

Sabbatical Application Proposal for Fall 2024 and Fall 2025

Tina Christensen, Life & Earth Sciences Department

GOALS AND OBJECTIVE:

I am hoping to be granted a split (Fall 2024 and Fall 2025) two-semester, independent project sabbatical leave. The goals of this proposed sabbatical are manifold, but can be briefly summarized as follows:

- 1) Develop curriculum, active learning activities and an in-house course reader for our new BIOL 102 course, Science skills for success in STEM and Pre-Allied Health, a course that will address some of COM's EMP and SP equity goals by hopefully improving retention and student success rates in STEM courses among all struggling students, but in particular Black and Latinx students.
- 2) Learn more about the TEAS test (the standardized entrance exam for U.S. Nursing schools) and incorporate material into my pre-nursing biology classes to give students exposure to the types of questions asked on this exam. This will hopefully improve the chances for our Pre-Allied Health students to get admitted. I will also reach out to our Nursing counselors to learn more about the admissions process to various nursing programs.
- 3) Do a major revision of the Human Physiology (BIOL 224) Laboratory Manual to remove or rewrite confusing language, add disposal (safety) information, and completely replace several lab experiments that are outdated.
- 4) Create new lab experiments to replace two existing labs in the BIOL 110L (Introduction to Biology) Lab manual that are in desperate need of replacement.

All of these activities will better support approximately 800 of our students who go through BIOL 110L and Allied Health classes yearly. This project will also fit with College of Marin's Mission statement^[1] and help us meet some of the goals within it by improving our "dedication to academic excellence and innovation", "student centered education", and "removing barriers to students' success". All of these sabbatical leave activities are of great benefit ultimately to student learning and student success, to the Life & Earth Sciences Department, and to the College of Marin.

At the conclusion of the sabbatical, I will communicate my work to Biology and Chemistry faculty and offer a FLEX session where the rest of the college community can hear about what I produced.

SPECIFIC PURPOSES (background and justification):

Due to my time involved in teaching a full-time load (courses: BIOL 110, BIOL 110L, BIOL 120 and BIOL 224 instruction, labs, grading, student communication, etc.), along with my involvement in committees (I have been on: Technology committee, IEC, PRAC, Transfer committee), training new faculty, and being department chair, there is not enough time available for me to pursue the specific activities mentioned below. Therefore, I am hoping you will grant me a sabbatical leave to complete these major projects. All of these sabbatical leave activities are of great benefit ultimately to student learning and student success, to the faculty in our department, and to College of Marin.

A more detailed discussion of specific objectives for my plan of study follows.

CONTENT:

FALL 2024:

- 1) **Developing engaging 'active learning activities and a course reader for our new course: *BIOL 102 – Science skills for success in STEM and Pre-Allied Health* course.**

In the Educational Master Plan (EMP), College of Marin defines Equity as “Recognizing the historical and systemic disparities in opportunity and outcomes and providing the resources necessary to address those disparities.” Our Strategic Plan (SP) provides a framework for achieving some of these equity goals for our institution. One Strategic Plan Objective EQ1.3 states “*All academic programs identify and carry out data-informed, equity-minded, program specific changes through the program review process toward Equity Goal 1 attainment*”. In this section, Action Step 3.2, states that that we will develop equitable practices and policies designed to support differences in the context of students’ learning – not to treat all students the same (p.19). Furthermore, our Strategic Plan Objective IP6.2 states “*Given AB 705 implementations, maintain current success rates in content courses which utilize English/Math skills*”. Here Action Step 2.1 states “*Identify English/Math skills that are needed in core content courses and develop responsive strategies*”.

The new *BIOL 102 – Science skills for success in STEM and Pre-Allied Health (COR)* is a course that addresses all the above equity objectives from the Educational Master Plan and Strategic Plan by giving students who need more support an engaging and safe learning environment where they can master basic math and science skills needed to succeed in other STEM classes. As the Life and Earth Science department worked on Program Review during Spring 2022, it became clear that success and retention rates for Black and Latinx students was lower than for White students in Allied Health courses (anatomy, physiology, and microbiology), and moreover that retention and student success rates for Black and Latinx students were low in all biology courses, but especially in Biology 110. The BIOL 102 course was designed specifically to address some of these disparities and to help these student groups succeed in STEM and Allied Health classes.

