

# Comprehensive Program Review Report



## Program Review - Chemistry

### Program Summary

#### 2021-2022

**Prepared by:** Julie Rodriguez, Ryan Froese, Teresa Mendoza, Jennifer Verissimo

**What are the strengths of your area?:** One of the strengths of our chemistry program is the partnerships that students build with the faculty members. Unlike large, impersonal introductory courses at many colleges and universities, the chemistry classes at COS have a maximum enrollment of 24 students. Small classes and labs make certain that students receive individualized attention and ensure greater success in chemistry.

Our dedication to teaching and supporting student learning is another strength of the department. Our department faculty also collaborate often and work well together to construct a successful chemistry program. Our success in this area is evidenced by our course fill rates. We have observed fill rates ranging from 100 – 107 % at census from 2018- 2021.

The new institution-set standard is a minimum of 67 % for course completion. Our average course success rates overall have been between 54 – 68 % in the last three years. We worked hard to raise that metric. We have recruited, trained and grown leaders who are working in the Math Engineering and Science Achievement (MESA) center. The data shows this, as there is a 20% improvement in the success rate for students in Chem 1 and Chem 12 who attend MESA versus the students who do not. These courses are each the first in their series, and therefore quite challenging for the students. In the 2020-2021 academic year, our success in Chem 20 and Chem 1 (our two introductory courses), was 69 % and 49 % respectively. This, however, is not the end of the story; once students passed their first chemistry course here at COS, their success rate increased to 84 % in Chem 2. This goes well beyond the minimum institution-set standard. Our organic chemistry tells a similar story, the success in Chem 12 and Chem 13 are 89 % and 100% respectively. The students who are taking their fourth or fifth chemistry course at COS, (depending on where they started), are exceeding the institution-set standard. Some of these students have reported back to us, and are finding success in chemistry courses in both the CSU and UC system upon transfer. Another revealing fact from the data is found when comparing the total number of students who are taking our courses with the overall success rates (which exclude EWs). The average number of students who took chemistry in 2018- 2021 was 920 students. In years 2016 – 2018, our department served an average of 804 students. The average number of students taking chemistry courses has increased by 116 students in the last three years. Our success rates in 2016 - 2021 were 55%, 51%, and 54%, 54%, 55%, 68% respectively. Our success rates have been mostly consistent over the past six years, with the exception of the last year having a jump of over 10 % in success. While that meets the standard for course completion, the 2020-2021 school year resulted in a greater number of students dropping their D or F grades using a Covid Withdrawal (CW) during the pandemic. This is a plausible explanation that would explain a heightened percentage of success during 2020-21. What is more noteworthy is that we have been able to serve more students, and therefore more students are getting through.

We have been utilizing the REALM program as a method to raise success rates in chemistry. Students accepted into the REALM program are funneled into Chem 20 courses with reserved seats, which helps to build a community among cohorts of students. Community is one of the central factors we believe in the MESA center's ability to increase student success. In addition to this, Julie Rodriguez, Teresa Mendoza, Ryan Froese and Jennifer Verissimo are currently guiding students through a student-centered Supplemental Instruction (SI) program for their introductory, general chemistry, and organic chemistry courses. The SI sessions have been widely popular, well attended and shown marked improvement when all other variables (that can be controlled) remain constant. One example pulled from data, Jennifer Verissimo's Chem 2 with an SI saw a 68 % success increase and a 57 % retention increase for students attending SI sessions. (This was during the spring of 2021). As an addendum, we also find that SI sessions build excellent community in the classrooms, and tend to aid in the formation of study groups.

Another two strengths in the Chemistry Department are the increase in the use of instrumentation, as well as the acquisition of

instruments that are essential for students' university and career readiness. This was previously identified as a weakness, but our efforts have transformed it into a strength. The students in Organic Chemistry now utilize GC-MS, FT-IR, Polarimetry, and NMR instruments, giving them a better experience of what they would have in the same course at a 4-year institution. The unique individual instruction provided by staff in the use of this equipment accentuates this experience making it superior to any 4-year institution. Our students finish this course ready for further study upon transfer, and/or work as a chemist in Industry. Preparing our students for work in a high-tech field helps to fulfill the mission of the district, "to help our diverse student population achieve its transfer and/or occupational objectives and to advance the economic growth and global competitiveness of business and industry within our region." This brings our department into alignment with the institution as a whole, which amplifies our success. We like to think of this vertical alignment as the Chemistry Department metaphorically "rowing with the team." A recent COS student who was a chemistry major received a part-time job running a local chemistry lab after having been exposed to the instrumentation that the chemistry department now provides to our students. He was chosen from a pool of four applicants and credited his laboratory experiences here at COS for his opportunity. Additionally, two other recent COS alums shared with this department their success in securing work as lab technicians.

We are continuing to look for ways to grow the Chemistry program out at the Tulare Center. The satellite campuses have been a challenging area in the past for our department, as there were no full-time faculty members to support these programs. In an effort to remedy this, we hired a new faculty member and our most senior faculty (Julie Rodriguez) moved out to Tulare to grow this program. This has allowed us to offer a major's class at a Satellite campus for the first time in COS history. Ryan Froese, our Department Chair is currently teaching a chemistry 20 class out at the Tulare Center. Teresa Mendoza has requested to teach a chemistry 20 class out at the Tulare Center in the spring. The Tulare Center has had fill rates ranging from 107 – 116 % at census from 2018- 2021.

