Instructional Programs Unit Assessment and Program Performance Report [UAR] – Fall 2024

Program Name: Chemistry

Program Description [List all degrees/ minors/ certificates included in 'program' along with PIF codes]**:**
The Chemistry program offers the following degree programs: Chemistry (717), Environmental Geochemistry (717/EM1) and Secondary Education-Chemistry (717/320) plus a Minor in Chemistry (25). The Chemistry major is based on the American Chemical Society's (ACS) Council on Professional Training (CPT) recommendations for an undergraduate chemistry program and it emphasizes quantitative problem solving and development of technical laboratory skills.
Chemistry personnel include five faculty: Dr Matthew Johnston, Dr. Rachel Jameton (25% Chem, 75% Admin), Dr. Wendy Shuttleworth (50% Chem, 50% Biol), Dr. Nancy Johnston (currently 50% research buy out), and Dr. Lloyd Mataka. One staff member, Dr. Loralee Ohrtman, manages the chemistry stockroom and laboratory services plus teaches Chem 353 (laboratory prep class) and often two lab sections of Chem 105 and sometimes CHEM 111 lab. Within PLMSS, the chemistry program provides classes for students majoring in biology, earth science and science education. On an institutional level the chemistry program delivers classes for the General Education core and support courses for the Division of Nursing & Health Sciences. In addition to CHEM prefix classes chemistry faculty are teaching FRSI 101, PHYS 171 & NS150

PREVIOUS YEAR'S WORK PLAN

List work plan elements/areas for improvement from the previous year, along with actions taken and a progress report.

- **Assessment of student outcomes**
  This is what we indicated last cycle
  The majority of our assessments are based upon student performance in the nationally administered student field tests and ACS exams. This will be enhanced by including assessment of skills learned from undergraduate research activities carried out by our students and ACS exams in the upper-level classes.
  In this cycle, we can report that, in addition to student field tests, we have also used Average ACS scores and undergraduate research.

- **Program Plan for Chemistry Majors**
  This is what we indicated last cycle
  There is a need to devise ways to reduce drop rates of lower-level chemistry courses. More innovative approaches to teaching lower-level chemistry classes to properly prepare our students for upper-level courses. One plan is to increase the relevance of the material through an approach called systems thinking in the next semesters of lower-level chemistry courses (e.g., CHEM 111/112). Further, there has been an increase in research activities, which add to the optimism in our program. Research activities are able to lure students toward the chemistry program. For instance, at least two chemistry majors decided to do double major due in part to

research they are conducting with chemistry faculty. We will also continue to recruit biology majors to become either double majors or chemistry minors.

In this cycle, we can report that there has been a change in the way we teach lower-level chemistry classes. For instance, relevance of chemistry was emphasized in CHEM 112 using a flipped classroom and Process Guided Inquiry Learning (POGIL) was used in CHEM 111 to improve student participation in the learning process.

- **Higher impact practices in CHEM 105/111/112**

  We have increased the use of higher impact practices, which include flipped classrooms and POGIL. There is also a discussion on the influence of scheduling on students' readiness to learn chemistry. For instance, the Monday/Wednesday chemistry lecture/lab section seems more arduous for students because they have biology in the morning, chemistry lecture in the afternoon, then chemistry lab afterwards. We feel that this may have an impact on their readiness for learning. In the coming year, we would like to make some changes to the scheduling to ensure that our students in the lower-level classes are ready for chemistry.

- We have been tracking the following in an effort to determine how we might increase the number of students pursuing a chemistry major.

  What proportion of graduating chemistry majors start as chemistry majors vs those who transfer/change from another program?

majors.

	# of chemistry graduates*	# graduates who changed major after starting at LCSC
'24	3	3
'23	2	2
'22	2	2
'21	3	3
'20	4	3
'19	2	2

*Includes chemistry, geo-chemistry, secondary education chemistry

Actions taken: This is now being monitored by the chemistry faculty.