BIOL 102 has already been approved by the curriculum committee and I have gotten support to offer this course both from the head of counseling, Gina Cullen, and the Assistant VP of Instruction, Cari Torres-Benavides. The counseling department told me that this is exactly the type of course that they would like to recommend for students who express insecurities about either their math and science preparation, study skills or students who have been away from school for many years or decades (who often feel that they don’t remember how to be a student or remember concepts or skills that they learned long ago).

Many of my students (about half) are highly motivated, middle-aged women with a B.A. or B.S. degree that completed school long ago, but are now returning to pursue a nursing degree. Others are traditional age students, often from underserved populations, who struggle with some of the math and science concepts that are assumed in many pre-nursing science courses. Students from both groups often confide in me their frustration that a class like BIOL 102 does not exist at College of Marin, and that they would have liked to take such a course before or concurrently while enrolled in either BIOL 110L, Anatomy, Physiology, Microbiology and Chemistry. After AB 705 removed all of the remedial math

courses, these students often feel that they have nowhere to go to get the help they need to be confident and do well in their STEM or Allied Health classes.

There have been attempts by other STEM departments to do something about this, but those classes only address a small fraction of the topics that the BIOL 102 course will address. BIOL 102 is designed to address not only math issues and math anxiety, but other aspects that students often struggle with such as fundamental chemistry concepts needed to understand biology, clever strategies to solve math, chemistry and biology problems, finding study skills that work, and tying real-life problems into math, chemistry and biology to motivate students to learn the material for their future career. In BIOL 102 students will be taught: Study skills to maximize learning, How We Learn (brain function)^[2], Growth Mindset^[3], Specific Math Skills (that are needed in Chemistry and Biology courses), Specific core Chemistry concepts that are needed to understand Biology, and it will introduce Key Topics of Biology that will give the students a foundation to build upon when they later encounter them again in the regular Biology courses and in nursing school. In addition, the math and other skills learned early in the semester will be reinforced throughout the semester by using those skills in chemistry problems and applied biology problems (dosage and electrolyte calculations, etc.). The idea is to get the students to reinforce their study skills and math skills repeatedly, and to discover why they need to know the math and chemistry to do well in biology courses (and in their future career).

This is a completely new course that to my knowledge does not exist at other institutions. Therefore there are no textbooks to use. In order to teach this class, I will need to design lectures, active learning activities, fieldtrips, readings, and worksheets either from scratch or from many different sources. Designing the curriculum will take a lot of planning since I want to continuously build upon prior knowledge and skills learned throughout the course. This material and the worksheets will need to be well thought out. Researching, planning and writing curriculum and worksheets for a whole course will take a lot of time which is why this is a major part of my sabbatical plan for the Fall 24 semester. Once completed, I plan to then put the material/worksheets together into a reader for the course, so that students can buy these at a low cost in the bookstore. (Note that it is much cheaper for students to buy a reader from the bookstore that was printed by Reprographics than it is for them to print at home from a PDF file in Canvas.)

Another main idea of this class is to incorporate as much *active learning* as possible to engage the students and inspire them to love STEM and overcome their “math anxiety”. It has been shown that active learning helps create an inclusive classroom and enhance the retention of groups historically underrepresented in STEM^[4, 5, 6]. Anyone that has designed active learning activities knows how much work and planning they take. In fact, one of the reasons faculty often don’t incorporate active learning into their classes is that they feel that it takes too much time to prepare^[7]. Active learning activities take a lot of time researching and thinking through step-by-step what to say and do in the classroom for the activity to be effective. Often you try them for the first time, only to learn that you need to do revisions and do things differently the next time. Many of these activities require you to go buy material for students to use, then put together packages for use in the classroom. The purchasing and packaging can be very time-consuming. Although I have the basic structure of the class planned out, I still need to develop the specific content of the course. In addition to engaging, active-learning activities, I need to design worksheets (for study skills, math, chemistry, and biology topics), plan a field trip where students gather real data to use later on in the semester (data analysis), and find articles that connect the topics in this course to real-life stories and applications. In addition, I plan to talk to Chemistry, Biology and

Nursing faculty to get their feedback on what skills they feel students need support with. In Spring of 2025, I hope to offer BIOL 102 for the first time and test out the material developed during the Fall 2024 sabbatical.