Given the current demand, we hope that we will eventually be able to hire another chemist who will teach at least part of their load out in Tulare so that the program continues to grow.

One effort we have made to increase success and retention is the creation of a new course. Many students need a lab science as part of their general education (GE) and have chosen Chem 20. Chem 20 is a course designed for Allied Health Majors as well as Science Majors beginning their chemistry series. Chem 253 was closer to the needs of the students using the course for general education, but it did not count due to the lack of a lab. For this reason, Julie Rodriguez wrote a Chem 10 course to fulfill the GE requirements for a physical science lab that was designed at the appropriate level. We hypothesized that the students in general education would be far more successful in this course than Chem 20, while still receiving what they need to prepare them for future courses and careers. Chem 10 has been taught for the past two years by Jennifer Verissimo with an average success rate of 57 %. Chem 20 has had an average success rate of 54% for the past six years. Both courses have seen an increase in success rates in the past two years compared to previous years. This indicates that students are able to complete their educational objectives in the course that is more tailored to their needs. Given this preliminary data, we will see as time goes on whether the average success improves or is maintained.

**What improvements are needed?:** One major area for improvement that remains is the instrumentation that students are exposed to in our majors' courses so that they can be competitive when they transfer to research institutions. At Clovis Community College, Reedley College, Fresno City College, and the Madera Center, students have 7 different instruments that they use in their courses. Here at COS, we have 4 instruments for our students to use. Clovis Community has a GC-FID, 2 GC-MS's, LC-MS, FT-IR, FT-IR with ATR, NMR, Cary 60 UV-Vis, 2 FlaskScrubber's and 2 SteamScrubbers's. We currently have an NMR, GC-MS, FT-IR with ATR, and one FlaskScrubber. As an important note, this is an improvement over three years ago when we did not have the GC-MS. We have attached the documentation which provides the proof that surrounding community colleges possess instrumentation that far surpasses what we have to offer our students. Our next instrument purchase to improve in this area would be a NMR (Nuclear Magnetic Resonance) Instrument. We would like to purchase an NMR to replace the broken NMR that we use in our Organic Chemistry Program. The NMR is an essential instrument in the Organic Chemistry program and is fundamental to the determination of the structure of organic molecules in solution. Many of the lab experiments completed throughout the year require the use of NMR to complete proper analysis of student results.

Additionally, we are seeking funding for new heating mantels. We have more Organic Chemistry students than we have ever had in the history of COS as more students choose to take advantage of the first two free years of college prior to transfer. This means that our equipment is being used more and is beginning to not work properly. We need to replace our heating mantels so that we can maintain our lab numbers.

We would like to purchase an automatic melt-temp apparatus because our Organic Chemistry program is growing. We now run three organic chemistry classes per year instead of two and all three classes are full. When students do lab in these classes, they usually make a different solid product with each lab. In order to evaluate the product, we use the melting point of the solid to verify purity and to check to see whether it matches what the melting point of what they were supposed to make. Students submit their melt-temp data and we usually have to trust it because determining a melting point of a solid takes about 30

minutes. If we have 20 students, it would take us 10 hours to find the melting points of all of their products. With this apparatus, it would automatically give the melting point of 5 solids in 10 minutes, and it would take 40 minutes to evaluate one class worth of solids.

We are requesting funding for additional Vernier melt-temp devices. Our Vernier hand-held Devices have a melt-temp probe that we use mostly in our Organic Chemistry labs. However, we offer 6 Chem 1 classes per year now and we use them for a lab that we do in Chemistry 1. We do this so that students can get used to using them in their first year of chemistry and we do not have to teach them how to use them when they get into Organic Chemistry. Since we have expanded to using them in our Introductory Chemistry lab, we would like to purchase a class set so that we can get the student into and out of a lab within the 3 hour lab period. It takes about 30 minutes to determine a melting point for a solid so it is tricky to get 24 students to share melt-temp instruments. We currently have 8 instruments. Plus, sometimes more than one lab will need them and we have to reduce the number in each lab by half which further slows things down for the students.

We have expanded our course offerings in Chemistry at the Tulare Center. Prior to Julie Rodriguez moving out to the Tulare Center, we offered about 2 introductory chemistry courses. This fall, we are offering 3 introductory chemistry courses (chem 20), 1 basic chemistry course (chem10) and 1 majors level chemistry course (chem 1). We have doubled our offerings and are also offering the higher level chemistry out in Tulare. An ice machine is a basic necessity to run chemistry labs and has not yet been prioritized at the Tulare Center because we have been able to get around it by not offering too many chemistry courses. The lab tech has gone to the store in the past and purchased ice and has kept it in the freezer, but the freezer capacity is limited to about 10 pounds of ice on a good day. This is not enough to supply an entire lab of students making ice baths. And, each of our classes have at least 1 lab where ice is needed. Chem 1 has more than one lab that needs ice. Facilities has already determined a good location for an ice machine. Now, we just need the funds to purchase the ice machine, and we might actually be one step closer to becoming a real chemistry department out at the Tulare Center. Exciting!

