

Biology Capstone Laboratory

BIOZ476
Fall 2019

Course Coordinator:

Tricia Hardt Smith, Ph.D.
hardtta@vcu.edu
[Removed]

Laboratory Instructors:

[Removed]

Location:

Laboratory sections meet [Removed]

All sections meet in [Removed]

Textbook:

'A Student Handbook for Writing in Biology' (4th ed.) by Karin Knisely (ISBN 978-1464150760)

Course Description:

One Semester course including 1 lecture hour and 3 laboratory hours. 2 credits.

Prerequisites: BIOL300, BIOL310 and 90 hours of undergraduate course work.

Welcome to the Capstone Laboratory! This laboratory course is designed to be a finishing element of your career as a biology undergraduate student. In this course you will practice the skills of a working scientist; including laboratory techniques, scientific research and writing, and presentation of scientific material. In the lab you will learn basic methods used in cellular and molecular biology; focusing on laboratory methods and instrumentation, experimental design and data collection, analysis and presentation. Exercises may include: DNA amplification, DNA isolation and analysis; molecular genotyping, DNA sequence analysis, cloning, SDS-PAGE electrophoresis, and ELISA analysis. Reading and critical analysis of scientific literature, scientific writings, and data presentation will also be an important component of the class.

Course Objectives

The main objective of this course is to teach basic current research techniques in molecular biology and apply them in a research setting. First, students will be exposed to a working environment in a biological laboratory where critical laboratory skills will be taught, including: instrumentation, experimental design, critical thinking, ethical and social responsibility, data collection and data analysis. All will soundly

following the principles of the Scientific Method. Students will then apply their knowledge and write a scientific paper in the standard scientific journal format.

The Capstone experience will be fulfilled by a data presentation on a relevant, current topic in biological research. This presentation will reflect the student's ability to relate their biological background acquired through their courses at VCU and the material learned in the semester. This assignment will showcase their ability to understand, critically analyze and synthesize ideas in a scientific manner.

Honor Code

Biol476 has zero tolerance towards cheating and I will strictly enforce the VCU

Honor Code without exception. I will not hesitate to report you! Students committing any act of cheating, plagiarizing, abusing academic materials, facilitating academic dishonesty, or soliciting others to engage in any of these acts will be referred to the Honor System Coordinator for disciplinary action. We will cover several possible consequences outlined in the in the University Bulletin. The Honor System in its entirety can be reviewed on the Web at http://www.students.vcu.edu/studentconduct/students/student_honor_system.html or it can be found in the VCU Insider at <http://www.students.vcu.edu/insider.html>. *Students are cautioned that the academic and disciplinary sanctions for academic dishonesty can be quite severe.*

Teaching Assistants (TAs) and Preceptors

TAs and preceptors are your most valuable resource in the lab! TAs have a wealth of laboratory experience to draw from and preceptors have successfully completed this course in the past. As an adult learner in a Capstone experience, it is your responsibility to ask questions and glean as much information from them as possible. If you need clarity on an issue or need something explained in a different way, do not hesitate to ask. In the professional environment of VCU, the preceptors are expected to treat you with respect and you are expected to do the same. Please remember that they want you to succeed!

TAs will hold office hours this semester, but may also be available by appointment. Please do not hesitate to contact your TA with any questions regarding assignments, lecture of lab material, or any other concerns regarding the course work or policy. The best way to contact us is by e-mail, but please allow a 24 hours response time during the week (no email responses during the weekend). TAs will not answer any questions 24 hours before an assignment is due (this includes, but is not limited to exams, lab reports, homework assignments, etc.)

