinforce learning? These could be modules or assignments in courses, additional courses, and/or co-curricular opportunities that would be required of all students in the program.**
- **Other?**

The courses which map to the Chemistry, AS are

- CHEM 121: General Chemistry I
- CHEM 122: General Chemistry II
- CHEM 341: Organic Chemistry for Scientists and Professionals I
- CHEM 241L: Organic Chemistry for Life Sciences Lab I
- CHEM 342: Organic Chemistry for Scientists and Professionals II
- CHEM 242L: Organic Chemistry for Life Sciences Lab II

The PLOs do reflect both the outcomes and measures that the Chemistry program wishes to advance. These have been reviewed and no updates were required. The curriculum sequences match that which is suggested by the American Chemical Society (ACS) and used by the majority of universities and colleges across the US.

The CLOs do map directly to the PLOs and directly reflect the content of the courses. These were reviewed and no revisions were required.

4.B. Evidence of Program Learning Outcomes Assessment

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Now that you have completed your curriculum map, summarize the most significant *program* assessment results since your last PUR. These will come from any data we have available in eLumen as well as past assessment reports. Please discuss these findings as they relate to the program and program learning outcomes, not just individual courses.

At the time of the last PUR, we were not completing a program-level assessment. The Chemistry, AS, had not been in place very long, and there were no graduates of the program. At this time, 7 students have completed the Chemistry, AS and 1 student is scheduled to complete the degree in the spring 2021 semester.

- 2014: Number of students completing the degree: 1
  - The student passed the CHEM 121 and CHEM 122 final exam, but there is no assessment for CHEM 241/241L, CHEM 242/242L as these courses were not completed at TMCC.
- 2015: Number of students completing the degree: 1
  - This student passed the final exams in CHEM 121, CHEM 122, and CHEM 242, but failed the final exam in CHEM 241.
- 2016: Number of students completing the degree: 1
  - The student transferred in CHEM 201 and CHEM 202 (equivalent to CHEM 121 and CHEM 122) and passed the final exam in CHEM 241 and CHEM 242.
- 2017: Number of students completing the degree: 1
  - The student passed all the final exams in CHEM 121, 122, 241, and 242.
- 2018: Number of students completing the degree: 1
  - The student passed all the final exams in CHEM 121, 122, 241, and 242.
- 2019: Number of students completing the degree: 2
  - One of the students passed all the final exams in CHEM 121, 122, 241, and 242.
  - The second student only passed the final exam in CHEM 241.
- 2020: Number of students completing the degree: 0
- 2021: Number of students planning to complete the degree: 1
  - The student passed all the final exams in CHEM 121, 122, 241, and 242.

Successful completion, as measured by the program outcomes, is passing the final exam based on the ACS standardized test. Based on the passing rates as

outlined above, 2/8 (25%) students were unable to be measured, 2/8 (25%) completed the degree but did not pass all of the final exams, and 4/8 (50%) completed the degree and did pass all of the final exams. In terms of program assessment, this means of those students who can be measured, 4/6 (67%) successfully completed the program outcomes.

The number of students completing the program is low, primarily because of the math and physics requirements. Many students opt instead to complete the general Associate of Science degree and fill in the math and physics at their transfer institution. With such low numbers, it is difficult to assess whether or not the program needs to address teaching and learning beyond the course level.

Prior to the introduction of CHEM 341/342 at TMCC, students who wished to pursue chemistry or allied health degrees and were planning to transfer to UNR were being advised to not take CHEM 241/242 at TMCC by UNR and the University of Nevada School of Medicine (UNSOM) advisors. In 2019, TMCC was allowed to create the 300-level courses to make the transfer more seamless for students. The hope is that student completion of the Chemistry AS will increase allowing for a more in-depth study of the program in the future.

Describe how plans were implemented to try and improve teaching and learning. What changes did you make to the program based on assessment results and improvement plans?

Individual courses are assessed every semester, even though official reports are only filed every 2 – 4 years. A summary of the non-general education assessment follows:

CHEM 121: General Chemistry I
Last formal report: Fall 2018 Next formal report: Fall 2021

CLOs: (Based on Fall 2018 data)

- Students will apply the scientific method in a laboratory setting to evaluate data collection and data interpretation.

  Not assessed in this period.

- Students will compare and contrast scientific measurement methods and apply basic mathematics and algebra to chemical concepts and problem solving.

  Measures: Pre/post exams.

Outcomes: 13% exemplary, 29% proficient, 28% marginal, 30% unacceptable

- Students will explain and apply chemical principles of atomic structure, electron configurations, inorganic nomenclature, stoichiometry, reactions in aqueous solutions, thermochemistry, gas laws, and Lewis structures.

Measures: Pre/post exams.

Outcomes: 27% exemplary, 33% proficient, 20% marginal, 20% unacceptable

- Students will explain and predict patterns of chemical properties and reactivity.

Measures: Pre/post exams.

Outcomes: 27% exemplary, 33% proficient, 20% marginal, 20% unacceptable

Analysis: The course instructors did not report any analysis for the assessment data and no reflection was provided in eLumen.

Action Plan: Beginning in Fall 2020, a new assessment will be designed by Ms. Olga Katkova as part of the assessment cycle (a new pre/post-exam is introduced every 3 – 4 years to vary the content that is assessed on the exams.

CHEM 122: General Chemistry II
Last formal report: Fall 2019 Next formal report: Fall 2022

CLOs: (Based on Spring 2019 data)

- Students will apply the scientific method in a laboratory setting to evaluate data collection and data interpretation.

Measures: Lab assignments graded on a rubric

Outcomes: 40% exemplary, 21% proficient, 34% marginal, 5% unacceptable

- Students will apply the scientific method in a laboratory setting to interpret data and draw conclusions based on the course topics

Measures: Lab assignments graded on a rubric

Outcomes: 40% exemplary, 26% proficient, 31% marginal, 3% unacceptable

- Students will explain and apply chemical principles of intermolecular forces, kinetics, equilibrium, acid/base chemistry, thermodynamics, and electrochemistry.

Measures: Pre/post exams

Outcomes: 37% exemplary, 32% proficient, 29% marginal, 3% unacceptable

- Students will explain and predict patterns of chemical properties and reactivity.

Measures: Pre/post exams

Outcomes: 53% exemplary, 19% proficient, 21% marginal, 7% unacceptable

Analysis: We found that students were not retaining much knowledge from the first exam material. Certain topics continue to be a challenge for students, such as intermolecular forces, integrated rate laws, acid/base equilibrium, solubility equilibrium, and using free energy with equilibrium. We decided to implement more questions from the first exam material into the second and third exam material. We will also be looking at the assessment from this semester and the next as the in-class Workbook is prepared for its next edition (to be released in the Fall 2021) with an eye to course materials that might help students in the topic with which they struggle. Students, in general, are much better at drawing conclusions than at performing calculations. (Side-note: all the common conceptual mistakes also appear as potential incorrect answers for calculation problems.) We may be seeing some effects from the change in the math prerequisite, though we do not have more than one semester of data for comparison as this assessment was new in Fall 2017.

Action Plan: We are in our second year of giving this particular assessment exam, and so in the Fall 2019 we will be implementing a new pre- and post-exam for the course. The development of the new assessment will involve looking over our results from the past three semesters as well as comparing with the most recent American Chemical Society (ACS) exam. Typically, we adjust content to reflect the national trends in assessment, but also keep a number of baseline questions so that we can track from one assessment to the next.

CHEM 220: Introductory Organic Chemistry

Last formal report: Fall 2019 Next formal report: Spring 2022

(This was included in this section as it is not a Gen-Ed course, nor part of our program but we still carry out assessment)

- The student will gain knowledge of selected organic structures and reactions that are important in physiological activity and biochemistry through textual materials, lectures, practice problems, and laboratory work.