We are in need of two additional full-time tenure track faculty members. We would like to permanently replace Daudi Bogonko who resigned at the end of the 2020/2021 academic year. (We were able to secure a one-year full-time temporary position to get his classes covered, but we really need to make this a permanent position to maintain our course offerings on the Visalia Campus.) We would also like to hire another full-time faculty member in chemistry to maintain our offerings on both the Visalia and Tulare Campuses. We cannot seem to offer enough chemistry classes. At Census, on the Visalia campus, the chemistry department had 106%, 98% and then 102% of the seats filled in 2018-2019, 2019-2020 and 2020-2021, respectively. Many of the courses that we offer are waitlist-full before normal registration begins. All of our Chem 20 courses are usually full within a couple of weeks. In addition to full classes and full wait-lists, in Chem 20 we observe about 5-7 people per section are trying to "crash" the class on the first day in hopes of enrolling in the course if a registered student drops. In Chem 1, we are beginning to see similar trends. Our Chem 1 classes' wait-lists are full as well. We think it is important to note that unlike other classes, we are unable to add extra students because our laboratory rooms will only hold 24 students. It poses a safety hazard to exceed this number, and we do not have the glassware to do so if we were so inclined. We currently have 4 adjunct faculty members covering 6 chemistry classes. We just recently lost one of our adjunct faculty members who was teaching two of those classes. For Spring 2022, we will be down 2 classes because of this resignation. Ryan Froese is also teaching large overloads right now and will not be doing so beyond this semester. We will lose at least another 2 classes when he stops teaching overloads. So, even though this will be a growth position, we need it to maintain our current course offerings. We would also like to move two more of our introductory courses out to the Tulare campus and have this new person teach part of their load on the Tulare campus. This way we will continue to expand the chemistry program on the Tulare campus. The chemistry fill rates on the Tulare campus have been 116%, 115% and 106% in 2018-2019, 2019-2020 and 2020-2021.

**Describe any external opportunities or challenges.:** We strive to improve our success and retention without compromising our standards. We find this most challenging in our majors' courses where we receive many students from local high schools who lack the skills necessary to succeed in a majors level chemistry course. The Department is searching for ways to improve success in our majors' courses through the use of technology, and we have utilized the REALM grant to support these efforts. Ryan Froese wrote an online-hybrid Chemistry 20 course and has been teaching hybrids since the fall of 2018. Teresa Mendoza has also recently began teaching some hybrid Chem 20 classes as well. This is a course where lower success rates abound across instructors, and discussions have revealed two reasons why. The first is that students have jobs that make attending class 4-5 times per week impossible. In response to this issue, the face-to-face courses are often scheduled for 2 lecture meetings per week. This has created a situation where too much information is covered in one class to be comprehensible by students. Surveys from the course show the online format has helped to provide more access to students who would otherwise be unable to take the class. Many students had glowing reviews of the format, but many others wrote they struggled to succeed due to time management and their own procrastination. The online format makes this procrastination even more possible than usual and has exhibited lower success rates. Much of these lower success rates is explained by an increase in access; the students who can only take the online format also have busy lives that inhibit success. We need to improve our sorting mechanism, so the students who are directed to take the hybrid course are the students for whom it is a good fit. Ryan Froese is still working on

ideas for improving this “funnel” in the coming year.

To increase engagement for online students, Ryan Froese created chemical demonstration videos to give students some of the comparable engaging experiences the face-to-face students get. Additionally, the videos were shared with the department which especially helped to add more engaging experiences for students when classes were moved online in the spring of 2020.

For the past ten years COS STEM majors have benefited from experiences provided by the REALM and PASEO grants. The REALM grant recently concluded, closing the door on additional support for incoming STEM majors. The Biology department has initiated a request for above base funding for a new program called MESA+. The Chemistry department strongly endorses their petition. The MESA+ program would offer essential orientation events, giveaways, STEM academic counseling, and four community based events for the following year. The MESA+ program would be linked to the current MESA program which means students would receive a MESA membership and have access to MESA coaches and tutors. Funding is requested to support the new program as well as to move the part-time MESA coordinator position to a full-time position. A full-time coordinator is necessary to manage the extra responsibilities associated with the new program. The beneficial opportunities provided by the REALM grant are well documented with higher success and retention rates. The success data indicates that the MESA+ program (which is a truncated version of the REALM grant) would produce similar results. The data can be found in the program review of the Biology department.

**Overall SLO Achievement:** Our department is still filtering through large changes in the area of SLO's. After previously noting an absence of useful data from SLO's, we determined that the SLO's themselves were the culprits. We collaboratively constructed new SLO's, PLO's, designed new assessment methods and scheduled assessments. We are excited about the new SLO's and PLO's, as they align much better between courses and with the program as a whole. They also create much better goals for student achievement that align more closely with the mission of the district. Instead of a myopic focus on individual paper-based skills, they broaden the scope to conceptual connections, exhibiting deep awareness of the underlying principles of both chemistry and critical thinking. They also broaden the scope of our goals to laboratory-based skills, which prepare the students for their careers. We have some preliminary SLO data, though we still need to get through more cycles for it to gain statistical accuracy.

Preliminary Data: Teresa Mendoza calculated that Chem 1 and Chem 2 are showing the most promising results with 85.9% and 80.8% respectively as an average SLO achievement for each course. This far exceeds our goal and speaks to the quality of instruction provided in these courses. Chem 12 and 13 showed an average SLO achievement of 69.0% and 69.2% respectively. These numbers were not surprising as these courses are quite challenging regardless of the institution in which they are taught. The SLOs that did not meet our goals were:

“Synthesis” and “Mechanisms” for both Chem 12 and Chem 13 under the Qualitative Analysis PLO.