Results: Of the recent chemistry graduates, most changed from another major chemistry; in most cases this was from biology. It is clear that very few students enter college as chemistry majors and this may reflect the opportunities in rural high schools, students speak of having to choose between biology and chemistry at rural high schools without the option to study both.

to LCSC lack of

We will continue to track this data for all students graduating with a chemistry major.

1) Program Outcomes

Program Outcomes: List your program outcomes (as noted in the current year catalog) in the tables below list and describe the indicator(s) and assessment methods you use to determine if your program has met its outcomes. Provide an analysis of data and establish work plans for the year [One table per program outcome; copy-paste table as needed]. **Note:** all program outcomes must be listed, however, programs with extensive outcomes lists may focus each year on half of the outcomes.

Outcomes	1. Upon completion of the chemistry program students will: *understand the relationship between matter and energy, composition and structure, and their relation to physical and chemical behavior.* 2. Upon completion of the chemistry program students will: *Apply chemical principles to biological, geological and environmental phenomena.* 3. Upon completion of the chemistry program students will: *demonstrate quantitative and conceptual reasoning.* 4. Upon completion of the chemistry program students will *Design, conduct and report scientific research within the discipline*
Indicators	• Score on Major Field Test for Chemistry for outcomes 1-3 • Number of graduates who conducted independent research and presented at on-campus and off-campus conferences for all four outcomes. • Research activities related to environmental chemistry and natural product chemistry for outcomes 2 and 4.
Assessment Method	• Comparison of student field tests to national ranking of 170 institutions for outcomes 1-3. • Ability to conduct independent research and present findings for all four outcomes.
Benchmark/Target	• Average percentile ranking for all senior students taking the exam in the last three years near the 50th percentile. The 50th percentile represents the median score nationally. • Graduating students must have at least one research presentation through independent research or classes specifically designed for independent research. • 40 percentile ACS exam scores
Data Sources	• ETS website for student field tests • Relevant research groups • Individual faculty members for ACS exam scores
Relevant dates	• May testing of graduating seniors. • May on-campus research symposium

Results (List at least two years of data if available)

Benchmark/ Target (select one): **Met** **Not Met** **Partially Met**

	# students	Average percentile	Range percentile
2024	1	56	45-69
2023	2	52	42-68
2022	4	50	37-67
2021*			
2020*			
2019	2	61	31-91

ACS results for 2023-2024 in the following subjects are as follows

	CHEM 111	CHEM 112	CHEM 370	CHEM 325
Percentile (2023-2024)	40	39	41	51
Percentile (2022-2023)	45	54		

Take note that ACS scores include those for the lower-level classes in the pipeline for the chemistry major. The percentiles include those who are not chemistry majors. The ACS exams cover the information indicated in this objective and they display another way our program demonstrates the achievement of the above objectives.

Analysis of results

- This goal was met for the 2024 graduating class of one student who scored in the 56-percentile rank. The institutional average met the goal at 50th percentile.
- The field test has four subsections: Physical, Organic, Inorganic and Analytical Chemistry, all of these areas relate to the program goal listed hence the use of the overall score rather than sub-scores.
- Take note that of the graduating students, only one took this test because the other students opted for field tests in other disciplines (e.g., biology).
- ACS scores met our goal for introductory and senior classes.
- The research goal was also met because all the graduating students were involved in undergraduate research and presented at campus and regional conferences.

Work plan actions to improve the outcome over the year

- Continue using student field tests
- Continue using American Chemical Society (ACS) exams for data collection.
- Continue using innovative approaches to teach introductory chemistry. These approaches should continue emphasizing relevance of chemistry and active approaches of learning.
- Continue encouraging undergraduate research, e.g., from the labs of Dr. Nancy Johnston and Dr. Lloyd Mataka.