My hope is that this course will engage students and inspire them to feel passionate about their future career and give them the confidence that they can succeed in our other STEM and Allied Health classes. After years of experience of teaching Biology courses and listening to what students complain about, I (and the counselors) feel that this course is exactly what COM needs to serve our students. BIOL 102 will hopefully improve student retention and success rates for Black and Latinx students and therefore contribute to College of Marin's equity efforts as described in the Educational Master Plan ⁽⁸⁾ and Strategic Plan. To demonstrate whether this actually occurs, I plan to analyze disaggregated retention and success data to determine whether rates in Biology courses, especially in BIOL 110 and the Allied Health courses, are higher among students who took BIOL 102 than students who did not. Of course, it may take several semesters of offering BIOL 102 until sufficient data is available for analysis.

2) Research the Nursing school admission process by consulting with counselors, research content and format of the TEAS test, and consult Nursing faculty about topics that are challenging for their students.

I teach Human Anatomy (BIOL 120), Human Physiology (BIOL 224) and Introduction to Biology (BIOL 110/L). Our Allied Health students (going into nursing, physician's assistant, dental hygienist, etc.) take all three of these courses. I often hear from former students that most of the TEAS test ⁽⁹⁾ (Test of Essential Academic Skills) contains questions that are covered in my classes. However, when I ask for more details about the questions, they often are unable to remember the specifics. I also recently discovered that our nursing program at COM weights the TEAS test the most of any factor in their admissions rubric at 38%, while students' cumulative GPA for Anatomy, Physiology, Microbiology, Chemistry and English is only weighted 28.5%! Students sometimes express concerns about doing well in my courses because they have heard that it is so important to get a "B" (or better) in order to get into nursing school, but few of them actually know that doing well on one test – the TEAS test – is even more important than ALL of their course grades (at least for applying to COM's nursing program).

More and more universities are getting rid of the SAT and ACT test for undergraduate admissions because some argue that these standardized tests discriminate against low-income and minority students ⁽¹⁰⁾. It is well known that you can improve your scores on these standardized tests by studying for them and getting help with strategies for how to take multiple-choice tests. Practice with taking these types of tests also helps improve test scores ⁽¹¹⁾. Wealthier families therefore often hire SAT/ACT tutors and send their children to SAT/ACT preparatory courses in an attempt to increase their children's test scores. The TEAS, being a 'standardized test' is no exception to these phenomena. Many of our students may not be able to afford expensive "preparatory courses" for the TEAS test. I therefore hope to be able to help our students by myself studying the TEAS test to find out what topics are covered and what kinds of questions they have on that test. I can then incorporate TEAS test-prep material, projects, and worksheets into my courses, and have them make meaningful connection between my curriculum, the TEAS test, their success in nursing school, and their future career. I think this can reduce inequities that

some of our students encounter in life and help our students perform better on the TEAS test without expensive preparatory courses.

In addition to learning more about the TEAS test, I would like to learn more about which nursing programs most of our students are admitted to and learn more about what those schools value in an applicant (if that information is available, like COM nursing program's rubric). Since College of Marin has several counselors with priority engagement on nursing admissions, I hope to reach out to them as a primary resource to learn more about the process. By knowing what makes a strong candidate, I can support students better in the classroom.

Finally, over the years, I have heard complaints from the nursing faculty that students are weak on certain things (such as dosage calculations for example). I would like to talk to several nursing faculty here at College of Marin and find out specifically what topics and problems they see students struggle with, so that we can better teach those in the Allied Health classes. Based on the feedback I get, I will try to design some topic lists and problem sets that better teach the skills needed to be successful in our nursing program. I will then communicate this information to chemistry and biology faculty so they can address these topics in their classes.

In summary, these two F24 sabbatical projects meet some of the goals (within both College of Marin's Mission Statement ^[1] and College of Marin's Educational Master Plan ^[8]) by improving our "dedication to academic excellence and innovation", "student centered education", and "removing barriers to students' success". It will also help me with my professional development by broadening my understanding of other departments and programs curriculum.

