

## Ventura College Sabbatical Leave Proposal for Fall 2022

Submitted by Kristin K. Clark

Chemistry Department

10/27/2021

**Instructor's Status:** Full-Time, tenured

**Hire Date:** January 2015

**Previous Leaves:** None

### SABBATICAL PROJECT AND DESCRIPTION:

#### I. Background:

Introductory Organic Chemistry and Biochemistry (ChemV21L) course is a two-unit lab that meets for six hours a week. This lab has had a variety of lab manuals since I have taught the course from Spring 2015-Fall 2021. Some of the lab manuals we used in the past cost as much as \$200, which is not uncommon for science course materials. I have switched course materials over the last six years three times and found the cheapest option was a lab manual for \$50.

This can still be a barrier to the class and I would use this sabbatical leave to develop a low cost/free lab manual that could be posted in Canvas and available to purchase at the bookstore. All of our other lab courses have lab manuals that are available in the format of online or as a low cost print edition from the bookstore. Providing quality images, structures of chemistry compounds, diagrams of the reactions and other technical information has been difficult to find in the lower cost options for lab manuals. I would use this time to ensure the text, graphics, diagrams, structures are quality resources to assist students with the difficult organic chemistry and biochemistry experiments. Studies have shown lowering the cost of the course materials has a positive outcome on the enrollment, course completion and overall student success.<sup>1</sup>

Student equity training at Ventura College has provided valuable insight into the need to increase representation in our course materials. Science labs and textbooks do not often reflect the diversity of our classrooms. From the Ventura College Dashboard you can see the trend in success rates for ChemV21Lab over time in comparison with students enrolled in ChemV20L and ChemV30L to include a larger representation of students in the same pathways. Success rates of ChemV20L, ChemV21L, and ChemV30L have dropped more significantly for our Hispanic student population when comparing the demographics shown in the dashboard data below. This could be from many barriers that were widened during the pandemic. Students had changes in their housing, jobs, life and we would like to see this population of student come back to our campus and be successful. This project would help to lower the barrier to an entry level science class and to encourage the retention and engagement of students by using relevant labs, new experiments and changing the format to have more visuals and take away the jargon and language barriers with photos and videos.

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<sup>1</sup> [Florida Virtual Campus \(2019\). 2019 Florida Student Textbook & Course Materials Survey. Tallahassee, FL.](#)