Measures: Pre/post exams

Outcomes: 27% exemplary, 27% proficient, 31% marginal, 16% unacceptable

- The student will gain knowledge of the structure and properties of compounds of biochemical interest such as amino acids, enzymes, carbohydrates, and lipids through textual materials, lectures, practice problems, and laboratory work.

Measures: Pre/post exams

Outcomes: 36% exemplary, 27% proficient, 18% marginal, 20% unacceptable

Analysis: Students struggled more this semester than they had in the past, evidenced by a larger number of marginal scores.

Action plan: Improved discussion boards may help engage the students that are marginal and bring them up to the level of proficient.

CHEM 241/341: Organic Chemistry I

Last formal report: Fall 2016 (for CHEM 241) Next formal report: Fall 2020

CLOs: (From Fall 2016)

- Students will gain knowledge of organic chemistry terminology, methods, language and structure, including functional groups, reactions, synthesis, and mechanisms.

Measures: Pre/Post exams

Outcomes: Average Hake gains: 0.382

- Students will learn fundamental problem-solving skills in organic chemistry

using chemical reasoning to anticipate products and design simple synthetic pathways.

Measures: Pre/Post exams

Outcomes: Average Hake gains: 0.382

Analysis: Data was collected before the ranking system associated with eLumen. The measure of a Hake gain now forms the basis for the current ranking system. A Hake gain of 0.382 means the class as a whole rated in the proficient range.

Action Plan: Topical areas which need strengthening will be emphasized with the development of new activities.

Note: CHEM 241 was converted to CHEM 341. The content remains the same, only the course number changed. CLOs were updated to reflect appropriate use of action verbs associated with measurable outcomes and to better align with the CHEM 341 course at UNR. The Fall 2020 Assessment report is being delayed due to the Covid-19 situation and low course enrollments as a result of that situation.

CHEM 241L: Organic Chemistry for Life Sciences Lab I
Last formal report: Spring 2019 Next formal report: Fall 2021

CLOs: (From Fall 2019)

- Students will apply deductive reasoning regarding organic chemistry synthetic pathways and demonstrate this in a series of organic laboratory experiments utilizing proper laboratory techniques.
  Measure: Laboratory assignments graded using a pre-determined rubric.

Outcomes: 67% exemplary, 33% proficient, 0% marginal, 0% unacceptable

- Students will be able to design, carry out, record, and analyze the results of chemical experiments.
  Measure: Laboratory assignments graded using a pre-determined rubric.

Outcomes: 33% exemplary, 25% proficient, 33% marginal, 8.3% unacceptable

Analysis: Student performance was better than expected.

Action plan: Implementation of an improved rubric will help with future assessment.

CHEM 242/342: Organic Chemistry II
Last formal report: Spring 2016 (for CHEM 242) Next formal report: Spring 2020

CLOs: (From Fall 2016)

- Students will gain knowledge of organic chemistry and biochemistry terminology, methods, language and structure, including functional groups, reactions, synthesis, and mechanisms.
  Measures: Pre/Post exams

Outcomes: Average Hake gains: 0.549

- Students will learn more advanced problem-solving skills in organic chemistry using chemical reasoning to anticipate products and design simple synthetic pathways.
  Measures: Pre/Post exams

Outcomes: Average Hake gains: 0.549

Analysis: Data was collected before the ranking system associated with eLumen. The measure of a Hake gain now forms the basis for the current ranking system. A Hake gain of 0.549 means the class as a whole rated in the exemplary range.

Action Plan: Topical areas which need strengthening will be emphasized with the development of new activities.

Note: CHEM 242 was converted to CHEM 342. The content remains the same, only the course number changed. CLOs were updated to reflect appropriate use of action verbs associated with measurable outcomes and to better align with the CHEM 342 course at UNR. The Spring 2020 Assessment report is being delayed due to the Covid-19 situation and low course enrollments as a result of that situation.

CHEM 242L: Organic Chemistry for Life Sciences Lab I
Last formal report: Spring 2019 Next formal report: Fall 2021

CLOs: (From Fall 2018)

- Students will apply deductive reasoning regarding organic chemistry synthetic pathways and demonstrate this in a series of organic laboratory experiments utilizing proper laboratory techniques.

- Students will be able to design, carry out, record, and analyze the results of chemical experiments.

No data has been reported by the course instructor in eLumen for this course.

4.C. General Education Outcomes Assessment

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

- **Identify which general education learning outcomes (GELOs) you assessed and summarize the most significant assessment results.**
- **Describe how plans were implemented to try and improve teaching and learning in general education (GE). What changes did you make assessment results and improvement plans? Do any CLOs need to be changed to meet GE assessment requirements?**

Three courses, CHEM 100, CHEM 121, and CHEM 122 are general education courses. All three courses are assessed every semester for every section. However formal reports are only filed every 2 - 3 years.

CHEM 100: Molecules and Life in the Modern World

Last formal report: Fall 2019 Next scheduled formal report: Fall 2021

General Education outcomes: (Spring 2018 – Fall 2019)

- Critical Thinking: Students will identify and summarize or explain the main question(s), problem(s), issues(s), points and/or arguments.

Measure: Specific sections of Writing Assignments 1, 2, and 3 evaluated based upon a rubric used by all instructors.

Outcomes:

Online sections: 34% exemplary, 32% proficient, 11% marginal, 23% unacceptable

Face-to-Face TMCC High School sections (high school sophomores): 24% exemplary, 14% proficient, 20% marginal, 42% unacceptable.

- Critical Thinking: Students will state a position, perspective, thesis, hypothesis, argument, or findings based on a line of reasoning and/or evidence.

Measure: Specific sections of Writing Assignments 1, 2, and 3 evaluated based upon a rubric used by all instructors.

Outcomes:

Online sections: 65% exemplary, 8% proficient, 13% marginal, 14% unacceptable

Face-to-Face TMCC High School sections (high school sophomores): 29% exemplary, 28% proficient, 20% marginal, 23% unacceptable.

- Quantitative Reasoning: Students will evaluate mathematical and/or logical results for issues of validity, accuracy, and/or relevance to the real world.

Measure: Specific sections of Writing Assignments 1, 2, and 3 evaluated based upon a rubric used by all instructors.

Outcomes:

Online sections: 71% exemplary, 18% proficient, 4% marginal, 7% unacceptable

Face-to-Face TMCC High School sections (high school sophomores): 35% exemplary, 28% proficient, 21% marginal, 16% unacceptable.

Analysis: Overall, the online sections tend to perform better than the TMCC HS sections, primarily because of the academic maturity of the college students in the online course. The performance for the online sections is quite good with 66%, 73%, and 89% exemplary or proficient but could be improved upon. The performance for the TMCC HS students has also fallen during the reporting period as compared to the prior semesters as one of the sophomore faculty with whom Dr. Katie Kolbet collaborated retired. During the evaluation period, the position was filled with a temporary instructor who had no interest in collaborating.

Action Plan: In summer 2020, the writing assignments were reviewed and redesigned to give more specific instructions. The rubrics were made more specific, and more critical thinking and quantitative exercises were introduced earlier in the course. Peer reviews were introduced to allow students a chance to see examples of both good and bad analysis, and so more of a progression of critical thinking is being looked at as students develop over the semester. For the TMCC HS course, once the Covid-19 restrictions have passed and these courses return to face-to-face, more in-class activities, and

peer reviews, as well as collaboration with the TMCC HS faculty, are planned.