FALL 2025:

- 3) A major revision of the existing Human Physiology Laboratory Manual to improve students' experience in the classroom. This includes revising language in all of the existing lab exercises, as well as replacing several existing labs with new ones.**

The Human Physiology Laboratory Manual was written and maintained by Dr. David Egert who is now retired. When I started teaching physiology labs at College of Marin, I had fresh eyes on the curriculum and on the experiments in the lab manual. What I discovered was that there are many instructions that are not written down in the lab manual. These were instructions Dr. Egert would give his students verbally. He never realized that something was missing, but as a new instructor in physiology, I noticed it right away and therefore had many, many questions. I often realized that if I struggled with fully understanding the instructions, then most certainly our students would as well. This also becomes a problem when we have new hires. They too have questions about these things: Where do the students find this equipment or the reagent mentioned in the manual? What part of the lab should the students start with, so they get out of the lab within 3 hours? Where are we supposed to dispose of the chemicals? Is it hazardous or not? Etc. These instructions need to be in the lab manual but are currently not. In addition, over the years, I have gathered feedback from both students and other instructors. I plan to use this feedback to improve flow, pedagogic value, and clarity. In addition, I plan on including

additional background information, theoretical context and clinical relevance to many of the labs in order to help students connect lecture, lab and real-life experiences together.

Another issue we have is that many times our lab tech will set up our labs incorrectly. He puts out equipment that does not belong to a particular lab and other times things are missing or broken. As part of this major revision of the Physiology Lab Manual, I plan to go through and update our lab tech's "prep sheets", so they have clearer instructions of what material and equipment is needed for each lab. These "prep sheets" will also have useful notes of what things he needs to check at the beginning of the semester, so that he can order new parts (if needed) so that those parts are working when it's time to do the experiments. This will greatly help reduce frustration by students when their lab experiments do not work out due to old or broken equipment.

Finally, the lab manual contains labs we don't do anymore. We have new labs that we do instead. However, those new labs are not in the manual. This means that we are wasting trees in both printing pages not used and having to supplement the manual with other lab handouts.

I would like to address all of these Physiology lab issues to give students a better learning experience in the lab. In addition, these edits will also help new faculty as they start teaching our physiology labs by having clearer instructions.

4) Revision of the BIOL 110L manual to replace Labs 1A and 1B with new labs.

Our BIOL 110L (Introduction to Biology Lab) lab manual was previously maintained and updated by our Biology Coordinator. However, this coordinator position was cut in the last budget reduction, so now there is no one taking charge and doing updates as needed to that manual; it doesn't help that nearly all of the 10 or 11 sections of BIOL 110L offered each semester are taught by part-time faculty.

Right now, there are two labs that need to be re-written to give students a better learning experience in that lab course. For example, currently we start out the semester with Lab 1B the first week and Lab 1A the second week. Just the numbering of these labs confuses students and they often come into lab having prepared for the wrong lab. Some students only bring the pages for one lab (instead of the whole manual), so some come in with pages for the wrong lab. There needs to be only ONE Lab 1 (no "A" and "B"), as well as an orientation lab session (Lab 0?) on the first week of classes.

In addition, Lab 1A and Lab 1B are jam packed with some very important information (such as learning how to use a microscope) but also some topics that don't really fit this course, such as learning about "significant figures" (more important for a general chemistry class). In addition, both Lab 1A and Lab 1B fail in introducing the most basic concept of the "Scientific Method" and "writing a hypothesis before an experiment," which should be in an introductory lab manual since these are fundamental topics in science. In fact, most publisher's general biology laboratory manuals all contain a "scientific method" lab at the beginning of their books^[12]. Our in-house manual does not even mention the words "scientific method" in it anywhere.

Moreover, the first two weeks of BIOL 110 lab are usually very stressful for both instructors and students because these two labs contain so much information. I have spoken with many of the part-time instructors who teach this course, and they feel the same way--that there is too much material in the

first lab we do the first time we meet the students, that it leads to a stressful experience for everyone, and that the information is not always relevant to the course objectives. Therefore, I would like to discuss with BIOL 110L instructors what parts of Lab 1A and Lab 1B they want to keep, what to remove, and what other, new topics they would like to see in the new "Lab 1". Then I plan to rewrite Lab 1A and Lab 1B into *one* Lab 1 and help make the start of the semester less stressful for our students (and instructors) and a more valuable learning experience for our students.