Attendance

Attendance is expected in lecture and is ***mandatory in laboratory ([Removed])***. ***MORE than TWO unexcused absences from laboratory will result in a failing grade for the course!*** If you are seriously ill or have an excused reason to be absent, contact Dr. Smith and your TA as soon as possible to try to make up the lab with another section. Remember that each lab will be offered only during the week it is

scheduled (i.e. you cannot make it up the next week). It is your responsibility to provide proof of your illness (i.e. a doctor's note) or the reason for your excused absence within one week of your return. You must make arrangements with your TA and Dr. Smith to attend another section. Dr. Smith will consider documented excusable absences to allow makeup lab quizzes. Any absence at all is a reason to contact your TA, even if unexcused, to determine how to deal with your absence. Many labs require materials and data prepared from a previous week, you will need to have a plan to deal with those issues. *Also, you must stay in the lab the entire session to receive credit!* If you leave early for any reason (outside employment, 'feeding the parking meter', etc.), this will count as an unexcused absence! You are responsible for being at the lab the entire period.

NOTE: *If you are deemed a distraction to others or behaving in a rude manner you will be asked to leave lecture/lab and will **not** receive credit for attending that lecture/lab.* Rude/distracting behavior includes, but is not limited to: answering your cell phone during class, leaving class to answer your cell phone, texting during class, listening to any music-playing device, watching videos/playing games on laptops, sleeping, and excessive talking. If computer usage is abused, we will take the appropriate measures to remove the distraction.

Lecture material is essential to understand the laboratory sessions and to answer questions in weekly lab quizzes, so it is strongly suggested that you attend lecture. ***You will have the chance to earn extra-credit for answering pop-quizzes during lecture.*** These points are not included in the total points of the semester and will not affect your final grade if you do not have them. **NO MAKE-UPS will be offered for the pop-quizzes under any circumstance.**

During lab, NO ELECTRONICS may be used! You may not access cell phones or laptops during the laboratory, unless specifically told otherwise during the lab by your TA (example: you may use a laptop when we explore BLAST sequencing. Electronics are not permitted in laboratory settings as they can be contaminated by chemicals or pathogens. *You will be asked to leave if you are caught with a cell phone, and that lab will count as an unexcused absence!*

Personal Protective Equipment Requirements

You are required to wear safety goggles, a lab coat, pants and closed-toed shoes at every lab to participate in lab, no exceptions!! You cannot attend the lab if you do not have these items and this will count against your two excused absences. You can purchase goggles from the chemistry department and lab coats at the VCU Medical Campus bookstore or at Uniform City at 402 E Grace St., Richmond, VA 23219. Their phone number is (804) 643-0291.

- Minimum required PPE that must be worn at all times in a laboratory or technical area is full-length pants (or equivalent).

- Minimum required PPE that must be worn at all times in a laboratory or technical area is enclosed closed toe/heel shoes to protect feet from chemical spills and sharp objects.
- Remove all additional required PPE before leaving your workplace.
- Never wear lab coats, gloves, coveralls or other potentially contaminated PPE to public locations such as cafeterias, restrooms, elevators, offices, or other off-site areas.
- Always wash your hands after removing protective equipment and before leaving the work area.
- Do not reuse disposable gloves.

Blackboard & Email

All documents and announcements will be posted on Blackboard (Bb), which can be found at <http://blackboard.vcu.edu>. You should check this and your VCU email prior to each class. It is important that you check both, as this will be how your TA and Dr. Smith will contact you as well as post any announcements.

Please allow your TA at least 24 hours to respond to an email during the week. TAs and Dr. Smith will not respond to emails over the weekend.

Grading

Grades will be determined by adding up all the points you have earned and dividing them by the total number of points assigned this semester.

Final Grade Scale

89.50-100% =A 79.50-89.49% =B 69.50-79.49% =C 59.50-69.49% =D Below 59.50% =F

I DO NOT BEND ON THESE GRADE BARRIERS. Sorry, the line has to be somewhere.

Letter grades will be assigned at the end of the course. Please be aware that I do not curve any exam or final grades. Also I do not “round” grades or drop grades. Only changes due to mathematical error will be granted.

Grades will be posted in Blackboard and you have one week to check them and get back to me with any question or concerns about them. **No grades will be changed after the one-week period.**

A grade of Incomplete (I) will be given only if an excused absence is granted for the final exam. .