CHEM 121: General Chemistry I
Last formal report: Fall 2018 Next formal report: Fall 2021

General Education outcomes: (Fall 2018)

- Critical Thinking: Students will draw valid conclusions.
  Measures: Pre-post exams.

  Outcomes: 10% exemplary, 28% proficient, 33% marginal, 29% unacceptable

- Quantitative Reasoning: Students will use the mathematics appropriate calculations to solve an application and/or particular problem to obtain a correct solution.
  Measures: Pre-post exams.

  Outcomes: 30% exemplary, 34% proficient, 35% marginal, 21% unacceptable

Analysis: The course instructors did not report any analysis for the assessment data nor was any reflection provided in eLumen.

Action Plan: Beginning in Fall 2020, a new assessment will be designed by Ms. Olga Katkova as part of the assessment cycle (a new pre/post-exam is introduced every 3 – 4 years to vary the content that is assessed on the exams.

CHEM 122: General Chemistry II
Last formal report: Fall 2019 Next formal report: Fall 2022

General Education outcomes: (Fall 2019)

- Critical Thinking: Students will draw valid conclusions.
  Measures: Pre-post exams.

  Outcomes: 53% exemplary, 19% proficient, 25% marginal, 3% unacceptable

- Quantitative Reasoning: Students will use the mathematics appropriate calculations to solve an application and/or particular problem to obtain a

correct solution.
Measures: Pre-post exams.

Outcomes: 37% exemplary, 21% proficient, 37% marginal, 5% unacceptable

Analysis: We found that students were not retaining much knowledge from the first exam material. Certain topics continue to be a challenge for students, such as intermolecular forces, integrated rate laws, acid/base equilibrium, solubility equilibrium, and using free energy with equilibrium. We decided to implement more questions from the first exam material into the second and third exam material. We will also be looking at the assessment from this semester and the next as the in-class Workbook is prepared for its next edition (to be released in the Fall 2021) with an eye to course materials that might help students in the topic with which they struggle. Students, in general, are much better at drawing conclusions than at performing calculations. (Side-note: all the common conceptual mistakes also appear as potential incorrect answers for calculation problems.) We may be seeing some effects from the change in the math prerequisite, though we do not have more than one semester of data for comparison as this assessment was new in Fall 2017.

Action Plan: We are in our second year of giving this particular assessment exam, and so in the Fall 2019 we will be implementing a new pre- and post-exam for the course. The development of the new assessment will involve looking over our results from the past three semesters as well as comparing with the most recent American Chemical Society (ACS) exam. Typically, we adjust content to reflect the national trends in assessment, but also keep a number of baseline questions so that we can track from one assessment to the next.

4.D. Five-year Course Assessment Cycle

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Assessment Cycle for 2019-2024			GEN ED Competencies: People and Culture=PC, Critical Thinking=CT, Communication=COM, Information Literacy=ILIT, and Quantita											
Final Proof 2/7/2020		Y=Mean	X=Means it is	CNO=Course up for assessment but not offered in										

			s it is an GE N ED Co urs e	schedul ed for assessm ent		the semester as indicated													
								Academ ic Year		Academ ic Year		Academ ic Year		Academ ic Year		Academ ic Year		Academ ic Year	
Pre fix	Co urs e #	Ge nE d	Co urs e	GE N ED Co mp ete nci es	Div isio n	De par tm ent	As Tau ght	Fall 20 19	Spr ing 20 20	Fall 20 20	Spr ing 20 21	Fall 20 21	Spr ing 20 22	Fall 20 22	Spr ing 20 23	Fall 20 23	Spr ing 20 24	Fall 20 24	Spr ing 20 25
CH EM	10 0	Y	MO LEC UL ES & LIF E IN TH E MO DE RN WO RL	Nat ura l Sci enc e: QR, CT	Sci enc e	Phy sic al Sci enc e						X						X	
CH EM	12 1	Y	GE NE RA L CH EMI ST RY I	Nat ura l Sci enc e: QR, CT	Sci enc e	Phy sic al Sci enc e							X						X
CH EM	12 2	Y	GE NE RA L CH EMI ST RY	Nat ura l Sci enc e: QR, CT,	Sci enc e	Phy sic al Sci enc e		X						X					

			II	ILIT														
CHEM	198	N	SPECIAL TOPICS IN CHEMISTRY	N/A	Science	Physical Science	X											
CHEM	220	N	INTRODUCTORY ORGANIC CHEMISTRY	N/A	Science	Physical Science		X	X				X				X		
CHEM	241L	N	ORGANIC CHEMISTRY FOR LIFE SCIENCES L	N/A	Science	Physical Science						X				X			
CHEM	242L	N	ORGANIC CHEMISTRY FOR LIFE SCI	N/A	Science	Physical Science			X				X				X		

			ENCES L																
CHEM	341	N	ORGANICCHEMISTRYFORSCIENTISTSAND	N/A	Science	Physical Science				X				X				X	
CHEM	342	N	ORGANICCHEMISTRYFORSCIENTISTSAND	N/A	Science	Physical Science					X				X				X

There are no changes to the current file on record with the Assessment and Planning Office.

5.A. FTE, Section Count, Course Fill Rate, and Unsuccessful Enrollment Attempts

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

The Chemistry program as a whole has shown slightly declining enrollment (-5%) over the last five years of from an FTE of 255.5 in 2015-2016 to 242.0 in 2019-2020, which coincides with TMCC's average decline of -6%. The section count has fluctuated between 42 – 48 sections per year during that time with an average fill rate of 84%. The section count decrease is in part due to the

loss of 2 – 3 sections per year from the Galena High School AP Chemistry program labs. These labs were only available to that cohort and not to the general college population, but they are no longer being offered. Also, some of the organic chemistry lab sections have been canceled for low enrollment rather than running them with less than 30% capacity and because of the lack of lab space, we moved all CHEM 100 sections other than the TMCC HS online, reducing them by at least one section a semester.

Typically, enrollment is higher in the spring semesters than in the fall, primarily because of the TMCC HS CHEM 100 sections (which fill to 100%) and the increase in CHEM 122 enrollment as more students have completed CHEM 121 in the fall. When CHEM 241 was offered only in the spring semester, the fill rate in that course was higher, but now that CHEM 341 is offered every semester, the fill rates have declined for that course. The highest fill rates are typically for the general education courses, CHEM 100, CHEM 121, and CHEM 122.

Unsuccessful attempts are highest for CHEM 121 and CHEM 122, typically for instructor-specific sections, or sections at high-demand times. Students tend to prefer to take courses from instructors they know—our full-time faculty and long-serving part-time faculty who have established themselves as excellent instructors. There were 52.6 unsuccessful attempts (approximately two sections of students) on average over the 5-year period for CHEM 121, and with a 93% fill rate, there is a definite need to expand sections at high-demand times. Additional sections will be added beginning in the spring 2022 semester with the new lab construction. The 11.7 unsuccessful attempts on average for CHEM 122 are typically for the evening section. Again, with the expansion in lab space, we will be able to offer an additional section of CHEM 122 beginning in the spring 2022 semester.

Please analyze and discuss the trends you see in FTE and section counts, including how they compare to those of the division and College. Discuss any factors that could have led to significant trends or shifts in enrollment and sections offered.

Please analyze the default settings first. Then, you may use the drop-down menus to examine more disaggregated data sets. If you describe any trends in these more specific data, please include a screen shot of the data to accompany your discussion.

Please see the first section.

Please analyze and discuss the trends or shifts you see. Discuss any factors that could have led to significant trends or shifts in course fill rate and unsuccessful enrollment attempts.