“Laboratory” for Chem 13 under the Laboratory PLO.

“Laboratory” for Chem 13 under the Quantitative Analysis PLO.

**Changes Based on SLO Achievement:** Ryan Froese and Jenny Verissimo are working to format Chem 12 and Chem 13 with more emphasis on higher-order thinking woven into the course's instruction to improve the SLOs regarding “Mechanism” and “Synthesis.” This should bring the average SLOs up to the target range next year. We believe that the SLOs that were not met in Chem 12 and 13 were because of the COVID pandemic in 2020 as well as a lack of lab instrumentation. The “Laboratory” SLO for Chem 13 was not met largely due to the cancellation of the lab practical due to COVID in the spring 2020 semester. There was also some vagueness in the results for the “Laboratory” SLO because students could only use the GCMS instrument and there was no functioning NMR instrument. This means students were unable to obtain all the spectra they needed to analyze their experiments. Both COVID and the lack of an NMR created a barrier to achieve student success. We have requested a new NMR to continue to give students a better and essential laboratory experience, which is one of our main SLO's vertically aligned throughout the program. The purchase of the NMR should improve student success in the laboratory and help improve our SLOs. We have also included the part-time faculty in the SLO process to some degree and are incorporating their data to develop a more complete image of the department as a whole. We have much growth needed in this area and would like to include adjunct faculty in our SLO data beyond simply incorporating their data.

**Overall PLO Achievement:** Ryan Froese mapped our course SLO's to our newly created PLO's and Teresa Mendoza tabulated the data. Any course that met the SLO goal we have set was counted as achieved. Our PLO's were as follows:

Quantitative Analysis: 3 SLO's met of 4 SLO's mapped to this PLO.

Qualitative Analysis: 4 SLO's met of 8 SLO's mapped to this PLO.

Laboratory Skills: 3 SLO's met of 4 SLO's mapped to this PLO.

**Changes Based on PLO Achievement:** From this data, we have begun to discuss the incorporation of more critical thinking in the form of qualitative questioning in the program from the outset. To address the Chem 12/13 “Synthesis” and “Mechanisms” SLOs, we have resumed discussions on how to increase the Brigg's level in previous courses by requiring students to answer more questions involving “Synthesis or Creation”. This may better prepare students for the level of this expectation in Chem 12.

We predict that the next PLO assessment will improve as we are now back to offering more in person classes after an online stint. We have also considered giving the ACS exam as a final for some of our courses so that we can compare our students' achievements with students across the nation. Finally, would like to further incorporate our adjunct instructors in the SLO discussion process and the workings of our department in general.

**Outcome cycle evaluation:** This year we have done some major work on our program. We used last year's cycle data to launch some major program overhaul, as well as start discussions of the next steps. The hard work of our department faculty is evident from the following bird's eye view of our changes.

We created new SLO's/PLO's to present students with a more cohesive program, and glean more relevant data. From the transformation of our SLO's/PLO's, we realized that Chem 253 was not meeting the needs of our students. We redesigned it to do so and is now known as Chem 10. This was also in response to the qualitative data showing Chem 20 contained many misplaced students, who now benefit from this new course. We teach a Chem 20 hybrid course to meet the needs of working students, and students who are family caregivers. We also did this to mitigate our student's poor study skills and increase access to content. We continue discussions and efforts to increase success in this course. The department realized students were not getting enough experience running equipment to prepare them for lab jobs in our community and further university studies, so we purchased and have been using new equipment in Chem 12 & 13. We have further objectives in this area and are actively seeking more equipment for students to gain experience on. As a final step, we have realized our last hurdle is course offerings. We have seen the majority of our courses get waitlist-full status shortly after registration has opened. We need to offer more courses to build on and continue the work we have done, so we have requested two full-time instructors. We would like to permanently replace Daudi Bogonko who resigned at the end of the 2020/2021 academic year. We currently have a full-time temporary teaching this load and would like to make this a full-time tenure track position. Additionally, we would like to hire another full-time chemistry faculty member in order to maintain our course offerings at the Visalia campus while adding chemistry courses out at the Tulare Center. Finally, we have seen excellent results from SI sessions from the limited data that we have but would like to get more data specific to this area.

All of these changes take a student-first approach, as the rationale behind each change demonstrates. We have striven to meet the needs of both our students and our community and look forward to continuing to do so.

**Related Documents:**

[Chem Program Review data 2021.pdf](#)

## Action: 2021/2022 - (Replacement Faculty Position) - Maintain Current Course Offerings

We would like to permanently replace Daudi Bogonko who resigned at the end of the 2020/2021 academic year. We currently have a full-time temporary teaching this load and would like to make this a full-time tenure track position.

**Leave Blank:**

**Implementation Timeline:** 2021 - 2022

**Leave Blank:**

**Leave Blank:**

**Identify related course/program outcomes:**

**Person(s) Responsible (Name and Position):** Julie Rodriguez, Ryan Froese

**Rationale (With supporting data):** We would like to hire a full-time tenure track replacement for Daudi Bogonko's position. Daudi resigned from the college at the end of the 2020-2021 school year. We were able to secure a one-year full-time temporary position to get his classes covered. But, we really need to make this a permanent position to maintain our course offerings on the Visalia campus.

