

Application for Sabbatical, Academic Year 2024 – 2025

Full name as it appears on your work records: Anna Toy-Palmer

Number of years of continuous full time service at VCCCD: 8

Number of years of continuous full time service at OC: 8

Have you ever had a sabbatical at VCCCD? No

How many years ago was your last sabbatical? Not Applicable

## Project Description:

The purpose of my sabbatical is to revise the laboratory manuals for the general chemistry courses, R110 (Introductory Chemistry), R120 (General Chemistry I), and R122 (General Chemistry II). The lab manuals have not had significant improvements since their original conception. In Fall 2024, we anticipate the onset of a shorter semester (16 weeks versus 18 weeks) with the ability to teach majors chemistry courses over summer (Chem R122). Therefore, revisions to the lab manuals and the experiments should accommodate a shorter semester and the ability to teach the courses over summer without reduction in content.

1. With the onset of COVID and the shelter-at-home mandate, modifications to the R110 manual were introduced but not made uniform across the multiple sections of R110. In addition, as on-ground laboratory instruction returned, modifications were made to integrate further the lecture material with the laboratory. An example is the replacement of an oxygen generation lab with the separation of a salt/sand/water mixture to introduce students to separation techniques and percent composition calculations. Unfortunately, multiple versions of the laboratory manual now exist, and the lack of uniformity on which version of the R110 laboratory manual used by instructors results in a lack of standardization across R110 sections. ***Therefore, the first goal is to revise the R110 lab manual to unify and standardize the experiments and prelab and postlab questions associated with the experiments. Because most of the material is already available but not all standardized and organized, updating the R110 manual is anticipated to be quick. Consistency in teaching the labs even with different instructors and the amount of time and materials to set up each experiment can also be optimized, reducing cost and effort from instructors and staff.***
2. For Chemistry R120 and R122, modifications to experiments were made to introduce the use of newly acquired laboratory equipment, incorporate experiments which can recycle reagents and/or waste products, and reduce hazardous waste and their associated cost for removal. As with R110, refinement of the new labs to ensure procedures are clear and then incorporation into the lab manual will unify and standardize the experiments. The prelab and postlab assignments will be re-evaluated and modified as needed. Incorporation of the labs into CANVAS will reduce classroom costs. ***Therefore, the second and third goals are to revise and update the R120 and R122 lab manuals to update experiments to be environmentally and cost friendly, to accommodate a shorter semester without loss of content and to standardize and unify the labs for multiple sections. These manuals will take longer to produce since more significant modifications must be made. Modeling after the Moorpark General Chemistry manuals, downloadable pdfs will be created on CANVAS. Creating separate files from the whole pdf that identify only those sheets that need to be printed out and submitted and the end of the experiment will help reduce costs for students, particularly for those who do not have access to printers for free.***
3. ***Finally, I would like to propose a course curriculum for the Chemistry Directed Studies course (Chem R199).*** Many students have enrolled in the OC School of STEM and are looking for opportunities to become more engaged in research and/or to learn about new chemistry

techniques. Recently, a research article, "Undergraduate research at community colleges: A pathway to achieve student, faculty, and institutional success" by Edgar F. Rosas Alquicira, Laura Guertin, Sean Tvelia, Peter J. Berquist, and M.W. Cole (DOI: 10.1002/cc.20524) discusses the importance of undergraduate research as an effective, high-impact educational practice. Therefore, I would like to design a course which will offer some undergraduate research opportunities based on chromatography and spectroscopy. The dual focus will be on the theory behind separations technologies and how to use a few selected techniques so students can learn the value of analytical and preparatory separations. The second will be on the theory behind spectroscopy and spectrometry and interpreting various types of spectra. Assessment of what the students learned will be through presentations based on research papers and if possible, results from their experiments. It is crucial to obtain input from the chemistry faculty and Dean Vargas. Therefore, my timeline will be to provide the curriculum for review and suggestions by May 2025 to the chemistry faculty and dean.

I am requesting my sabbatical for Spring 2025 instead of Fall 2024 because I want to be available to write the program review reports and resource requests for Chemistry, maintain participation in several tenure review committees, and be an active member in participatory governance since some committees meet only in fall.

**Your background as it relates to the project and to your role at Oxnard College:**

I am a faculty member in Chemistry at Oxnard College and have been teaching Introductory Chemistry (R110), General Chemistry I (R120) and General Chemistry II (R122) since my start of employment in 2016. I have taught chemistry (Introductory, General, Organic Short Course and Organic) as an adjunct faculty member at CSU Northridge since 2005. My Bachelor's, Master's, and Doctorate degrees have all been in chemistry. My thesis was on the synthesis and NMR structural determination of small peptides. My postdoctoral experience was in multidimensional NMR spectroscopy of the protein, rusticyanin, and my industrial experience was in Computer-Assisted drug design.