<table>
<tr><td>Outcome</td><td>Upon completion of the chemistry program students will: think critically and apply knowledge in novel contexts.</td></tr>
<tr><td>Indicator</td><td>• Successful completion of CHEM 376 (Organic Chemistry II Lab), CHEM 481 (Biochemistry), and CHEM 454 (Instrumental Chemistry)
• Conducting independent research activities through upper-level courses or faculty/student research activities.</td></tr>
<tr><td>Assessment Method</td><td>• Percent of chemistry graduates successfully complete CHEM 376, CHEM 481 &/or CHEM 454 with C grade or better.
• Percent of chemistry graduates who have conducted undergraduate research.</td></tr>
<tr><td>Benchmark/Target</td><td>• 70% of students achieve a C grade in at least two of these classes
• All graduating students should at least have one independent research activity</td></tr>
<tr><td>Data Sources</td><td>Individual faculty records</td></tr>
<tr><td>Relevant dates</td><td>May each year</td></tr>
<tr><td>Results
(List at least two years of data if available)</td><td>Benchmark/ Target (select one): (Met) Not Met Partially Met
<table>
<tr><th></th><th># Chem majors* graduating</th><th>% students CHEM 376 C or better</th><th>% students CHEM 454 C or better</th><th>% students CHEM 481** C or better</th></tr>
<tr><td>2024</td><td>3</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>2023</td><td>2</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>2022</td><td>4</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>2021</td><td>3</td><td>100</td><td>100</td><td>67</td></tr>
<tr><td>2020</td><td>4</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>2019</td><td>2</td><td>100</td><td>100</td><td>100</td></tr>
</table>
*Includes Chem & Geo-Chem Majors
**Note: GeoChem majors are not required to take CHEM 481
• All the graduating students have presented their research activities at an on-campus research symposium and at an off-campus INBRE research conference.</td></tr>
<tr><td>Analysis of results</td><td>• The benchmark was met. All students graduating from the chemistry program completed Instrumental Chemistry with a C or better.
• All chemistry graduates required to take CHEM 481 completed that course with a C or better.
• All graduating students have presented their research activities at an on-campus research symposium and at an off-campus INBRE research conference.</td></tr>
<tr><td>Work plan actions to improve the outcome over the year</td><td>• Continue using innovative approaches to teach introductory chemistry to foster critical thinking.
• Continue encouraging undergraduate research, e.g., from the labs of Dr. Nancy Johnston and Dr. Lloyd Mataka.
• Continue conducting course based undergraduate research in CHEM 376 and CHEM 454.</td></tr>
</table>

Outcome	Upon completion of the chemistry program students will *Design, conduct and report scientific research within the discipline*
Indicator	Percent of chemistry graduates that conduct and present their research
Assessment Method	Reporting participation in a scientific conference or symposium
Benchmark/Target	All chemistry majors to present research at one point in their undergraduate career.
Data Sources	LCSC Research symposium catalog. Individual faculty reporting.
Relevant dates	Aug '23 -May '24
Results **(List at least two years of data if available)**	**Benchmark** (select one)**:** **Met** **Not Met** **Partially Met** May 2024-The graduating students conducted research with either Dr. Nancy Johnston or Dr. Lloyd Mataka. They all presented their research work at the LCSC Research symposium between April 29 to May 3. All four graduating students also conducted Course Based Research with Dr. Lloyd Mataka; they all presented their work at the LCSC Research Symposium in May '24. May 2023-The graduating students conducted research with either Dr. Nancy Johnston or Dr. Lloyd Mataka. They all presented their research work at the LCSC Research symposium on May 5 or May 6. All two graduating students also conducted Course Based Research with Dr. Rachel Jameton, they all presented their work at the LCSC Research Symposium in May '23. May 2022 – Most of the graduating students conducted research with Dr. Nancy Johnston, they all presented their work at the LCSC Research symposium on May 5 or May 6. All four graduating students also conducted Course Based Research with Dr. Rachel Jameton, they all presented their work at the LCSC Research Symposium in May '21. May 2021 – All three graduates conducted air sampling research with Dr. Nancy Johnston, they all presented their work at the LCSC Research symposium in May 20 or May '21.
Analysis of results	This goal is currently being met by the requirement for research and presentation in CHEM 376 and other classes. All chemistry graduates gained experience with independent research outside of their scheduled classes.
Work plan actions to improve the outcome over the year	• Continue encouraging undergraduate research, e.g., from the labs of Dr. Nancy Johnston and Dr. Lloyd Mataka. • Continue conducting course based undergraduate research in CHEM 376 and CHEM 454.