Please analyze the default settings first. Then, you may use the drop-down menus to examine more disaggregated data sets. If you describe any trends in these more specific data, please include a screen shot of the data to accompany your discussion.

Please see the first section.

5.B. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, and Age Range

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Over the last five years, the Chemistry program has seen a decrease in Caucasian students from an average of ~58% to ~50% and an increase in Hispanic students from ~24% to ~30%. This reflects the overall change in the student population at TMCC. The program serves slightly more Asian students (~9%) than the general TMCC population (~6%) and slightly fewer Black students (~1.5% for the program, ~2.8% for the general population).

The Chemistry program has a higher female percentage, ~ 59%, than the general TMCC student population (~54%). The primary age group of the student taking chemistry courses is the 18 – 24-year-old range (~61%), with slightly higher levels in the fall semesters than in the spring semesters as students begin their studies right out of high school. The second highest age group is the 25 – 34-year-old range (~22%). These match age group breakdowns in the general TMCC population. Unlike the TMCC student population, the Chemistry program has not seen an increase in the number in the number of high school students who are dual-enrolled. These numbers have remained steady, with a small spike in Fall 2018, over the five years. The lower enrollment in chemistry courses for high school students is most likely due to the math prerequisite of MATH 126, which many students have not completed until their senior year of high school.

Approximately 43% of all students taking chemistry courses are full-time, with an average of 77% of the students continuing their studies at TMCC. These numbers have fluctuated over the five-years, but not by much. The number of

full-time students in the general population at TMCC in the same period averages ~27% full-time with 73% continuing. Thus, more students who are taking chemistry are taking full course loads, and there are only slightly more of them continuing their studies at TMCC.

Briefly describe the typical student profile in terms of ethnicity, gender, credit load, student status, and age in your program/unit. Please note and discuss any reasons why the demographics of students in your program noticeably differ from TMCC's student demographics. Please note any potentially underserved student populations and the reasons why they may exist.

Please see the first section.

6.A. Course Completion

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

The five-year average for course completion rate in chemistry is 81% with successful completion at 70%. These rates have remained steady for the last five years, with a small uptick to a 75% successful completion rate in the 2018 – 2019 academic year. The completion/successful completion rates are directly in line with those for the general TMCC population but above the averages for the Division of Math and Physical Sciences. Students who do earn a C- or lower can proceed to take the next course in all cases except for the transfer from CHEM 121 to CHEM 122. These rates have remained steady for the last five years.

Almost all of the student ethnic groups show the same completion/successful completion rates (with Asians, American Indians, and Caucasians slightly higher) except for the Hawaiian/Pacific Islander group, which has a 75% completion and 50% successful completion rate. The Hawaiian/Pacific Islander group makes up less than 0.1% of the chemistry student population, so the lower success rate may be a reflection of the low number of students in the cohort.

There are no significant differences in completion/successful completion rates for male vs. female students, nor between full-time and part-time students. For the age groups, the only significant differences in completion/successful completion rates are for the 18 group (97%/87%) and the 50+ group (74%/58%).

Based on these data, the conclusion can be drawn that there are no equity gaps except for possibly the 50+ group. The only observed issue with the 50+ group is the struggle with the high level of computer literacy required in the course.

Please describe any substantial trends or shifts that you see in overall course completion rates and successful completion (C or better). What might these trends or shifts mean? Discuss any factors that could have led to these trends or shifts in the data. Next, disaggregate the data by student demographics and describe any substantial trends. An educational equity gap is where there is a significant and persistent disparity in educational attainment between different groups of students. Are there any equity gaps in course completion or successful completion rates?

Please see the first section.

6.B. Graduation and Transfer

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Please discuss any trends or shifts that you see in overall graduation and transfer. Next, disaggregate the data by student demographics and describe any substantial trends. An educational equity gap is where there is a significant and persistent disparity in educational attainment between different groups of students. Are there any equity gaps in graduation or transfer?

In the Physical Sciences department, approximately 74% of the students who graduate transfer to other institutions. Of those, 84% transfer to other NSHE institutions, and 16% transfer to non-NSHE institutions. For the entire department, only 62 students are counted as transfer graduates and most of those are in Computer Science and Engineering.

The Chemistry program averages 1 graduate per year, with 6 graduates in the last 5 years. Of those, 2 are female and the rest male. The majority of the students (4/6) who completed the Chemistry, AS were full-time students, in the 24 – 35-year-old range, and Caucasian. Because of the small number of graduates per year, it is difficult to draw any broad trends.

7.A. Faculty Achievement

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Describe the program/unit's full-time (FT) faculty credentials, experience, and highlights of significant activities and/or contributions to TMCC. Please use the format below for each FT faculty member.

- **Faculty Name, FTE**
- **Degree(s) or professional certification(s) awarded, discipline, awarding institution**
- **Substantial accomplishments or contributions to the community, especially those related to education or your discipline (e.g. mentoring, community service) (please limit to 3)**
- **Number of years teaching at TMCC**
- **Total number of years in academia**
- **Primary courses taught**
- **Significant activities or contributions made to TMCC (Please limit to 3)**

Kathleen Kolbet, 1.3 FTE

Ph.D in Physical Chemistry from the University of Illinois-Champaign-Urbana
B.S. in Chemistry from Gonzaga University
B.S. in Mathematics from Gonzaga University

Faculty advisor to Chem101, Inc. (2017 – present)
Author: Chem 121 Workbook, Chem 122 Workbook used at TMCC, WNC, and Sierra Nevada College.
Active member of the American Chemical Society (ACS)-Education division

Number of years teaching at TMCC: 16 (started 2005)
Number of years in academia: 28 (started 1993)

Primary courses taught:
CHEM 100: Molecules and Life in the Modern World (lead faculty)
CHEM 122: General Chemistry II (lead faculty)
CHEM 121: General Chemistry I

Chair, Curriculum Review Committee (2020 – 2022)
Chair (2012 - 2015) and Chair-elect of the Physical Sciences Department
Recipient of the Distinguished Faculty Award “Faculty Excellence in Teaching” (2016)

Olga Katkova, 1.2 FTE
M.S. in Chemistry, Bowling Green State University
M.S. in Chemical Engineering, D. Mendeleev Russian University of Chemical Technology of Russia
B.S. in Marketing, Commercial College, Moscow, Russia

Active member and Facilitator for 2YC3 (Two-year College Chemistry Consortium)
ACS Chemistry Ambassador to local schools
Recipient of the Certificate of Effective College Instruction (ACUE)

Number of years teaching at TMCC: 6 years (started 2014)
Number of years teaching in academia: 16 (started 2003)

Primary courses taught:
CHEM 121: General Chemistry I (lead faculty)
CHEM 100: Molecules and Life in the Modern World

Chair of the Award Selection Committee for the Distinguished Faculty Awards
Nevada Promise Scholarship mentor
Recipient of the Distinguished Faculty Award “Faculty Excellence in Teaching” (2017) and PTK “Teacher of the Year Award” (2016)

Matthew Leathen, 1.2 FTE
Ph.D. in Organic Chemistry, University of Michigan-Ann Arbor
B.S. in Biochemistry, University of Wisconsin-Madison
B.S. in Chemistry, University of Wisconsin-Madison

Nevada Science Olympiad Supervisor (Food Science 2016 – 2018)
Nevada Promise Scholarship mentor
Recipient of the Certificate of Effective College Instruction (ACUE)

Number of years teaching at TMCC: 6 years (started 2014)
Number of years teaching in academia: 9 (started 2011)

Primary courses taught:
CHEM 220: Introductory Organic Chemistry (lead faculty)
CHEM 341: Organic Chemistry for Scientists and Professionals I (lead faculty)
CHEM 241L: Organic Chemistry for Life Sciences Lab I (lead faculty)
CHEM 342: Organic Chemistry for Scientists and Professionals II (lead faculty)
CHEM 242L: Organic Chemistry for Life Sciences Lab II (lead faculty)

Chair, Salary, Benefits, Budget Committee (2020 – 2023)
NASA Space Grants—STEM promotion events on TMCC's campus (2016)

In Spring 2017, the chemistry faculty at TMCC hosted the 2YC3 conference at TMCC. The General conference chair and Local arrangement chair was Ms. Olga Katkova. The Co-chair and Program manager was Dr. Katie Kolbet, and the Exhibits chair was Dr. Matt Leathen. The conference attracted ~50 chemistry educators from across the United States and featured presentations from our own Dr. Matt Leathen as well as scientists from DRI.