Here are the anticipated number of points this semester, this list is subject to change (weather, outbreaks, etc. can seriously affect our schedule!):

| Assignments | Number of possible points |
|-----------------------------------|---|
| Academic Integrity Quiz | 10 pts |
| VCU Chemical Safety Modules | 1 pt |
| Weekly Quizzes | 110 points |
| Laboratory Notebook | 45 points |
| Homework | 30 points |
| GMOs Manuscript | 50 points |
| DNA Barcoding Partial Manuscript | 40 points |
| DNA Barcoding Complete Manuscript | 100 points |
| Data Presentation (Total) | 57.5 points |
| Exam I & II | 200 points |
| Total points possible: | 643.5 total points |
| Lecture Pop-quizzes | 20 points? (Extra-credit, Not included in total points) |

TAs will post grades on Blackboard in a timely manner; for most assignments this will be before your next lab session after the session the assignment was due. Papers and exams may take longer to grade. After you have received your graded assignment, you have ***1 week to address questions or concerns regarding your grade*** with your TA or Dr. Smith. ***Grade changes will not be considered after this 1 week time period has lapsed.*** If a grade has been *posted incorrectly* on Blackboard, simply bring your assignment to your TA, as soon as possible, to have the grade reviewed. For any and all grade changes, please bring the assignment for Dr. Smith for a full regrade. I am happy to regrade any assignment for you. Please note that I will grade the entire assignment from scratch. This complete regrade of the assignment may result in a higher or lower score. ***Assignments turned in pencil won't be considered for grade changes once returned to the student.*** **Please note; extra credit in this course is a privilege, not a right, and may be removed at any time at the instructor's discretion.**

Friday Lecture

Each Friday we will have a lecture. Lectures start promptly at [removed] and students should be on time. As mentioned above, the lecture material is essential for your understanding of the laboratory sessions, therefore, I expect that you attend all of them. The extra credit pop quizzes will be offered randomly at any time during lecture, therefore you need to be on time and present through the duration of lecture to earn the points. No points will be earned if you come after or leave before the pop quiz is given. **NO MAKE-UPS** for pop-quizzes under any circumstance.

Lab Notebooks

Students will be required to keep a bound notebook (lab notebook with carbon copy) throughout the entire semester. In this notebook, students will write the lab objective and a summarized protocol for the day's work. During lab, students will record their results and write their observations/conclusions in the notebook. Instructions for keeping your lab notebook are provided in the lab manual and on Blackboard. The TA will collect the notebooks at the beginning of the lab as you walk in the door. The purpose of the notebook is to help you prepare your final report for the class. The TAs will give you suggestions in how to present your results and your conclusions.

Lab Quizzes

*In preparation for each lab, students should review the lecture from the previous Friday and last week's lab for the quiz as well as thoroughly read **all** lecture and lab documents pertaining to the current lab.* Quizzes will be given each week in lab on the previous week's procedure and will also include the previous week's lecture material. Students will not be allowed to use notes during the quiz.

Tardiness to Lab

- ❖ Any student arriving more than 20 minutes late to lab will not be allowed to participate.
- ❖ All students must attend the lab they are registered for.
- ❖ Quiz make-ups will only apply to a documented, excused absence (in accordance with VCU policy)

Homework

Homework will be assigned for some of the labs. Assignments will be due the week after the lab is completed. Homework assignments will be posted before lab for students to review; however, questions will not be addressed about the assignment until AFTER the corresponding lecture AND lab have been completed. Homework is to be completed in your own words and should show your own work, even if you work together with someone. Assignments that have been copied and/or do not reflect individual work will receive a grade of "0" and will be considered an Honor code violation.

NOTE: Students should be prepared to hand in all assignments as soon as you arrive to class. Any assignments turned in after collection will be considered late and points will be deducted accordingly.

Lab Manuscripts

You will be required to write several formal scientific lab manuscripts. The first report will cover the GMO experiments; the labs from DNA extraction through Electrophoresis. This report, both a printed and an electronic copy, will be due at the start of your lab section on the due date. The objective of this

report is to provide the opportunity to write a short scientific journal article about your findings and to give you feedback about what a scientific lab manuscript should include.