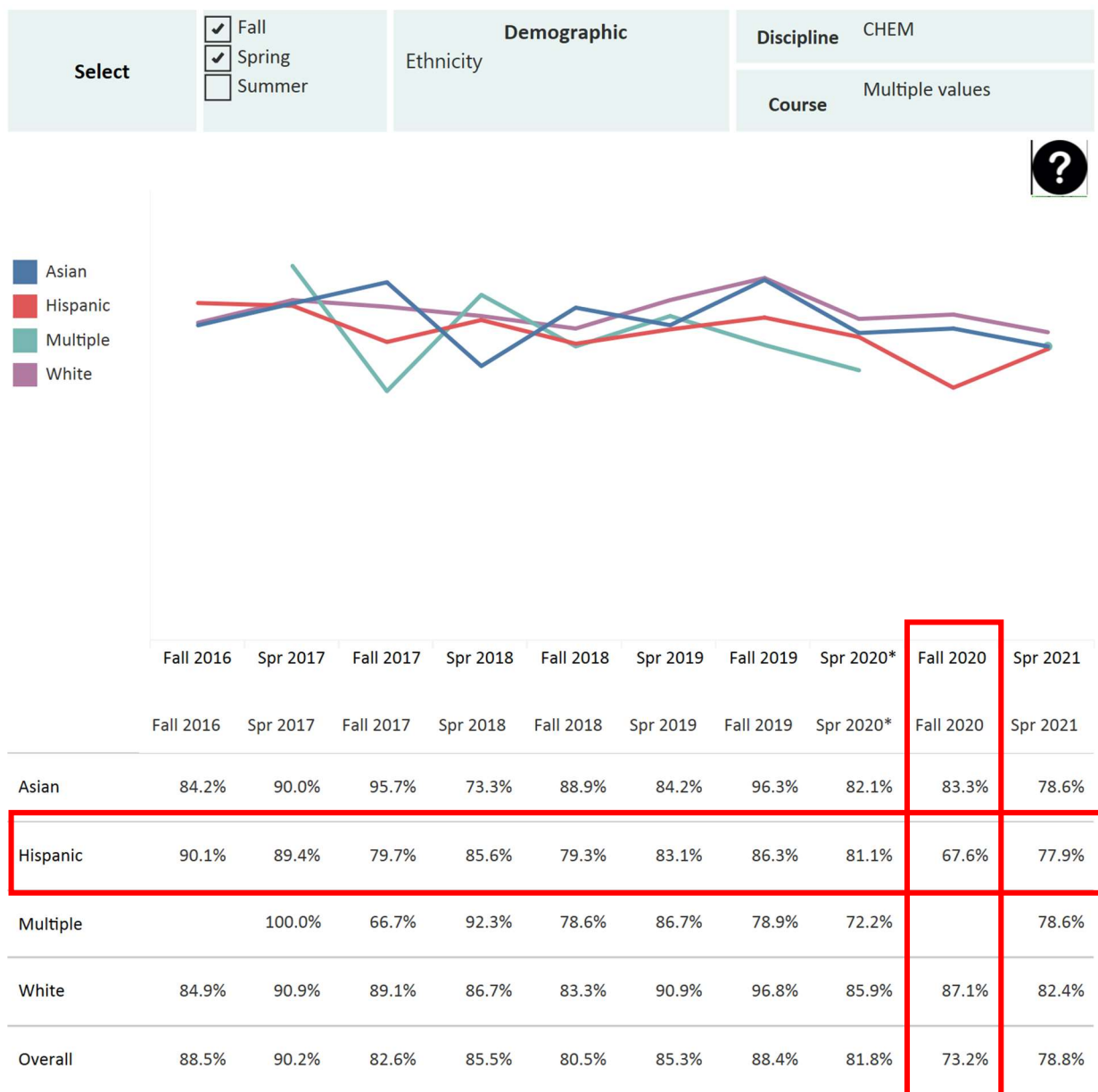


Figure 1. From the Ventura College Dashboard showing the shift from Spring 2020 to Fall 2020 in a key demographic to Ventura College.

## II. Components of the Sabbatical Project:

- **Part One Develop a New Lab Manual:** I plan on creating a lab manual for ChemV21L Introductory Organic Chemistry and Biochemistry with 18 experiments and 2 project based learning assignments to reflect inclusion and diversity in science.
  - Curriculum Development
    - Ensure the entire content and course materials are completely available in the lab manual. I currently have to supplement to provide additional labs and handouts that are not included in the lab manual.
    - Align the content of the labs to ensure there are appropriate assessments that align with the current Student Learning Outcomes and Course Outline of Record.

- Lab Manual Design
  - Increase lab exercises that are current and relevant based on the standards from professional organizations such as: the American Chemical Society, 2YC3 Two Year Community College Chemistry, American Association of Chemistry Teachers AACT and the Journal of Chemical Education.
  - Provide current and relevant experiments to reflect new discoveries in chemistry and biochemistry.
    - Our DNA lab that is part of CSLO-3 should be updated to include more of a discussion on CRISPR and related biotechnologies that pre-health majors will need to know for their careers.
    - **CSLO-3:** Master biochemical laboratory procedures for isolating and identifying DNA
  - Incorporate updated safety standards and write procedures that match some of the new equipment we have in our organic chemistry lab (GC-MS, IR, UV-Spectrophotometers)
  - Ensure students are developing critical job skills such as lab report writing and maintaining a lab notebook. Incorporating critical job skills that are going to enable our students to be successful in other lab courses and programs will increase our student engagement by intentionally designing the course to be relevant and helpful in their career pathways.
  - Because the current lab manual is supplemented from other sources to meet the COR the formats and lab reports are quite variable. Creating a uniform lab report format and keeping the content consistent will also minimize confusion and barriers for student success in this lab course.