7.B. FT/PT Faculty and Student Credit Hours Taught

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

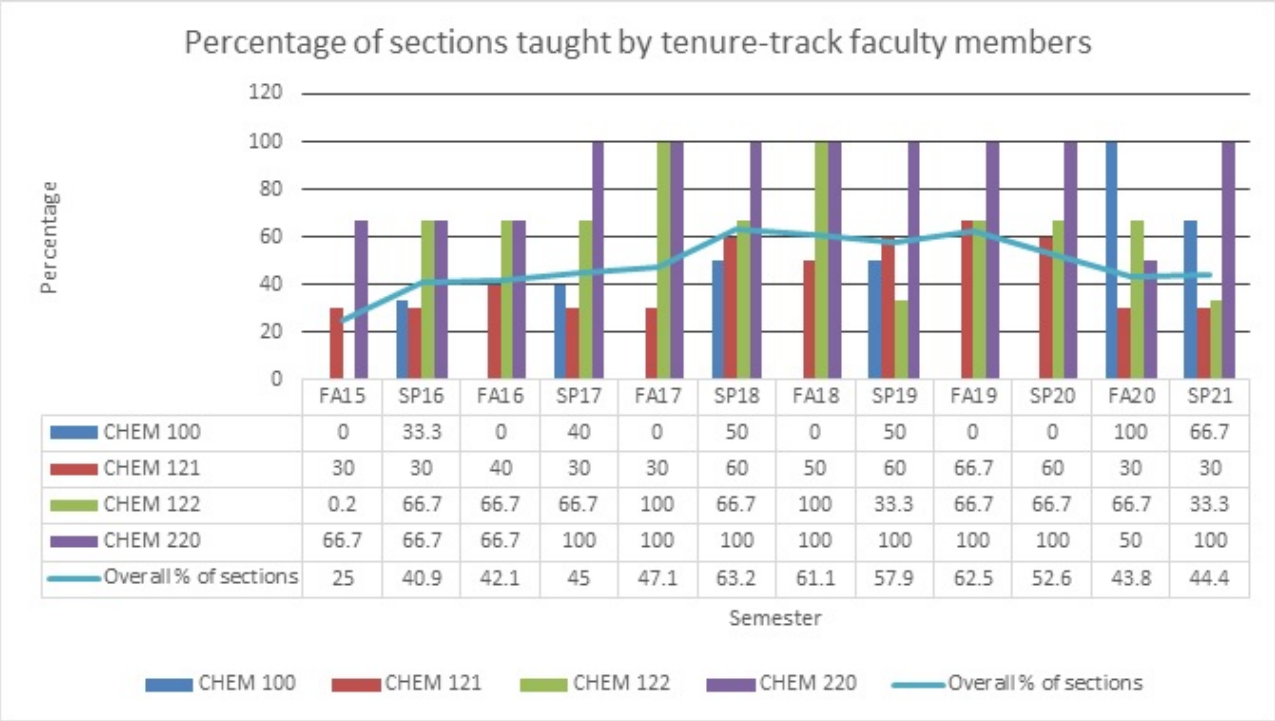
The data provided for full-time and part-time faculty is for the entire Physical Sciences department rather than the Chemistry program. The Physical Sciences department currently has 10 full-time faculty and has 19 – 23 part-time faculty depending on the availability of part-time faculty and the number of courses that need to be filled. The FTE reported for the department averages 7.5 for full-time faculty and 6.7 for part-time faculty.

The chart below shows the percentage of sections in each course that was taught by full-time faculty members during the five years of the study. The red line shows the overall percentage of sections. The CHEM 341, 241L, 342, and 242L sections are not shown as those sections are taught entirely by full-time faculty members. A section of CHEM 100 counts as 3.8 contact hours, and sections of CHEM 121, 122, and 220 count as 6 contact hours (3 for the lecture and 3 for the lab). Therefore, a faculty member who teaches three sections of CHEM 121 carries a load of 18 contact hours or 1.2 FTE. As a result, the full-time faculty teach overloads almost every semester.

The Chemistry program currently has three full-time faculty members and one open position. Mr. Perry Mitchell joined the department in the fall of 2017 and left during the summer of 2020.
In fall 2015, Dr. Katie Kolbet was on sabbatical, and in fall 2017, Ms. Olga Katkova was on leave. These changes in faculty are reflected in the low percentage of overall sections taught by full-time faculty in the fall 2015 semester, and the higher percentages in the spring 2018 – spring 2020 semesters.

Several factors will impact the full-time/part-time ratio in the next few

years. Currently, Dr. Katie Kolbet is chair of the Curriculum Review Committee, and as chair receives a six-credit reassignment per semester for that work during the current academic year, and a four-credit reassignment per semester for the next academic year. She will also take on the duties of department chair beginning July 1, 2021, and will receive a further nine-credit per semester reassignment. Dr. Matt Leathen is chair of the Salary, Benefits, and Budget Committee and for the next two years will receive a three-credit reassignment per semester for that work. With the current hiring freeze on filling empty positions, the number of sections taught by full-time faculty in the chemistry program will decrease.



	FA15	SP16	FA16	SP17	FA17	SP18	FA18	SP19	FA19	SP20	FA20	SP21
CHEM 100	0	33.3	0	40	0	50	0	50	0	0	100	66.7
CHEM 121	30	30	40	30	30	60	50	60	66.7	60	30	30
CHEM 122	0.2	66.7	66.7	66.7	100	66.7	100	33.3	66.7	66.7	66.7	33.3
CHEM 220	66.7	66.7	66.7	100	100	100	100	100	100	100	50	100
Overall % of sections	25	40.9	42.1	45	47.1	63.2	61.1	57.9	62.5	52.6	43.8	44.4

Describe the trends or shifts in the number of full-time (FT) and part-time (PT) faculty, and the number of student credit hours (SCH) taught by FT and PT faculty since the last program/unit review. What Impact, if any, have these trends or shifts had on the program/unit?

Please see the first section.

7.C. Support Staff

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Describe the program/unit's support staff, including their FTE, major duties, and any specialized credentials necessary to carry out their duties. Is the number of staff adequate to support the program/unit? Explain.

The Physical Sciences department has one classified employee, Lee Anderson, at the level of
Administrative Assistant III (1.0 FTE). Lee was hired in 2006 for this department. Lee maintains the Physical Sciences, prepares LOA/LOB and hourly contracts, enters the semester course
schedules into PeopleSoft, prepares textbook orders, assists the departments' part-time instructors, and
assists students by answering questions and facilitating course enrollments. Lee holds a B.A. in Art
History/Museum Science.

The department is supported part-time (0.53 FTE) by a Laboratory Manager dedicated to the Physical Sciences. The Lab Manager, Ms. Sydnee Franzwa, oversees the day-to-day operations of the Prep lab by ensuring that materials are prepared for all lab classes. This position requires that the employee meet the criteria of a Laboratory Technician II, as defined by the State of Nevada. Also, the Laboratory Manager serves on the Chemical Safety Committee. Due to the potential increase in workload to the addition of new chemistry labs in October 2021, additional personnel support may be needed.