The second manuscripts, assigned in two parts, will cover the DNA barcoding experiments, from DNA extraction through the Phylogenetic analysis.

The papers will be returned two weeks later with comments/corrections made by your TA.

I will cover the specifics and grading of these assignments during my 'Scientific Writing' Friday lecture.

- ❖ 5 points will be deducted from the grade per day if you do not turn your first report on time (both printed and electronic copy). **Both the printed and electronic copy must be appropriately turned in for your paper to be considered submitted. You will accumulate late point deductions until BOTH are turned in!** We do NOT accept papers over the weekend. Late papers must be submitted to the Biology business office, where they will receive a time stamp and be placed in the mailbox of Dr. Smith or your TA. Papers DO accumulate late deductions over the weekend!
- ❖ **Any cheating/plagiarism will be addressed as outlined in the "Honor Code" section** (i.e. any violation will be turned into the Honor Code Council).
- ❖ You and your lab partner may NOT copy the manuscript from one another, nor may you use your materials from last semester if you need to retake the course.
- ❖ TAs will **not** proofread ("check over") your rough or final draft prior to submission. If you have a specific question regarding a concept or idea, please contact your TA in a timely manner.
- ❖ All electronic copies will be checked against several databases for original content to produce an originality report. This report will show how your paper compares to documents available on the Internet, in many print journals, a *database of other papers submitted by Virginia Commonwealth University students*, as well as a Global Database of papers submitted by all users of SafeAssign. All electronic copies will be added to the Virginia Commonwealth University database for comparison of future papers against my work.

Any work not reflecting your own will be subjected to Honor Code Violation.

Data Presentations

As part of the Capstone experience, students will pick a lab mate to work with for the Data Presentation.

The topic of the presentations will be submitted in near the start of the course (see course schedule).

Students will work together reviewing the current scientific literature and conceptualize ideas with their current class and classes at VCU (Cell Biology, Genetics, etc.). The Data Presentation will cover one primary, peer-reviewed article in the realm of molecular biology. This assignment is worth 100 points total. Information regarding this assignment will be given in the laboratory manual, Blackboard (Week 1 folder), and during the Scientific Writing Friday Lecture (Dr. Smith).

Important dates for Presentation assignment (see class schedule for dates)

Update 1: Group assignment (5 points)

Update 2: Topic submission (5 points)

Update 3: Presentation Abstract (5 points)

Last week: Presentation week (42.5 points)

Exams

There are two exams which will be given during the Friday one-hour lecture period and will test what was covered in lecture *and* lab to that point.

Exam dates are posted in the schedule; there is NO FLEXIBILITY to these exam dates and times. Proper documentation will be required for emergency situations that interfere with scheduled testing dates and should be brought to your TAs attention as soon as possible. However, if you purchase a non-refundable plane ticket we WILL NOT reschedule your exams.

Please make sure that you know exactly when the tests are, I will not give any test, including the Final, early or late under any circumstance. Also I will not give a test if you are 15 minutes late or a student has already finished and turned the exam; you will receive a zero.

IF YOU MISS AN EXAM YOU WILL RECEIVE A ZERO.

Absences from an exam:

Due to the size of the class I **DO NOT** offer make-up exams.

If you have a valid reason to miss an exam you must contact me within 24 hours of the exam (**preferably before**). Valid reasons include: funerals (must provide obituary), hospitalization (must provide hospital documentation), severe illness (must provide an official doctors note *stating specifically that you are too sick to take the exam* – please note VCU health services notes rarely state this); other reasons will be considered but official documentation must be provided. ***If no proof is provided you will receive a 0.***

In the event that I approve an absence I will discuss an appropriate alternative assessment based on the circumstances this could include a mix of multiple choice, short answer and **oral** responses. All students must take the final exam during the final exam period – no make-ups will be allowed.