Outcome	Upon completion of the chemistry program students will *Safely and effectively apply laboratory skills*
Indicator	Percent of chemistry graduates successfully completing one semester of CHEM 353 Laboratory Preparation Techniques
Assessment Method	Requirement for completion of degree
Benchmark/Target	All chemistry graduates will complete CHEM 353
Data Sources	Individual faculty reporting.
Relevant dates	Aug '23 -May '24
Results (List at least two years of data if available)	Benchmark (select one): (Met) Not Met Partially Met May'24-All chemistry graduates successfully completed one semester or more of CHEM 353, this is not a requirement for GEO-CHEM majors. May'23-All chemistry graduates successfully completed one semester or more of CHEM 353, this is not a requirement for GEO-CHEM majors. May'22-All chemistry graduates successfully completed one semester or more of CHEM 353, this is not a requirement for GEO-CHEM majors. May '21 - All chemistry graduates successfully completed one semester or more of CHEM 353, this is not a requirement for Geo-Chem majors. May '20 – All chemistry graduates successfully completed one semester or more of CHEM 353, this is not a requirement for Geo-Chem majors.
Analysis of results	In addition to the requirement for chemistry majors to take many classes that have a laboratory component every LCSC chemistry major completes at least one semester of solution prep which requires one on one work in the chemistry stockroom with Dr. Loralee Ohrtman. This provides valuable experience in the laboratory and enables our students to transition smoothly into the industrial or academic laboratory.
Work plan actions to improve the outcome over the year	• We will continue offering CHEM 353 • In addition, research faculty will continue to emphasize safety in their research lab.

Outcome	Upon completion of the chemistry program students will: *apply collaborative, ethical and civically engaged practices.*
Indicator	Number of chemistry majors that engage in research relevant to their community.
Assessment Method	Percentage of chemistry majors doing research in the community Percent of students doing collaborative research in chemistry discipline courses (e.g. CHEM 376)
Benchmark/Target	75%
Data Sources	Individual reporting
Relevant dates	Aug '23-May '24

Results (List at least two years of data if available)	Benchmark/ Target (select one): (Met) Not Met Partially Met May '24 – All chemistry graduates were involved in environmental sampling as part of Dr. Nancy Johnston's CHEM 454 class. May'24 – All chemistry graduates were involved in collaborative research in CHEM 376. May '23 – All chemistry graduates were involved in environmental sampling as part of Dr. Nancy Johnston's CHEM 454 class. May'23 – All chemistry graduates were involved in collaborative research in CHEM 376. May '22 – All chemistry graduates were involved in environmental sampling as part of Dr. Nancy Johnston's CHEM 454 class. May '21 – All chemistry graduates were involved in environmental sampling as part of Dr. Nancy Johnston's CHEM 454 class. May '20 – All chemistry graduates were involved in environmental sampling as part of Dr. Nancy Johnston's CHEM 454 class.
Analysis of results	The benchmark was met from projects within the chemistry curriculum. • For the last several years Dr Nancy Johnston has had students conduct air sampling in and around the LC valley. • For the last several years Dr. Rachel Jameton has had students conducting collaborative research dealing with natural medicinal products in CHEM 376. • Currently Dr. Lloyd Mataka has taken over CHEM 376. Apart from that Dr. Lloyd Mataka is conducting natural product research, which also focuses on collaborative, ethical and civically engaged practices.
Work plan actions to improve the outcome over the year	• Continue encouraging undergraduate collaborative research, e.g., from the labs of Dr. Nancy Johnston and Dr. Lloyd Mataka. • Continue conducting course-based undergraduate collaborative research in CHEM 376 and CHEM 454.