7.D. Facilities and Technology

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Describe the facilities and technology used by the program/unit, and discuss any unique requirements. These may include labs, studios, off-campus sites, computer classrooms, specialized equipment, etc. Are program/unit facilities and technology adequate to support the program? Explain.

The majority of Physical Sciences lecture sections are offered in traditional classrooms. The Physical
Sciences lab sections are offered in specialized teaching labs at the Dandini Campus, Red Mountain
Building (RDMT). Each laboratory is equipped with the necessary components

for classroom instruction and/or hands-on training specifically dedicated to the subject matter. The table below lists the rooms utilized by the Chemistry program and the special characteristics of each.

The classroom laboratory space **RDMT 300** is used for CHEM 100, 121, and 122 and is a Tier 1
teaching laboratory. This room houses 12 computers that the students use for laboratory experience and
is contiguous with RDMT 303.

The laboratory space **RDMT 306**, previously used as storage space for RDMT 304 and the geology, environmental science, and geography materials is now being used as a biology research laboratory. All of the storage that was in this room has been relocated to RDMT 300 or placed into cabinets in RDMT 304.

The classroom laboratory space **RDMT 303** is used primarily for CHEM 100 and 121 and is a
Tier 1 teaching laboratory. During a typical semester, we run 12 - 14 sections of non-major Chemistry and General Chemistry I courses in this classroom. The classroom is outdated, containing only 24 workbench positions for classes that typically run 28 students. In addition, there are only two sinks in the room, resulting in a backup when students need to clean glassware.

During the summer of 2020, construction will begin on these two rooms to combine them into one lab that is being designed to house the organic chemistry courses. CHEM 220, 241L, and 242L will move into this lab room, and the room capacity will drop to 20 students to maintain the safety guidelines for organic chemistry laboratories.

The classroom laboratory space **RDMT 304** is currently dedicated to the second-semester general chemistry (CHEM 122) and organic chemistry courses (CHEM 220, 241, and 242) although Environmental Science labs are occasionally taught here as well. This is a Tier 1 teaching
laboratory. Some of the space in the laboratory was lost when storage items from RDMT 306 were moved into this room. Following the remodel, organic chemistry will move to the new RDMT 303 lab and this room will house CHEM 100, 121, and 122 labs. The items that are being stored in this room will be moved into the new laboratory area, which contains a storage area.

Beginning in spring 2022, the Chemistry program will be able to expand lab offerings with the addition of two new labs in RDMT 325 and RDMT 326. RDMT 326 will be dedicated entirely to CHEM 121. RDMT 325 will be used for CHEM 100, CHEM 122, and other courses in the Physical Sciences department.

The laboratory space **RDMT 301A** is a shared preparatory lab where the majority of the management of

and preparations for the instructional laboratories are carried out. Our Laboratory Technician II works
out of this facility. The solvent storeroom, autoclave, and biological safety cabinet are housed in this
laboratory, along with chemicals, reagents, and supplies for the labs.

8.A. Five Year Plan

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

At this time, the faculty in the Chemistry program has streamlined the catalog offerings at TMCC. Courses that are no longer offered have been removed, and there are no immediate plans for new courses. The recent addition of the 300-level organic chemistry courses came just as Covid-19 hit, so we have not done much in the way of marketing those courses for or the increased ease of transfer for the Chemistry, AS to UNR. Currently, we are using our informal advising time to advocate for students to complete the Chemistry, AS at TMCC for seamless transfer. Should the need for new courses arise in response to the many programs we support, the faculty are prepared to develop and implement those courses.

We do not envision that the Chemistry, AS will see more than double its current number of majors. Many students do not complete the AS in chemistry for a variety of reasons (most of these based on discussions with current and former students):

1. There are not that many students majoring in chemistry on an annual basis in the area. UNR had only 33 BS degrees in the 2017 – 2018 AY and 36 BS degrees in the 2018 – 2019 AY (https://www.collegefactual.com/colleges/university-of-nevada-reno/academic-life/academic-majors/physical-sciences/chemistry/index.html)
2. Many of the students reach the credit cap at TMCC before finishing the courses required for the Associates of Sciences in Chemistry. Those students do not go through the process of back-transferring the courses they need to complete the degree.
3. Advisors at UNR often tell students they must take their organic chemistry at UNR if they want to succeed or attend medical school. We do hope that the change in the course number for CHEM 341 and 342 will help address this issue, especially if we can encourage students to transfer CHEM 345 from UNR to TMCC in place of CHEM 241L and CHEM 242L.

With the addition of the new chemistry lab spaces in RDMT 325 and RDMT 326, we will be able to increase offerings at peak times for CHEM 121 and CHEM

122, and possibly expand our on-campus offerings for CHEM 100. We had moved that course entirely online because of student complaints about the Friday lab times, but those lab times were the only ones available with the current lab schedules. This process of increasing offerings and adjusting schedules will begin in Spring 2022 and will be ongoing as we try to align course offerings with student need.

With the improved laboratory space for organic chemistry in RDMT 303 scheduled for completion in Fall 2021, equipment and glassware needs for the organic chemistry courses will need to be reviewed and updated. The additional fume hoods will dramatically increase the safety in the organic chemistry lab and allow further development of the labs for the course. Opportunities for acquiring and upgrading the instrumentation in the lab, such as the addition of a GC-MS (gas chromatograph-mass spectrometer) and upgrade to the infrared spectrometer will need to be explored.

Student success strategies will be focused on the individual courses rather than the program as a whole. All of the chemistry faculty reflect on their teaching each semester, often having informal discussions with each other and our part-time faculty on how to increase student success. We often try new things to see if we can improve student learning, so the effort is ongoing. At this time, with an overall 80% completion and 70% successful completion rate, we're doing pretty good. There were no glaring equity gaps that need to be addressed.

One of the biggest lacks we see is the number of available tutors for individual and group review sessions. While faculty are available for office hours and individual conferences, many students would like to see a tutor outside of class. While we do have some tutors, there are never enough to meet student demand in chemistry. Many of our students who would make good tutors complete CHEM 122 or their organic chemistry courses and either transfer away from TMCC or are too busy to work as tutors. One of our strategies will be to try to recruit more students into tutoring and to work with the Learning Commons to fund additional tutors.

In conjunction with additional tutors, we would like to have a study area near our office suite where students can congregate for more informal tutoring and faculty help. This space could be shared with the rest of the Physical Sciences Department. Currently, there is a lobby area to the office suite, but students congregating there often disturb or interfere with our Administrative Assistant's work. Students who want to work on problems and then pop into a faculty's office to ask questions either have to sit in a faculty member's office while other students are coming in and out, or have to run back and forth to the student center. Having a separate informal area where students can gather would help promote community among our students. This area would have a table and whiteboard, with possibly a computer so student can access Canvas

or other online learning tools.

Using the most significant curriculum and assessment-driven findings, and considering any internal or external factors anticipated to impact your program, discuss strategies to sustain or improve student learning. This may also include deactivating existing or introducing new courses or programs to meet student and/or Industry demand.

Please see the first section.

After considering the most significant enrollment findings, and any internal or external factors anticipated to impact future enrollment, discuss strategies, if needed, to improve enrollment or address these factors. These may include, more efficient scheduling, streamlining pathways to completion, outreach to underserved students, etc.

Please see the first section.