## Part Two: Add Project Based Learning

- Research a scientist
  - Students need to see that the field of science has changed. Representation of minority groups in science curriculum can be limited and data show that providing more opportunities for students to see themselves reflected in the course as a scientist can increase their success in the course.<sup>2</sup> The studies from Hunter and Metevier showed that females and minorities in STEM fields had the highest attrition rates with only 56% completion for female and minority students when compared to other demographics of predominantly white students that had completion rates of 73%.
  - Project Based Learning creates a community activity which is more relevant and relatable. I currently use one class project and would like to develop more to increase student engagement. Our class discussions on how to perform research in science and use these tools in other classes creates student buy-in to be a part of the course and contribute. Many Journal of Chemical Education Articles are available to demonstrate how to implement this at the college lab level.<sup>3</sup>
- Research a new technique in science

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<sup>2</sup> Hunter, Lisa, and Anne J. Metevier. 2010. *Diversity and Equity in the Lab: Preparing Scientists and Engineers for Inclusive Teaching in Courses and Research Environments* Learning from Inquiry in Practice ASP Conference Series, Vol. 436

<sup>3</sup> Diawati, et. al. 2018 *Using Project-Based Learning To Design, Build, and Test StudentMade Photometer by Measuring the Unknown Concentration of Colored Substances* J.Chem.Ed.

- To make sure the lab manual can evolve with the many new developments in science I would also like to have a project where students research new technologies and techniques used in organic chemistry and biochemistry.
- I was so excited when Jennifer Doudna came to our area in 2018 to speak at UCSB and I have incorporated how this local CA Nobel Prize winner has changed the face of science into my ChemV21 lecture but due to our budget constraints have not had time or resources to incorporate what CRISPR a revolutionary gene editing technique in DNA can do for science labs.
- It is important to highlight the success and achievements of non-traditional scientists and their contributions to the field of science.

### **Part Three: Create new videos and images to provide visuals to engage students**

- Convert wordy safety text into short videos and images
  - Having heavy word based descriptions is a barrier for safety and learning in a science lab. The first lab manual we had led to safety concerns and long lab introductions to include topics that were not clear in the lab manual.
  - Incorporating more visuals to guide students will help decrease the barrier of jargon and science terms non-science based students are not familiar with.
  - Many students have not been in a physical lab the last year and a half so they have no context or understanding for what science equipment is and how to use it.
  - Including short videos that can be watched on Canvas to build up students confidence, understanding and safety in a science lab will provide a new way to ensure our SLOs are met and the time used in lab can be spent more on helping the students and allowing them to work with pictures of what the lab setups look like.
- Create Canvas materials for use with in person face to face labs and hybrid labs
  - Students work and have life commitments that can be a huge hurdle with a 6 hour a week lab
  - Providing materials that can be used on Canvas to supplement the learning experience in either lab modality will help the lab instructor and the student
  - New Canvas features for Student Annotation exist to help minimize printing costs for students
  - Students can upload their results and work for feedback that we sometimes run out of time for in the lab because they are so busy collecting their data they need help interpreting the results.
  - JOVE lab videos have been used when we transitioned to Canvas and those were so valuable it really showed me that students need that video or more background content on the how/why and what before going into the lab to understand the theory.

### **Part Four: Department Access**

- A Canvas Instructor course shell will be incorporated to provide a way for the department to share course materials, keys, editable documents to maintain this lab manual for future updates.
- We can continue to edit and grow this lab manual and share course materials through the college supported One Drive and LMS systems.

## Part Five: Student Access

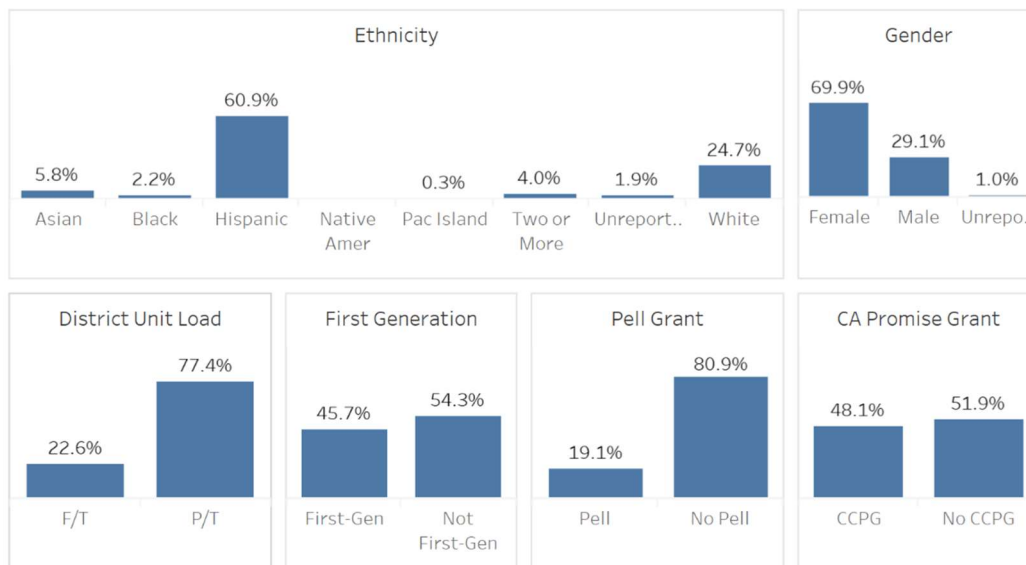
- The chemistry department lab manuals for other courses are available for students to download from chemistrylabmanual.com, this new lab manual would align ChemV21L with the other lab courses.
- I would make sure a copy is posted on the department website, in the instructor Canvas shell, and OneDrive for easy importing into the new lab sections of Canvas shells so students can download a copy.
- Work with the Bookstore to provide a low cost print copy for purchase.