2) Program Performance

Program Performance Indicators. Indicators focus on the extent to which your program is contributing to the overall efficiency and productivity of the college. Data will be provided by IR&E per usual processes/ timelines. **Note** the performance indicators have been reduced based on the AY19-20 prioritization process. This category is directly tied to the program prioritization initiative of the State Board of Education, and referred to at LCSC as Program Performance.

Performance Indicator	**Impact of program: measured by program completion numbers** Number of graduates in fiscal year; some programs may track completion *rates* for accreditation purposes

<table>
<tr><td>Assessment Method</td><td>IPEDS Completion Report [Integrated Postsecondary Education Data System – data from IR&E]</td></tr>
<tr><td>Benchmark/ Target</td><td>Determined by program with Chair & Dean *No target has been determined</td></tr>
<tr><td>Data Sources</td><td>IPEDS Completion Report</td></tr>
<tr><td>Relevant dates</td><td>November 1</td></tr>
<tr><td>Results
(List at least two years of data if available)</td><td>Benchmark/ Target (select one): Met Not Met Partially Met
<table>
<tr><th>Academic Year</th><th># Graduates Chemistry Major</th><th># Graduates Geo Chemistry Major</th><th># Graduates Chemistry Minor</th></tr>
<tr><td>23-24</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td>22-23</td><td>2</td><td>0</td><td>3</td></tr>
<tr><td>21-22</td><td>4</td><td>1</td><td>3</td></tr>
<tr><td>20-21</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>19-20</td><td>3</td><td>1</td><td>1</td></tr>
<tr><td>18-19</td><td>2</td><td>0</td><td>3</td></tr>
<tr><td>17-18</td><td>2</td><td>2</td><td>6</td></tr>
<tr><td>15-16</td><td>6</td><td>1</td><td>10</td></tr>
<tr><td>14-15</td><td>3</td><td>0</td><td>10</td></tr>
</table></td></tr>
<tr><td>Analysis of results</td><td>The number of chemistry graduates has averaged 3 per year over the tracking period (9 years). There are no discernable trends given the low numbers. The number of chemistry minors increased for a few years but has now dropped off. Students majoring in other programs, notably Biology, are encouraged to pursue the chemistry minor if their schedule permits.</td></tr>
<tr><td>Work plan actions
(What we will do as a result of our analysis to improve the program over the next year)</td><td>• It has been noted that the majority of our chemistry graduates started out as declared biology majors who switched in their second year.
• Faculty will continue to encourage students to consider a chemistry minor; for biology majors this often requires the addition of only one class (CHEM 325) to their program plan.
• Lower-level chemistry classes are devising ways to recruit biology students into the chemistry program by emphasizing applications of chemistry and adding chemistry jobs websites to canvas.
• More innovative approaches to teaching lower-level chemistry classes to properly prepare our students for upper-level courses. One plan is to increase the relevance of the material through an approach called systems thinking in the next semesters of lower-level chemistry courses (e.g., CHEM 111/112).</td></tr>
</table>

Performance Indicator	**Impact of program: measured by program enrollment numbers**
Assessment Method	Fall Census Day Report
Benchmark/ Target	Set by program. *No target has been determined
Data Sources	Current year Fall Census Day Report
Relevant dates	November 1
Work (List at least two years of data if available)	**Benchmark** (select one)**: Met Not Met Partially Met**

*Separate categories for Chemistry Major, GeoChem Majors Secondary Ed Majors now reported

Academic year	Declared majors - Chem	Declared majors -Geo Chem	Declared majors - Secondary Ed Chem	Declared Minors	
23/24	11	1	0	2	&
22/23	10	1	0	2	Chem
21/22	10	0	1	2	
20/21	12	0	0	5	
19/20*	12	2	0	5	
18/19	16			7	
17/18	16			6	
16/17	18			10	
15/16	23			14	
14/15	31			11	

Analysis of results	The declared majors tally include chemistry, chemistry secondary education and environmental geochemistry majors. These numbers vary from year to year with no detectable trend.