With respect to course pass rate, graduation, and transfer, discuss strategies to enhance student success. These may include curriculum changes, streamlining pathways to completion, Improving advising, mentoring, and retention efforts, etc. Address any equity gaps. How does the department or unit plan to improve degree/certificate completion and/or course completion if the department or unit does not offer any degrees/certificates?

Please see the first section.

Considering the above strategies, what are the major goals that the department/unit hopes to accomplish in the next 5 years? How does the department or unit plan align with the Academic Affairs Strategic Plan or the College's Strategic Master Plan? Include an estimated timeline of goal completion.

Please see the first section.

9.A. Resource Requests

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

For each request, please indicate whether the request is for an additional faculty and/or staff position, capital improvements (facilities), technology or specialized instructional resources, or professional development and address the following items:

- **Request (Additional faculty/staff, capital improvements, technology or other specialized instructional resources, or professional development)**
- **Estimated time to hire or time the request will be made**
- **Projected measurable outcomes: What does the program hope to introduce, develop, improve, enhance, accomplish, etc. as a result of the request? Which PLOs and/or student success metrics does the department hope to improve as a result of the request?**
- **Alignment to the Academic Affairs and College's Strategic Plan**
- **Institutional Funding Priority: Indicate which of the following institutional funding priorities your request addresses:**

1. **Compliance with mandates and requirements.**
2. **Address and/or mitigate issues of liability.**
3. **Address compensation equity.**
4. **Improve efficiency and/or effectiveness.**
5. **Leverage resources, investments with returns.**
6. **Promote professional development.**

Request 1: Fill the open tenure-track position in chemistry

1. Estimated timeline: Spring 2022 or as soon as the hiring freeze is lifted
2. Projected outcome: restore full-time/part-time faculty ratio to 2018 – 2019 levels.
3. Alignment: Academic Master Plan Objectives 3, 4, and 5.
4. Institutional Funding Priority: 1, 4

Request 2: Support funds for the recruiting/hiring of additional chemistry tutors

1. Estimated timeline: Spring 2022 or as soon as possible
2. Projected outcome: increase student access to tutors and improve student success in chemistry courses.
3. Alignment: Academic Master Plan Objectives 1, 3, 6
4. Institutional Funding Priority: 4

Request 3: Support funds for additional laboratory equipment for the new labs

1. Estimated timeline: Spring 2022 or as soon as possible
2. Projected outcome: better-equipped labs, especially the organic chemistry laboratory
3. Alignment: Academic Master Plan Objectives 3
4. Institutional Funding Priority: 2, 4

Request 4: Construction of an informal student gathering area in Physical Sciences

1. Estimated timeline: Spring 2023 or as soon as possible

1. Projected outcome: increase student access to faculty and informal tutoring and improve student success in chemistry and physical sciences courses.

1. Alignment: Academic Master Plan Objectives 3
2. Institutional Funding Priority: 4

Academic Standards and Assessment Committee Findings and Recommendations

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Academic Standards and Assessment Committee's Findings:

This question has not been answered yet

Program Strengths:

- The program has made clear and substantial progress towards previous recommendations.
- Catalog information is almost completely up-to-date. Other than removing CHEM 242, which the department plans to do, information is accurate.
- CHEM 100 and 122 Canvas shells are accessible.
- CLOs are well-mapped to PLOs and ACS guidelines.
- The contribution of CHEM courses to general education, pre-professional training, and

university transfer is strong.
- Course-level assessment is quite strong and includes improvement plans based on assessment results.
- Student centered offerings are clearly at the forefront with chemistry section offerings including in-person, online, and hybrid modalities over a wide range of times.
- A grant was secured to fund lab expansion, which is currently in progress.
- Strategies for sustaining or improving program enrollment are clear and robust.
- Chemistry faculty are invested in improving their courses and the program.

Areas of Concern or Improvement:

- There is a need for accessibility of course materials as well as accessibility training for FT and PT faculty.
- The AS Chemistry is a low yield program.
- The mapping of CHEM 341 and 342 CSLOs do not include identification of the level of achievement (e.g. introduced, reinforced, practiced, etc.)
- There is minimal discussion of program level improvement as opposed to improvement of assessment methods.
- CHEM 121 is a general education course but has not been formally assessed as such.
- There is a clear demand for additional sections of CHEM courses that cannot be supported by current faculty and facilities.
- Five-year timeline goals are currently in progress; additional goals and a timeline are absent and there is no mention of alignment with the Academic Affairs or College Strategic Plans.

Recommendations:

- We recommend re-evaluation of the 2+2 transfer agreement to determine alignment with UNR BS Chemistry subspecialties given the recent addition of CHEM 341 and 342.
- The ASA Committee supports hiring a replacement FT faculty member based on documented need for additional chemistry course offerings and current faculty consistently teaching overloads as a result of both contact hours, and currently, service as department or committee chairs.
- We recommend revising the 5-year plan to include timelines and alignment to the Academic Affairs or College Strategic Master Plan.
- We recommend having the Physical Sciences mission statement being more forward facing.
- We recommend generation of a forward facing Chemistry Program specific mission statement that aligns with Physical Sciences and ACS.
- We recommend that the department continue their efforts in regards to faculty advising.
- We recommend the department continue to increase their roles in advising and student outreach.
- We recommend deactivating CHEM 242 as soon as feasible.
- We recommend having FT faculty complete and encourage PT faculty to complete accessibility training.
- We recommend the department continue its efforts to make more materials accessible.
- Assessment of CHEM 121 as general education should be conducted within the year.
- Review current CSLOs and PSLOs to include more specific action verbs from Bloom's taxonomy along with course map review to include identification level of CSLOs (e.g. introduced, reinforced, etc.).
- We recommend working with facilities to establish a physical sciences student support area, as recommended in the Dean's comments.

- We recommend that faculty develop undergraduate research opportunities.

Other comments:

The ASA Committee commends the Chemistry faculty for their ongoing assessment efforts, student centered course offerings, and conclusive evidence of faculty interest in improving their courses and the program. We also commend the Chemistry Department for its robust offerings to General Education as well as serving a significant number of other degrees and programs.

Dean's Findings and Recommendations

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

Academic Dean’s Findings:

The chemistry program, though low-yield, is an exceptional program at TMCC, with well-invested, highly qualified faculty, and ongoing assessment in addition to the required assessment. The program aligns itself seamlessly with UNR and most American Chemical Society programs across the country, preparing students for futures in chemistry or other related educational and preprofessional pathways. The program shows little to no gaps amongst most ethnic group in completion and successful completion rates. They were successful in receiving $1.14 million from the Pennington Foundation to expand the lab spaces, update current labs, and update much needed equipment. And, as faculty, they have been operating with one frozen tenured faculty position. This position will need to be restored, once available.
The program has multiple areas of focus, from introductory courses and general education courses to program and preprofessional upper division courses. Overall, the program has created a student-centered schedule to best fits the needs of the students and maximizes room and lab space, further justifying the need for expansion.
Although the program is a low-yield graduate program, as a feeder program it supports many other science degrees and those needing preprofessional requirements. CHEM 121, for example, has a 96% fill rate.
The faculty are well-invested and mentor their part-time faculty by providing onboarding and ongoing support, canvas shells, and course content that is up to date. Assessment is an ongoing effort done both formally and informally as a means for continuous improvement.
I applaud the Chemistry faculty team for facilitating learning as best as possible and responding to students needs during the Covid-19 pandemic. They all revamped their classes to response to the need to pivot to remote learning, implemented labs that best simulated the lab experience online, and developed labs that could be completed at home. Dr. Kolbet provided webcams at each lab station so each lab team could have one person on campus and the partner at home simultaneously working together. They have all adjusted the experience while maintaining the rigor.