**Project Objectives:**

- Bring lab manuals for the Introductory and General Chemistry courses up to date to include new instrumentation while reducing hazardous waste costs through recycling and using more environmentally friendly materials.
- Make each course more affordable by organizing the new lab manuals on CANVAS while ensuring standardization across multiple sections of each course. The course will be more affordable since lab manuals will be placed on CANVAS for download. If possible, I would like to pattern after Moorpark College's Chemistry manuals, which specify the sheets that need to be submitted. This will support those students who do not have access to free printing.
- Work towards offering a directed studies course that provides students opportunities to expand on their chemistry knowledge, lab techniques and research experience. The goal will be to offer students the ability to explore chemistry beyond traditional classwork so they can be prepared for research. In particular, teach students the techniques of chromatography and the uses of various types of spectroscopy and mass spectrometry.

## **Project methodology:**

For the lab manuals:

- Current experiments will be reviewed and updated to ensure lab concepts and procedures are clear and understandable.
- New labs will be sought or designed to reduce hazardous waste while maintaining the essential concepts of the original experiment. Any new lab being introduced will be tested to ensure procedure is correct and understandable.
- In addition, percent errors for the labs should be provided to all instructors so that student lab technique can be assessed and improvements can be made. Each lab will have its own CANVAS page with necessary links to the prelab, postlab, theory and procedure and data tables.
- When reviewing the labs, make sure text and figures are accessible.

For the directed chemistry course (R199)

- Establish topics per week to cover separations and spectroscopy.
- Obtain selections from textbooks that explain concepts being explored.
- Identify and create problem sets for students to practice what they learned.
- Identify research papers from primary sources (such as Journal of Medicinal Chemistry, Journal of the American Chemical Society, Journal of Organic Chemistry, etc.) for students to review and present.
- Develop or find experiments that integrate concepts with the use of current instrumentation and/or lab materials to help students determine the benefits of different techniques and attempt method development if feasible.

## **Product of the sabbatical (a paper, a film, an exhibit, etc.):**

The lab manuals organized on CANVAS will be an easy product to display at the end of the sabbatical. It will be placed in the Chemistry and/or Science CANVAS sites that can be copied into the chemistry instructors' CANVAS courses. The manuals can also be placed on a CANVAS website, patterned after Moorpark College's example, to make the lab manual freely available for download.

The course description for Chemistry R199 will need to undergo the approval process. However, if the course is approved, the results will be widely available and considered successful if students enroll in the directed studies course.

## **How do you plan to share your sabbatical results at Oxnard College? Do you have plans for sharing your results more broadly?**

The plan is to have the lab manuals available to the Chemistry program and to students taking these chemistry classes free of cost on CANVAS. The manuals can be placed on the Commons on CANVAS to offer the work on a broad basis.

The R199 course curriculum will need to be proposed and approved. Once the curriculum has been approved, the course can be proposed to students and later, to industries in Oxnard that may need students with these analytical chemistry skills.

### **Work plan and schedule:**

By February 1, 2025 – have the R110 lab manual updated and on the Chemistry CANVAS site. Current R110 experiments on the Chemistry department CANVAS shell will be evaluated and revised as necessary if they are different than the revised R110 labs. In addition, experiments that can be combined to accommodate a shorter semester will be rewritten so the lab and theory are integrated. Updated prelab and postlab questions will be part of the R110 CANVAS lab manual.

By March 1, 2025 – have the R120 lab manual updated. As with R110, prelab and postlab questions will be included. An example of prelab and completed data tables with calculations will be available along with a template for the prelab information students need to prepare before coming to class and the data tables for each lab. Study assignments will also be posted. Again, labs will be assessed to determine if they need to be combined or made more efficient to accommodate a shorter semester.

By April 1, 2025 – have the R122 lab manual updated. The format of the R122 lab manual will be like the R120 lab manual, including a lab example, templates, data tables and study assignments. Again, as with the R120 lab manual, the experiments in the R122 lab manual will be assessed to determine how they can be made to accommodate a shorter semester and possibly for summer.

By May 15, 2025 – finalize posting all manuals on CANVAS. Submit a proposal for a 16-week directed studies in chemistry course with a focus on separations technologies and spectroscopy to chemistry faculty and Dean Vargas for suggestions before forwarding the proposal.