Work plan actions (What we will do as a result of our analysis to improve the program over the next year)	• Faculty will continue to encourage students to consider a chemistry minor; for biology majors this often requires the addition of only one class (CHEM 325) to their program plan. • Lower-level chemistry classes are devising ways to recruit biology students into the chemistry program by emphasizing applications of chemistry and adding chemistry jobs websites to canvas. • More innovative approaches to teaching lower-level chemistry classes to properly prepare our students for upper-level courses. • We are actively discussing ways to increase enrollment in chemistry. One way is to request chemistry majors to become spokespeople for the major. We believe that students hearing from other students about the chemistry program may improve the number of majors. • We will continue highlighting employment opportunities in the chemistry field in our lower-level classes.

Performance Indicator	**1. Impact of program as measured by: [Optional] Program Specific Indicators** Student enrollment in General Education core classes. Key courses delivered to Non-Natural Science and Mathematics majors. CHEM 105 is required for Nursing and Health Science Majors and CHEM 100 is an online general ed core class required for online education programs, and PHYS 171 is a requirement for Elementary Education majors.
Assessment Method	Census Day Headcounts
Benchmark/ Target	**No target**: Data on headcounts are monitored and used to adjust the number of sections in critical classes supporting programs outside of PLMSS. CHEM 100, 105, 111 & FSCI 101
Data Sources	IRE
Relevant dates	Census day

Results (List at least two years of data if available)

Benchmark (select one)**: Met Not Met Partially Met**

Semester	CHEM 105	CHEM 100	CHEM 111	FSCI 101**	PHYS 171
FA 24	108		46		12
SP 24	71	21			
FA 23	88		45		18
SP 23	60	24			5
FA 22	81		43		11
SP 22	56	18			17
FA 21	92		39		15
SP 21	62	15			11
FA 20	94		35		10
SP 20	63	21		24	
FA 19	105		65		
SU 19		11			
Sp 19	93	23	32		

** FSCI 101 taught exclusively by chemistry faculty (Dr, Matthew Johnston)

Analysis of results

The data indicates an increase in CHEM 105 in both spring and fall semesters. No change was observed in CHEM 111.
PHYS 171, which is required for Education majors is part of the course load for chemistry faculty.
PHYS 171 is offered in the fall semesters and enrollment has been fluctuating.

Work plan actions (What we will do as a result of our analysis to improve the program over the next year)

- Continue collecting this data. Note this is census day data, not the beginning of the semester.
- Deal with the scheduling conflicts, which sometimes reduce the number of CHEM 105 students in spring semesters.
- Deal with lab scheduling for CHEM 111 to reduce students' science load on Mondays and Wednesdays. The suggestion is to conduct lectures on M/W and labs on T/Th.
- Continue tracking PHYS 171 data for scheduling purposes.

Performance Indicator	**2. Impact of program as measured by:** Student enrollment in key courses delivered to other science majors, especially those in Biology, Exercise Science, Engineering, Computer Science & Earth Science.
Assessment Method	Census Day Headcounts
Benchmark/ Target	**No target** Data on headcounts are monitored and used to adjust the number of sections in PLMSS majors service classes CHEM 111, CHEM 112, CHEM 371/3 & CHEM 372/6
Data Sources	IRE
Relevant dates	Census day
Results (List at least two years of data if available)	**Benchmark** (select one)**: Met Not Met Partially Met**

Semester	CHEM 111	CHEM 112	CHEM 371/3	CHEM 372/6	CHEM 481
Fall 24	48		12		18
SP 24		30		12	
FA 23	45		18		11
SP 23		30		16	
FA 22	43		15		15
SP 22		28		15	
Fall 21	39		16		12
SP 21		32		16	
FA 20	35		18		20
SP 20*		35		16	
FA 19	65	10	25		16
Sp 19	32	27		10	
FA 18	63	21	18		24

*In SP 20 the off-sequence offerings of Chem 11/112 were halted. For the foreseeable future Chem 111 will only be offered Fall and Chem 112 Spring semester.