Without this full-time position, we would lose 3 chemistry classes. Right now these classes are being taught by a full-time temporary employee. This faculty member teaches one majors level class (either Chem 1 or Chem 2) and also two general chemistry classes (chem20). These three classes are always full and sometimes even waitlist full. At Census, on the Visalia campus, the chemistry department had 106%, 98% and then 102% of the seats filled in 2018-2019, 2019-2020 and 2020-2021 respectively.

**Priority:** High

**Safety Issue:** No

**External Mandate:** No

**Safety/Mandate Explanation:**

### Resources Description



# Program Review - Chemistry

**Personnel - Faculty** - We would like to hire a full-time tenure track replacement for Daudi Bogonko's position. Daudi resigned from the college at the end of the 2020-2021 school year. We were able to secure a one-year full-time temporary position to get his classes covered. But, we really need to make this a permanent position to maintain our course offerings on the Visalia campus. (Active)

**Why is this resource required for this action?:** Without this full-time position, we would lose 3 chemistry classes. Right now these classes are being taught by a full-time temporary employee. This faculty member teaches one majors level class (either Chem 1 or Chem 2) and also two general chemistry classes (chem20). These three classes are always full and sometimes even waitlist full. At Census, on the Visalia campus, the chemistry department had 106%, 98% and then 102% of the seats filled in 2018-2019, 2019-2020 and 2020-2021 respectively.

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):**

**Related Documents:**

[CHEM 2021 Program Review Data.pdf](#)

[Faculty Growth F21 Program Review.pdf](#)

## Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 1.1** - The District will increase FTES by 1.75% over the three years

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

District Objectives: 2021-2025

**District Objective 1.1** - The District will increase FTES 2% from 2021 to 2025.

**District Objective 2.1** - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

## Action: 2020-2021 (Above Base) Replace broken Verniers for all chemistry courses

We need to replace the Verniers, of which many of our class set has died. We will be able to use the remaining old Verniers to cobble together two sets possibly to support our expanded course offerings.

**Leave Blank:**

**Implementation Timeline:** 2020 - 2021

**Leave Blank:**

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**Identify related course/program outcomes:**

**Person(s) Responsible (Name and Position):** Ryan Froese, Teresa Mendoza, Jenifer Verisimo, Daudi Bogonko

**Rationale (With supporting data):** These are used in every single course we teach in the chemistry department in multiple labs. The set we have has been dying one by one, which means students now have to share. This means they will not have the same learning experience.

**Priority:** High

**Safety Issue:** No

**External Mandate:** No

**Safety/Mandate Explanation:**

**Update on Action**

*Updates*

# Program Review - Chemistry

**Update Year:** 2021-2022

10/02/2021

**Status:** Action Completed

The Verniers were updated and are currently in use by our Chemistry students.

**Impact on District Objectives/Unit Outcomes (Not Required):**

## Resources Description

**Equipment - Instructional** - A class set of Vernier devices and pH probes for the Visalia Campus. (Active)

**Why is this resource required for this action?:** This is a student success issue. Our Vernier handheld units are beginning to break on the Visalia campus. They are used multiple times in Chem 20, Chem 1 and Chem 2 labs. Many of them are no longer functioning, and more are dying by the day. Since we only have one class-set, each device that dies means that another student does not have the necessary tools to complete the lab on an individual basis, and receive that learning experience.

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):** 10143.1

**Equipment - Instructional** - Verniers are used in almost all of our labs and they are getting old. We need to replace some of these Verniers that no longer work so that we can continue to use them in our labs. (Active)

**Why is this resource required for this action?:**

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):**

## Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

## Action: 2021/2022 - (Growth Faculty Position) - Maintain Current Course Offerings in Visalia while Expanding Course Offerings in Tulare

We would like to hire a full time chemistry faculty member in order to maintain our course offerings in Visalia while adding chemistry courses out in Tulare.

**Leave Blank:**

**Implementation Timeline:** 2021 - 2022

**Leave Blank:**

**Leave Blank:**

**Identify related course/program outcomes:**

**Person(s) Responsible (Name and Position):** Julie Rodriguez, Ryan Froese

**Rationale (With supporting data):** All of our chemistry classes fill! At Census, on the Visalia campus, the chemistry department had 106%, 98% and then 102% of the seats filled in 2018-2019, 2019-2020 and 2020-2021, respectively. We currently have 4 adjunct faculty members covering 6 chemistry classes. We just recently lost one of our adjunct faculty members who was teaching two of those classes. For Spring, we will be down 2 classes because of this resignation. Ryan Froese is also teaching large overloads right now and will not be doing so beyond this semester. We will lose at least another 2 classes when he stops teaching overloads. So, even though this will be a growth position, we need it to maintain our current course offerings. We would also like to move two more of our introductory courses out to the Tulare campus and have this new person teach part of their load on the Tulare campus. This way we will continue to expand the chemistry program on the Tulare campus. The chemistry fill rates on the Tulare campus have been 116%, 115% and 106% in 2018-2019, 2019-2020 and 2020-2021.

**Priority:** High

**Safety Issue:** No

# Program Review - Chemistry

External Mandate: No

Safety/Mandate Explanation:

## Update on Action

### Updates

Update Year: 2021-2022

10/02/2021

Status: Continue Action Next Year

We were not given a growth faculty position last year so we will be asking for this same growth Chemistry position this year.