5) Updates to BIOL 102 based on feedback and experiences while teaching that class in Spring 2025

While teaching BIOL 102 for the first time Spring 2025, I plan on collecting student feedback on activities, course content, fieldtrips, and worksheets that I used that first semester. Then I will use this feedback to make changes to the course content in order to improve its usefulness to students. In addition, I will also use assessment performance in the course to make changes to the curriculum to better meet the learning objectives of this course. The improvements may come in the form of new or modified worksheets, class activities, readings, field trips, or assessments. I anticipate this will be a substantial amount of work.

SCHEDULE:

Fall 2024 ("ON sabbatical")

Month:	Objective (for each numbered content/activity above):
August	<p>#1) Research and planning for BIOL 102 specific content:</p> <ul style="list-style-type: none"> • talking to Chemistry and Biology faculty about math that students need to know. • talking to Biology faculty about Chemistry that students need to know. • Talking to Nursing faculty about math, chemistry and biology that students need to know. • Research "citizen science" field trip • Talk to students about their needs for success and reduction of anxiety. • Analyze feedback from students and faculty.
September	<p>#1) Research and planning for BIOL 102 specific content:</p> <ul style="list-style-type: none"> • talking to Chemistry and Biology faculty about math that students need to know. • talking to Biology faculty about Chemistry that students need to know. • Talking to Nursing faculty about math, chemistry and biology that students need to know. • Research "citizen science" field trip • Talk to students about their needs for success and reduction of anxiety. • Analyze feedback from students and faculty.
October	<p>#1) Planning for BIOL 102 specific content:</p> <ul style="list-style-type: none"> • Plan out the order of learning activities and concepts that tie together. • Look for opportunities to repeat topics in a new context throughout the semesters in order to reinforce learning. • Make Lesson Plans and activities for "How we learn and Growth Mindset" unit of this course. • Write Math worksheets for Basic Math unit
November	<p>#1) Planning for BIOL 102 specific content:</p> <ul style="list-style-type: none"> • Make Lesson Plans and activities for Math, Chemistry and Biology units of this course. • Write Chemistry and Biology worksheets. • Research and design 'Active Learning' class activities. <p>#2) Research the Nursing school admittance process and the TEAS tests. Talking to nursing faculty about what topics/skills they find students struggle with.</p>
December	<p>#2) Write TEAS test specific problems and preparatory curriculum to implement into Anatomy and Physiology courses.</p>

Spring 2025 ("OFF sabbatical")

- Teach BIOL 102 for the first time. Gather feedback to improve curriculum the next time it's taught.
- Incorporate a first batch TEAS testing problem sets and worksheets on specific chapters/topics in Anatomy and Physiology, get feedback to make appropriate changes the following fall.
- Share my findings with Chemistry and Biology faculty.

Fall 2025 (“ON sabbatical”)

Month:	Objective (for each numbered content/activity above):
August	<p>#3) A major revision of the Human Physiology Laboratory Manual to improve students’ experience in the classroom.</p> <ul style="list-style-type: none"> • analyze feedback from faculty, lab tech and students about what labs or parts of labs that are not working well. • Identify labs that need to be removed and what labs should be incorporated instead. • Research new labs to replace lab protocols or equipment that currently causes problems and stress to students and faculty. • Research equipment and reagents needed for such new labs and find out what the costs would be.
September	<p>#3) A major revision of the Human Physiology Laboratory Manual to improve students’ experience in the classroom.</p> <ul style="list-style-type: none"> • Writing new labs • Updating existing labs • Adding Pre-Lab tables (to get students to prepare before they come into lab) • Write new preparatory sheets for our lab tech to reduce improper set-ups.
October	<p>#3) A major revision of the Human Physiology Laboratory Manual to improve students’ experience in the classroom.</p> <ul style="list-style-type: none"> • Writing new labs • Updating existing labs • Adding Pre-Lab tables (to get students to prepare before they come into lab) • Write new preparatory sheets for our lab tech to reduce improper set-ups.
November	<p>#4) Revision of the BIOL 110L manual:</p> <ul style="list-style-type: none"> • Research what experiments other GE Biology lab courses start with. • Compare those with our Lab 1A and Lab 1B content. • Discuss findings with other BIOL 110L instructors and come up with content for our new “Lab 1”. <p>#5) Updates to BIOL 102 based on feedback and experiences while teaching that class in Spring 2025</p>
December	<p>#4) Revision of the BIOL 110L manual:</p> <ul style="list-style-type: none"> • Research what experiments other GE Biology lab courses start with. • Compare those with our Lab 1A and Lab 1B content. • Discuss findings with other BIOL 110L instructors and come up with content for our new “Lab 1”. <p>#5) Updates to BIOL 102 based on feedback and experiences while teaching that class in Spring 2025</p>