Analysis of results	Chem 111 & 112 are required for several other PLMSS majors, notably Biology and Exercise Science majors. Chem 371/2/3/6 (Organic Chemistry) is required for all biology pre-health/pre-med students. It should be noted that this data is for census day, but it is the number of places in classes at the beginning of the semester that determines the number of sections required to accommodate needs. The data provides a tool for planning the number of sections of these classes to offer each semester to staff appropriately. Chem 481 is required for all Biology majors.
Work plan actions (What we will do as a result of our analysis to improve the program over the next year)	• Continue to collect this data and use it for scheduling purposes. Note this is census day data, not the beginning of the semester. We must determine that there are sufficient class places for day 1 of the semester. • Continue using innovative approaches to teach introductory chemistry to foster critical thinking. These approaches include emphasizing relevance of chemistry and active approaches to learning.

ASSESSMENT/ PERFORMANCE REFLECTION

Other Insights/Findings/Comments: What other significant findings, opportunities, or needs have emerged over the past year?
During the last cycle, we touted the increase in research for both chemistry majors and non-majors through the research labs of Dr. Nancy Johnston and Dr. Lloyd Mataka. These labs have garnered interest from students who want to have research experience before they graduate. We will continue recruiting students into our research labs to improve their interest in chemistry and provide critical skills for the work force, medical, and graduate school. During our last cycle, we discussed the need for proper instrumentation for chemistry research. The purchase of an LC/MS during the 2022/23 cycle improved our research capacity. Students are actively using the instrument in both natural product chemistry, atmospheric chemistry, and melatonin research. We also planned to write a grant for the purchase of an 80 MHz nmr instrument. We can report that the grant was not written for this purchase, mainly because there was less interest from INBRE in this type of grant after our last instrument grant was funded. However, plans are still there to write the grant for the purchase of the instrument, probably using NSF grant There is need for training on the best recruitment strategies to improve enrollment in the chemistry program.

	List dates of meetings where assessment/ performance data and/or program improvements were discussed	**Location of assessment meeting minutes from previous year**

ASSESSMENT MEETINGS DURING previous year	02/26/2024, 10/17/2024, 10/24/2024, 11/20/24	Teams

REVIEW

	Name	Date
Program Assessment Coordinator	**Lloyd Mataka**	**11/24/2024**
Division Chair/Director	**Rachel Jameton**	**12/1/2024**
Dean	**Martin Gibbs**	**12/4/2024**
Provost		

CHEMISTRY: ASSESSMENT PROGRESS
AY 2023-2024

QUINTILE 2 SUSTAINABLE WITH MODIFICATIONS [ALIGNS WITH THE COLLEGE'S ROLE AND MISSION; IMBALANCE BETWEEN ENROLLMENTS, COMPLETIONS AND OVERALL PROGRAM COSTS LIMITS SUSTAINABILITY AND GROWTH].	LAST YEARS PROGRAM ANALYSIS OF THE QUINTILING	HOW ARE YOU ASSESSING LAST YEAR'S FINDINGS?	RESULTS OF THE ASSESSMENT	OTHER IMPORTANT CONSIDERATIONS