Impact on District Objectives/Unit Outcomes (Not Required):

## Resources Description

**Personnel - Faculty** - We would like to hire another full-time Faculty member in Chemistry to maintain our offerings on both the Visalia and the Tulare Campus. (Active)

**Why is this resource required for this action?:** All of our chemistry classes fill! At Census, on the Visalia campus, the chemistry department had 106%, 98% and then 102% of the seats filled in 2018-2019, 2019-2020 and 2020-2021, respectively. We currently have 4 adjunct faculty members covering 6 chemistry classes. We just recently lost one of our adjunct faculty members who was teaching two of those classes. For Spring, we will be down 2 classes because of this resignation. Ryan Froese is also teaching large overloads right now and will not be doing so beyond this semester. We will lose at least another 2 classes when he stops teaching overloads. So, even though this will be a growth position, we need it to maintain our current course offerings. We would also like to move two more of our introductory courses out to the Tulare campus and have this new person teach part of their load on the Tulare campus. This way we will continue to expand the chemistry program on the Tulare campus. The chemistry fill rates on the Tulare campus have been 116%, 115% and 106% in 2018-2019, 2019-2020 and 2020-2021.

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):**

**Related Documents:**

[CHEM 2021 Program Review Data.pdf](#)

[Faculty Growth F21 Program Review.pdf](#)

## Link Actions to District Objectives

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District Objectives: 2021-2025

**District Objective 1.1** - The District will increase FTES 2% from 2021 to 2025.

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**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

## Action: 2021/2022 - (Above Base) - Replace our broken NMR

We would like to purchase an NMR to replace the broken NMR that we use in our Organic Chemistry program.

Leave Blank:

Implementation Timeline: 2021 - 2022



# Program Review - Chemistry

Leave Blank:

Leave Blank:

**Identify related course/program outcomes:** Experimental Data

Students will be able to collect, record, organize, and analyze experimental data and recognize the limitations of measurements.

**Person(s) Responsible (Name and Position):** Ryan Froese

**Rationale (With supporting data):** About 8 years ago, the chemistry department purchased a benchtop NMR to use with the Organic Chemistry program. And, from the time it was installed, it never really worked. It was serviced a number of times but could never be fixed. We have even had to stop trying to use it because it sprays the user in the face when you try to inject samples. Some students have unfortunately been on the receiving end of that occurrence and so have Ryan Froese who teaches organic chemistry.

Our Organic chemistry program is growing. We now have two full Chem 12s per year and 1 full Chem 13 per year. It is an advantage for our students to be able to use an NMR prior to transferring because they will most likely use it in the future if they stay in the field of chemistry.

**Priority:** High

**Safety Issue:** Yes

**External Mandate:** No

**Safety/Mandate Explanation:** Our current NMR has had to stop being used because it sprays the user in the face with the sample you are trying to inject which is most times, an organic solvent.

## Resources Description

**Equipment - Instructional** - We would like to purchase a new NMR to replace our broken one. (Active)

**Why is this resource required for this action?:**

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):** 154000

**Related Documents:**

[NMR Quote.pdf](#)

[NMR Site Plan.pdf](#)

## Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

District Objectives: 2021-2025

**District Objective 2.1** - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

## Action: 2021/2022 - (Above Base) - Replace our old Heating Mantels

We have more Organic Chemistry students than we have ever had in the history of COS as more students choose to take advantage of the first two free years of college prior to transfer. This means that our equipment is being used more and is beginning to not work properly. We need to replace our heating mantels so that we can maintain our lab numbers.

Leave Blank:

**Implementation Timeline:** 2021 - 2022

Leave Blank:

Leave Blank:

**Identify related course/program outcomes:** Experimental Data

Students will be able to collect, record, organize, and analyze experimental data and recognize the limitations of measurements.

# Program Review - Chemistry

**Person(s) Responsible (Name and Position):** Julie Rodriguez, Ryan Froese

**Rationale (With supporting data):** Our Organic Chemistry program has expanded. We now offer two Chem 12 classes per year and one Chem 13 class per year while we previously only had one Chem 12 class per year. This means that more students are using the equipment and it is getting old and many of our heating mantels are beginning to not function. We need to maintain a certain number of heating mantels so that we can maintain our current number of students in lab.

**Priority:** High

**Safety Issue:** Yes

**External Mandate:** No

**Safety/Mandate Explanation:** Old heating mantels that are shorting out and are getting plugged into the electrical outlets are not that safe. We try to side-line those heating mantels that are the worst but sometimes have to use some that are questionable.

## Resources Description

**Equipment - Instructional** - Heating mantels are used in most of our organic chemistry labs and the ones we currently have are getting old. Some short out and can not even be used. We would like to replace these old heating mantels. (Active)

**Why is this resource required for this action?:** Our Organic Chemistry program has expanded. We now offer two Chem 12 classes per year and one Chem 13 class per year while we previously only had one Chem 12 class per year. This means that more students are using the equipment and it is getting old and many of our heating mantels are beginning to not function. We need to maintain a certain number of heating mantels so that we can maintain our current number of students in lab.

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):** 7000

**Related Documents:**

[Heating Mantles Wards 1.PDF](#)

[Heating Mantles Wards 2.PDF](#)

## Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

District Objectives: 2021-2025

**District Objective 2.1** - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

## Action: 2021/2022 - (Above Base) - We would like to purchase an Automatic Melt-Temp apparatus.

We would like to purchase an auto-melt temp apparatus.