Strengths:

The Chemistry program has well written CSLO's accompanied by a well-designed mapping to the PSLOs. The PSLOs are current and align with the American Chemistry Society (ACS) national standards and guidelines.
The program successful aligned itself with UNR and will align to most all transfer institutions.

The program thoughtfully offers a student-centered schedule, while maximizing the availability of the labs.
The program employs high-quality and invested faculty. Two of whom have been recognized as Teachers of the Year.
The faculty take ownership of their classes and the program by mentoring the part-time faculty. Additionally, the team meets often informally to discuss curriculum for a continuous line of open communication focused on course improvements.
I commend the faculty in CHEM 100, 121, and 122, for assessing SLO's every semester, even though formal assessment reports are not required every semester, exemplifying a true investment to student learning. I look forward to seeing the new assessment design for CHEM 121 that was implemented Fall 2020.

The program successfully applied and received $1.14 million from the Pennington Foundation to update current labs and expand the lab classroom space. The renovations will help to grow the program, and importantly, expand the CHEM 121, which are always in high demand, but limited due to lab space. The improvements will also help to align standards in the CHEM 300-level labs, by adding the necessary equipment to run the 300-level labs.

A commend the program in finding almost no gaps among the ethnic group in completion and successful completion rates. The only gap noted was Hawaiian/Pacific Islander group, which is a very small percent of the student population.

I commend the team for being ready when Pennington Foundation approached the department to fund the new Chemistry Lab renovations. This will be a dramatic change in lab space, in lab improvements, and finally allows the program to grow.

Areas for Improvement:

The fourth tenured faculty position, now frozen, will need to be successfully searched and hired when available to support the program once the labs are complete. The position was needed prior to the lab renovations, and will be needed more so once the space is expanded, so more sections can be added. For now, there is a robust pool of part-time faculty, but full-time faculty investment is crucial for long term success of the program and to restore the full-time to part-time ratio.

The program is a low yield program. It serves many students that need CHEM requirements for other programs, such as allied health, engineering, biology, and environmental sciences. The program needs to find ways to improve graduation rates. That said, although the program is low-yield, enrollment in the CHEM-BS program at UNR is only 1% of their program enrollment. So, although this is a low-yield program at TMCC, it could be said that is the lower enrollment program at our neighbor institution as well.

The last PUR noted the need to develop a faculty advisement strategy by discipline to increase transfer and graduation rates. While CHEM faculty advise informally, this should continue to be a priority.

What will help to facilitate a faculty-to-student soft-touch program advising would be the creation of a stickier atmosphere around the department, RDMT 320, and the newly renovated RDMT 325/326 space. The goal would be to create a more inviting space for students to congregate before and after classes. This will make it more convenient to visit instructors in office hours, for faculty to nurture a collaborative atmosphere with their students, and add a sense of community amongst the science students. I recommend the faculty continue to outreach to students to promote the classes and the program. This was lacking due to Covid-19 and I hope opportunities will present themselves to move forward with this type of outreach again.

The PUR noted that only two courses currently meet accessibility standards. The program should look into its assigned material and review them for accessibility.

It may be too soon to determine, but with the lab expansions, more lab support personnel may be needed to support the increase number of lab sections and have materials prepared for each one.

The program notes a lacks of qualified CHEM tutors. This may be due to the fact that the program found most of their students are full-time students. And, thus availability of tutors is difficult. I recommend working closely with the tutoring coordinator to facilitate an embedded tutoring program to begin developing tutors that can take on roles in the TLC to support the CHEM general education course.

Summary Action Recommended (Continue program(s), significantly revise, discontinue, etc. followed by explanation):

No recommendations at this time to discontinue or revise the program

Recommendations and Implementation Timeline:

No recommendations at this time to discontinue or revise the program .

Resources Necessary for Implementation of Recommendations:

Resources will be needed to restore the frozen faculty tenure position.

Resources will be needed to support funding of smaller equipment and glassware needed in the renovated and new labs.

Impact of Recommendations on Division Planning:

Extra operational dollars may be needed in Physical Sciences in planning for the expense additional equipment and glassware needed.

Impact of Recommendations on Program/Unit Faculty:

None at this time

Vice President of Academic Affairs' Findings and Recommendations

Chemistry

Physical Sciences (Chemistry) 2020-21 PUR Self-Study

VPAA's Findings:

Our Chemistry program is a very strong service-learning program that supports a variety of important fields both in and beyond the Physical Science division. The program's curriculum is streamlined, the learning outcomes are clear, and the program has a functioning assessment effort that measures student proficiencies per the ACS. As at many two-year colleges the number of graduates is typically one per year, yet there is opportunity here to increase student awareness of career opportunities.

Strengths:

The quality and qualifications of the teaching faculty are very high. Many colleges would be envious of the teaching staff at TMCC, given their experience and obvious care for their students and the program. The team delivers robust offerings for AS majors and related programs. The newly renovated labs are also a significant asset, and the demographics of the students reflect the college's overall appearance. The college has allocated funds for an improved student gathering space in the RDMT 300 area, including soft seating, tables, charging ports, and wall art/posters that reflect and support AS major programs, particularly undergraduate research content.

Areas for Improvement:

The program has opportunities to increase major declarations by expanding students' awareness of careers for trained chemists, particularly with regard to climate change and its effects. Undergraduate research should be sewn into the curriculum, at least as a 200-level elective. This discussion is occurring in a variety of TMCC program areas. Program faculty could also explore opportunities for students to support research at DRI.

The following recommendations made by the Academic Standards and Assessment Committee and Dean are upheld, and/or additional recommendations include the following: (Please include an implementation timeline, and indicate how these recommendations align to the Academic Affairs Strategic Plan and/or the College's Strategic Master Plan.)

VPAA supports:
- studying transfer articulations with UNR
- aligning the 5-year plan to the goals in the strategic master plan
- investing in accessibility training and materials conversion as needed
- developing an undergraduate research curriculum

- investing in trained tutors to support Chemistry students in our Learning Commons

VPAA also recommends:
- expanding students' awareness of careers for trained chemists
- promoting major declarations and awareness of reverse-transfer opportunities

The following recommendations made by the Academic Standards and Assessment Committee and Dean are not upheld: (Please provide an explanation.)

VPAA recognizes the importance of staffing sections with FT faculty but does not support a FT faculty hire at this time. FTE in CHEM courses fell from 120.1 in Fall 2018 to 82.9 in Fall 2021, a 31% decline, owing broadly to the challenges of the pandemic. If FTE recovers and particularly if it rises above 2018 levels in a sustained fashion, then this question should be revisited.

In order to implement recommendations towards program improvement, the following resource requests are upheld, and/or additional recommended resources include the following:

The RDMT labs have been renovated with generous support from the Pennington Foundation. VPAA supports the acquisition of equipment and glassware needed to kit out the newly renovated lab spaces.
The VPAA worked with Dean Flesher and Finance in February 2022 to design a student gathering space near the RDMT labs, including new furniture and amenities. This will create a sticky, collaborative atmosphere for Physical Sciences students. Facilities is working on this order as of March 2022.

The following resource requests are not upheld: (Please provide an explanation.)

VPAA recognizes the importance of staffing sections with FT faculty but does not support a FT faculty hire at this time. FTE in CHEM courses fell from 120.1 in Fall 2018 to 82.9 in Fall 2021, a 31% decline, owing broadly to the challenges of the pandemic. If FTE recovers and particularly if it rises above 2018 levels in a sustained fashion, then this question should be revisited.

Summary Action Recommended (Continue program, significantly revise, or discontinue, followed by explanation):

Definitely continue this program, as it is vital to our AS and related programs.