### III. Value of Sabbatical Project to VCCCD and Ventura College

- This project will serve our population of students that needs course materials to reflect them and support them. The Ventura College Department of Chemistry offers this course every fall and spring semester and it always fills. This semester is the first time we had major challenges due to the Dental Hygiene Board wet lab waiver. Having time to update the labs and course materials to ensure alignment for all pathways: nursing, dental hygiene, kinesiology, general science and veterinary technicians will be significant as we align our college with the pillars of the Guided Pathways.
- The figure below from the Ventura College Guided Pathways Dashboard shows the data on the demographics of students we serve in our chemistry labs in pre-health courses and career pathways of:
  - EMT
  - General Studies
  - Holistic Health
  - Kinesiology
  - Medical Assistant
  - Nursing
  - Nutrition and Dietetics
  - Pre-Allied Health
  - Public Health ScienceMany of these students are not eligible for pell grants or promise grants which could help offset the costs of science labs. The value of offering a low to no cost lab manual would help support the population of students that do not always fit in the financial aid category or other special groups that receive waivers for course materials; replacing an expensive lab manual with a free to low cost lab manual, would reduce a barrier to their success in ChemV21L.<sup>4</sup> The dashboard data for the pathways listed above is shown below and 45.7% are first generation, 69.9% female, 60.9% Hispanic and 51.3% do not receive the CA Promise Grant.
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<sup>4</sup> <https://www.venturacollege.edu/guided-pathways-dashboard-major-demographics>



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**V. Value of Sabbatical Project to Students**

- The lab course ChemV21L serves many different majors and pathways for students. It is a lab that can serve as a physical science lab course for CSU-GE and IGETC transfer requirements. Students take this course in the first year after completing ChemV20L. It is often a course that can come early in the career for students and provide a chance for students to see that STEM is a potential field for them. I would love to make sure the lab has the best available practices in science and incorporates the necessary updates to offer an engaging, low-cost course in science.

**VI. Value of Sabbatical Project to Instructor**

As a full time faculty member at Ventura College who has taught in other areas Water Science, Environmental Science and almost all of the other Chem labs, ChemV21L has been my favorite class to teach. The dynamic nature of how each lab will be different when using biochemistry experiments and how each student can see how biology and chemistry really go together make it a joy to teach. I have only not taught this lab for one fall semester and I dearly missed it. I love the variety of career pathway students that I meet and work with on their journey to different programs like Veterinary Technicians, Dental Hygiene, Medical Assistants. Some of these shy students do not see themselves as scientists and I do my best to open new doors and opportunities for them to expose them to other avenues and topics in science like how the simple wavelengths and vibrations of a molecule can tell you its identity. I tell them about how I used IR and other lab techniques when I worked at the Forensic Analytical Center for the Army labs and how important it is to have qualitative and quantitative tests. The knowledge I have gained from Faculty Academy, workshops and other professional development opportunities has provided me with the tools to sit down and craft a lab manual to welcome diversity in science. I just need the time to do this. I think it would be wonderful to have a complete lab manual that could easily be shared so other faculty could also teach this course. One problem we have had this current semester is there are so many lab handouts from different publishers that are used to provide adequate assessment of our SLOs it becomes confusing for students and instructors with variable formatting and making copies of labs to hand out in class. I hope that this new lab manual could reflect the relevant new materials we need to show our diverse student population how much we are still learning about the biomolecules and exploring new scientific discoveries every year.

Thank you for your consideration.

Sincerely,

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