**Leave Blank:**

**Implementation Timeline:** 2021 - 2022

**Leave Blank:**

**Leave Blank:**

**Identify related course/program outcomes:** Experimental Data

Students will be able to collect, record, organize, and analyze experimental data and recognize the limitations of measurements.

**Person(s) Responsible (Name and Position):** Julie Rodriguez, Ryan Froese

**Rationale (With supporting data):** Our Organic Chemistry program is growing. We now run three organic chemistry classes per year instead of two and all three classes are full. When students do lab in these classes, they usually make a different solid

# Program Review - Chemistry

product with each lab. In order to evaluate the product, we use the melting point of the solid to verify purity and to check to see whether it matches what the melting point of what they were supposed to make. Students submit their melt-temp data and we usually have to trust it because determining a melting point of a solid takes about 30 minutes. If we have 20 students, it would take us 10 hours to find the melting points of all of their products. With this apparatus, it would automatically give the melting point of 5 solids in 10 minutes. and it would take 40 minutes to evaluate one class worth of solids.

**Priority:** High

**Safety Issue:** No

**External Mandate:** No

**Safety/Mandate Explanation:**

## Resources Description

**Equipment - Instructional** - An auto-melt temp instrument would significantly reduce the amount of time that it would take for the students and for us to evaluate their products in lab. (Active)

**Why is this resource required for this action?:** Our Organic Chemistry program is growing. We now run three organic chemistry classes per year instead of two and all three classes are full. When students do lab in these classes, they usually make a different solid product with each lab. In order to evaluate the product, we use the melting point of the solid to verify purity and to check to see whether it matches what the melting point of what they were supposed to make. Students submit their melt-temp data and we usually have to trust it because determining a melting point of a solid takes about 30 minutes. If we have 20 students, it would take us 10 hours to find the melting points of all of their products. With this apparatus, it would automatically give the melting point of 5 solids in 10 minutes. and it would take 40 minutes to evaluate one class worth of solids.

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):** 10000

**Related Documents:**

[Auto Melt Temp SRS.pdf](#)

[Auto Melt Temp Wards.PDF](#)

## Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

District Objectives: 2021-2025

**District Objective 2.1** - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

## Action: 2021/2022 - (Above Base) - Purchase enough Vernier Melt Temps to have a complete class set in Visalia.

We would like to purchase enough melt-temps to have a complete class set.

**Leave Blank:**

**Implementation Timeline:** 2021 - 2022

**Leave Blank:**

**Leave Blank:**

**Identify related course/program outcomes:** Experimental Data

Students will be able to collect, record, organize, and analyze experimental data and recognize the limitations of measurements.

**Person(s) Responsible (Name and Position):** Julie Rodriguez, Ryan Froese

**Rationale (With supporting data):** Our Vernier hand-held Devices have a melt-temp probe that we use mostly in our Organic

# Program Review - Chemistry

Chemistry labs. However, we offer 6 Chem 1 classes per year now and we use them for a lab that we do in Chemistry 1. We do this so that students can get used to using them in their first year of chemistry and we do not have to teach them how to use them when they get into Organic Chemistry. Since we have expanded to using them in our Introductory Chemistry lab, we would like to purchase a class set so that we can get the student into and out of a lab within the 3 hour lab period. It takes about 30 minutes to determine a melting point for a solid so it is tricky to get 24 students to share melt-temp instruments. We currently have 8 instruments. Plus, sometimes more than one lab will need them and we have to reduce the number in each lab by half which further slows things down for the students.

**Priority:** High

**Safety Issue:** No

**External Mandate:** No

**Safety/Mandate Explanation:**

## Resources Description

**Equipment - Instructional** - We would like to purchase enough melt-temps to have a class set of 24 to use in Chem 12, Chem 13 and Chem 1. These would be used in 9 of our classes throughout the year. (Active)

**Why is this resource required for this action?:** Our Vernier hand-held Devices have a melt-temp probe that we use mostly in our Organic Chemistry labs. However, we offer 6 Chem 1 classes per year now and we use them for a lab that we do in Chemistry 1. We do this so that students can get used to using them in their first year of chemistry and we do not have to teach them how to use them when they get into Organic Chemistry. Since we have expanded to using them in our Introductory Chemistry lab, we would like to purchase a class set so that we can get the student into and out of a lab within the 3 hour lab period. It takes about 30 minutes to determine a melting point for a solid so it is tricky to get 24 students to share melt-temp instruments. We currently have 8 instruments. Plus, sometimes more than one lab will need them and we have to reduce the number in each lab by half which further slows things down for the students.

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):** 9000

**Related Documents:**

[Vernier Melt Temps.pdf](#)

## Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 1.1** - The District will increase FTES by 1.75% over the three years

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

District Objectives: 2021-2025

**District Objective 1.1** - The District will increase FTES 2% from 2021 to 2025.

**District Objective 2.1** - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

## Action: 2021/2022 - (Above Base) - Purchase an ice machine to supply ice to our Chemistry labs at the Tulare Center.

As we expand our course offerings in Chemistry at the Tulare Center, we are doing higher level chemistry labs and also more chemistry labs. When students have to make an ice bath to cool something, we struggle to have enough ice to supply for an entire lab. An ice machine is a basic necessity to run chemistry labs.

**Leave Blank:**

**Implementation Timeline:** 2021 - 2022

# Program Review - Chemistry

Leave Blank:

Leave Blank:

**Identify related course/program outcomes:** Experimental Data

Students will be able to collect, record, organize, and analyze experimental data and recognize the limitations of measurements.