Develop sustainability enrollment targets for next three (3) years	*Current enrollment figures indicate 10 Chem majors & 1 Geo-Chem major. There are no secondary Education majors. *On average the chemistry program has graduated three chemistry majors a year over the last eight years *Chemistry majors usually start their college career in other programs and switch after their first year *Chemistry majors require four classes specific to the major that are rotated in a two-year period. A cap of ten students in these lab and instrument intensive classes would be the maximum. *Given the information above; a suggested sustainability enrollment target would be a max of five graduates a year and an increase in the number of chemistry minors.	• Fall '24 program numbers indicate there are 10 chem majors & 1 Geo-Chem major. There are no secondary Education majors. The numbers are low but appear to be holding steady in this difficult climate. • Three students graduated with chemistry degree in May 2024 • Two students graduated with a Chemistry minor in May 2024	Steps are being taken to reduce the drop rates of our students by introducing evidence-based teaching practices in lower-level chemistry courses. One way to do this has been to increase the relevance of chemistry in lower-level courses and increase collaborative activities. In addition, research based instructional approaches are being encouraged.	

Develop aggressive action steps to increase enrollment to meet sustainability targets	*Actively recruiting majors in Chem 111 or Chem 112* the latter was preferred *Encourage suitable Biol majors to double major, (note the "Math barrier" requirement for Calculus II) *Provide Math cohort support early to lower "Math barrier" (check with other schools *Encourage Biol majors to minor in Chem (1 additional class) *Targeted recruitment of transfer students from local community colleges, NIC, CWI, WWCC *Promote internships for high school students (Summer research opportunities) *Link content of Gen Chem labs to careers in chemistry	• Faculty are actively engaged in recruitment from the Freshman class. • This involves recruiting students for chemistry research, posting links pertaining to chemistry jobs, encouraging biology majors to become double bio/chem majors. • One biol/Chem major this year. • No action on this item • Faculty are encouraging qualified students to do this. • During the last cycle postcards were sent to dual credit high school visits and for the local CCs • No action on this item		

	*Promote careers in chemistry, highlight recent graduates, where are they now? FB site? *Highlight opportunities for well-funded undergraduate research	• Plans are being discussed to change introductory chemistry labs to reflect the changing nature of learning. • Faculty posting chemistry job links on Canvas in lower-level chemistry classes. • Increasing communication of INBRE research opportunities, we recently hosted a campus meeting for all interested parties. • INBRE posters posted in SAC • Students are actively invited to apply for INBRE research grants, e.g., students in Dr. Mataka's and Dr. Johnston's research groups have applied for an INBRE research fellowship.		
Identify internal and external resources needed to implement action steps to meet enrollment targets	*Support to produce specific recruitment packages for Chem majors, e.g., NIC, INBRE funds may be available for targeting CC transfers to four-year degree programs. *Assistance with the production of quality recruitment videos.	• Construction of recruitment material has been discussed during program meetings. • We are trying to find innovative methods to improve recruitment. • One of the proposals is to use chemistry majors or minors as recruiters into the chemistry program. • We believe that hearing students can talk better to		

	*Dr. Nancy Johnston brings in sizable grants for her research, these unique opportunities for student research in local environmental chemistry should be showcased and used as a recruiting tool.	other students.		
Identify mechanisms to increase program efficiency	Several processes are being carried out to increase enrollment and retention rates in the chemistry program as indicated in the report. There is an increase in independent undergraduate research activities, which include students from biology. *The Chem major requires four upper division classes in addition to the Biol major, only three classes beyond the minor. The chemistry program does not require a lot of faculty resources and the faculty member teaching most of these classes brings in significant overhead for her research program that is active both within	• Several research students have presented their work at regional conferences. • More funding opportunities are coming from the chemistry faculty as the new funding cycle begins.		

	formal classes and as independent research projects. *Chem faculty are predominantly teaching Gen Ed or support classes for other programs.			
Continuously monitor efficiency and effectiveness of program through program/ division assessment processes, including the UAR	*Chemistry faculty will continue assessment discussions pertaining to these sustainability targets during regular program meetings and work to implement action items listed above.	• Faculty meet regularly to discuss the program		