Spring 2026 (“OFF sabbatical”)

Communicate results of sabbatical project to faculty in Biology and Chemistry. (Department meetings, FLEX session). Readers and lab manuals will be produced and printed by reprographics to be sold in the COM bookstore.

CONCLUSION:

- The *objective* of my sabbatical program will be to improve student learning experiences and meet some *goals* of the college Educational Master Plan by:
 - Develop our new BIOL 102 course, Science skills for success in STEM and Pre-Allied Health, a course that will address some of COM's EMP and SP equity goals by hopefully improving retention and student success rates in STEM courses among all struggling students, but in particular Black and Latinx students.
 - Learn more about the TEAS test (the standardized entrance exam for U.S. Nursing schools) and incorporate material into my pre-nursing biology classes to give students exposure to the types of questions asked on this exam. This will hopefully improve the chances for our Pre-Allied Health students to get admitted. I will also reach out to our Nursing counselors to learn more about the admissions process to various nursing programs.
 - Do a major revision of the Human Physiology (BIOL 224) Laboratory Manual to remove or rewrite confusing language, add disposal (safety) information, and completely replace several lab experiments that are outdated.
 - Create new lab experiments to replace two existing labs in the BIOL 110L (Introduction to Biology) Lab manual that are in desperate need of replacement.
- *Products* of this sabbatical:
 - I will produce a BIOL 102 'course reader' that will be printed by reprographics and sold in the bookstore at cost.
 - I will develop TEAS test problem sets that will be incorporated into my Anatomy and Physiology courses.
 - I will do a major revision of the current Human Physiology Lab Manual (and the lab tech preparatory sheets) in order to make instructions clearer and enhance the students' learning experiences in lab. **This will require edits to all of the labs, as well as completely replacing several of the lab experiments.**
 - I will rewrite Lab 1A and Lab 1B of our current BIOL 110L lab manual, to better align the first lab with what students need to know for this course and make the lab experience more pleasant for both students and instructors.
 - I will communicate my sabbatical project findings and updates to Chemistry and Biology faculty at College of Marin. (Department meetings, FLEX sessions etc.).
- I will improve my *professional development* by learning more about what specifically is taught in Chemistry and Nursing courses and gain knowledge of what their students struggle with.
- I will improve my *professional development* by learning more about Nursing Programs that our students go to and what obstacles our students face with taking the TEAS test. In addition, this project will involve a lot of research of topics covered in other disciplines (math, chemistry, and nursing) and finding specific content that matches those topics. This will most certainly be professional development that benefits both me and my students.

- The knowledge gained and the resources created as part of this effort will support many of College of Marin's Educational Master Plan goals and action steps by developing strategies to help students who are struggling, and by creating supplemental instruction to help students brush up on foundational skills.

References:

1. [College of Marin's Mission Statement](#)
2. [How we learn \(Neuroplasticity and learning explained\)](#)
3. [Developing a growth mindset with Carol Dweck](#)
4. [What is Active Learning?](#)
5. [Why use active learning?](#)
6. [Active learning increases student engagement.](#)
7. [Instructor strategies to aid implementation of active learning: a systematic literature review](#)
8. [College of Marin's Educational Master Plan](#)
9. [What is the TEAS test?](#)
10. [How Admissions Tests Discriminate Against Low-Income And Minority Student Admissions At Selective Colleges \(forbes.com\)](#)
11. [What the Research Says About the Effects of Test Prep](#)
12. [Unfolding the Mystery of Life - Biology Lab Manual for Non-Science Majors \(Genovesi, Blinderman and Natale\) - Biology LibreTexts](#)