**Person(s) Responsible (Name and Position):** Julie Rodriguez, Louann Waldner

**Rationale (With supporting data):** We have expanded our course offerings in Chemistry at the Tulare Center. Prior to Julie Rodriguez moving out to the Tulare Center, we would offered about 2 introductory chemistry courses. This fall, we are offering 3 introductory chemistry courses (chem 20), 1 basic chemistry course (chem10) and 1 majors level chemistry course (chem 1). We have doubled our offerings and are also offering the higher level chemistry out in Tulare. An ice machine is a basic necessity to run chemistry labs and has not yet been prioritized at the Tulare Center because we have been able to get around it by not offering too much chemistry. The lab tech has gone to the store in the past and purchased ice and has kept it in the freezer. The freezer only has room for about 10 pounds of ice on a good day. This is not enough to supply an entire lab of students making ice baths. And, each of our classes have at least 1 lab where ice is needed. Chem 1 has more than 1 lab that needs ice. We have had facilities out to pick out a good space to put one in and I think we've got it figured out. Now, we just need the funds to purchase the ice machine and we might actually be one step closer to becoming a real chemistry department out at the Tulare Center. Exciting!

**Priority:** High

**Safety Issue:** No

**External Mandate:** No

**Safety/Mandate Explanation:**

## Resources Description

**Equipment - Instructional** - We have expanded our course offerings in Chemistry at the Tulare Center. Prior to Julie Rodriguez moving out to the Tulare Center, we would offered about 2 introductory chemistry courses. This fall, we are offering 3 introductory chemistry courses (chem 20), 1 basic chemistry course (chem10) and 1 majors level chemistry course (chem 1). We have doubled our offerings and are also offering the higher level chemistry out in Tulare. An ice machine is a basic necessity to run chemistry labs and has not yet been prioritized at the Tulare Center because we have been able to get around it by not offering too much chemistry. The lab tech has gone to the store in the past and purchased ice and has kept it in the freezer. The freezer only has room for about 10 pounds of ice on a good day. This is not enough to supply an entire lab of students making ice baths. And, each of our classes have at least 1 lab where ice is needed. Chem 1 has more than 1 lab that needs ice. We have had facilities out to pick out a good space to put one in and I think we've got it figured out. Now, we just need the funds to purchase the ice machine and we might actually be one step closer to becoming a real chemistry department out at the Tulare Center. Exciting! (Active)

**Why is this resource required for this action?:**

**Notes (optional):** Installation is approximated at \$350 so the cost of the request exceeds the price of just the ice machine.

**Cost of Request (Nothing will be funded over the amount listed.):** 1200

**Related Documents:**

[Ice Machine Quote F21.pdf](#)

## Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 1.1** - The District will increase FTES by 1.75% over the three years

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

District Objectives: 2021-2025

**District Objective 1.1** - The District will increase FTES 2% from 2021 to 2025.

**District Objective 2.1** - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year



# Program Review - Chemistry

institutions by 10% from 2021-2025.

## Action: 2021/2022 - (Above Base) - Purchase Vernier Melt Temps for the Tulare Center to keep the student experience at the Tulare Center equivalent to the Visalia Campus.

In an effort to make the student experience at the Tulare Center equivalent to the student experience at the Visalia campus, we would like to purchase Vernier Melt Temps for the Tulare Center.

**Leave Blank:**

**Implementation Timeline:** 2021 - 2022

**Leave Blank:**

**Leave Blank:**

**Identify related course/program outcomes:**

**Person(s) Responsible (Name and Position):** Julie Rodriguez, Olivia Schmidt

**Rationale (With supporting data):** The Vernier Melt-Temps are used to measure the melting point of solids. They hook into our already purchased Vernier Handheld devices. The Visalia campus has many Melt-Temp apparatuses and they are used in Chemistry 1 so that students are familiar with them when they take Chemistry 12. Right now, the Visalia campus has melt-temps for student use in Chemistry 1 but the Tulare Campus does not have any yet.

**Priority:** High

**Safety Issue:** No

**External Mandate:** No

**Safety/Mandate Explanation:**

### Resources Description

**Equipment - Instructional** - The Vernier Melt-Temps are used to measure the melting point of solids. They hook into our already purchased Vernier Handheld devices. The Visalia campus has many Melt-Temp apparatuses and they are used in Chemistry 1 so that students are familiar with them when they take Chemistry 12. Right now, the Visalia campus has melt-temps for student use but we do not have any yet. My Chemistry 1 is taught both semesters now out at the Tulare Center and I think it is important for our students to get the same experience as they do on the Visalia campus. Right now, they do not get introduced to this device like the students on the Visalia campus do. (Active)

**Why is this resource required for this action?:**

**Notes (optional):**

**Cost of Request (Nothing will be funded over the amount listed.):** 3200

**Related Documents:**

[Quote Vernier Melt Temps F21.pdf](#)

### Link Actions to District Objectives

District Objectives: 2018-2021

**District Objective 1.1** - The District will increase FTES by 1.75% over the three years

**District Objective 2.1** - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

**District Objective 2.2** - Increase the number of students who transfer to a four-year institution by 10 percent over three years

District Objectives: 2021-2025

**District Objective 1.1** - The District will increase FTES 2% from 2021 to 2025.

**District Objective 2.1** - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

**District Objective 2.2** - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