Late Work

All assignments are due at the beginning of your lab, no exceptions. If you need to turn in assignments outside of class time, please turn it into your TA's mailbox ([Removed]). This document **MUST** be time-stamped by the Biology office staff. If the assignment is not time-stamped, your TA will assume you turned in the assignment on whatever day they check their mailbox! Please check that the time stamp is correct when handing in your paper. Late points accrue over the weekend.

- ❖ **Manuscripts that are late will be penalized 5 points per 24 hour period**
- ❖ **Poster updates that are late will be penalized 1 point per 24 hour period**
- ❖ **Homework assignments that are late will be penalized 3 points per 24 hour period.**
- ❖ **Lab reports that are late will be penalized 1 point per 24 hour period.**

General Notes

DO NOT USE ANY MATERIALS FROM ANY PREVIOUS LAB SEMESTERS.

- This course changes every semester and students should not use any materials from previous semester, even if you are retaking the course. If you are caught using materials from previous semesters to complete ANY assignment, including your own, you will receive an automatic “0” on that assignment and will be subjected to honor code violation.
- If you provide any materials to students in future classes, you will be subject to honor code violation. (SafeAssign)
- Every week we will have a guest lecturer, but ***Dr. Smith is the course administrator and has FINAL say in any and all policy.*** Anything stated by guest lectures may be considered, but it is up to the discretion of the course administrator to incorporate any changes. Please follow all policy outlined in this syllabus unless changes have been approved by Dr. Smith.
- Please be on time to lab and lecture and prepared to stay for the entire scheduled time.
- You are responsible for cleaning the workstation and lab apparatus you have used each week. Failure to clean up will result in a deduction of points!

Letters of Recommendation

Due to the high level of demand for letters of recommendation, this is my policy:

First, all letter must be requested a minimum of two weeks in advance! I will not consider writing any letters that do provide ample notice! I do not write letters while VCU is closed, such as winter holidays, spring break, summer break, etc..

Letter of recommendation to professional school (medical, dental, vet, nursing, pharmacy, etc.) and to the VCU Pre-Health Track Committees (or any other pre-professional school committee):

I only write these letters for students who have served as my preceptors or in another close role. A successful letter of recommendation to a professional school must have detailed information about a student’s personality, work ethic, scholastic performance, reliability, interpersonal relationships, etc. I can only get to know a student well enough to write this letter by working with them personally, as I do my preceptors. To become a preceptor, you must have an A in that course with me, and you must be able to attend lecture during that semester.

Letter of recommendation to undergraduate programs (travel abroad, summer research, etc.):

You must complete two courses with me with an A. Furthermore, you must be someone I am familiar with and meet on a regular basis (office hours, before/after class, etc.)

For all letters of recommendation:

If I agree to write a letter for you, you must let me know at least two weeks, preferably more, before the letter is due. I do not write letters while VCU is closed or I am not teaching a class, so please plan accordingly for holiday and summer breaks. Please email me a CV or resume with a picture on it, and all the necessary paperwork to accompany the letter. Also, include a list of all the classes you have taken with me, including the semester and section number. Make sure to tell me when the letter is due, where to send the letter, and tell me about the program you are applying for and why you want to be in it. Also make sure you have filled out your section of the form and signed where needed. Please make sure that the document file format is a type that I can edit.

Lastly, please be advised that the better I know you, the better (and longer) your letter will be. **If I have agreed to write a letter for you, but have not spent a lot of time with you, the letter will be short. If this letter of recommendation is for something very competitive or important to you, your application will suffer considerably from a short letter.** You may want to ask someone who knows you better and can write more confidently about you.

General University Policies

The required syllabus statements originally included here are maintained by the Office of the Provost and are regularly updated. To prevent the dissemination of information which may no longer be accurate or complete, the full text of the required syllabus statements have been removed from this document.

Students should visit <http://go.vcu.edu/syllabus> and review all syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.

As a reminder, both faculty and students should turn off cell phones and pagers while in the classroom.

TIPS & TRICKS

ALWAYS COME TO CLASS AND COME ON TIME!

- I love giving out hints about what's on the exam! Sometimes I will flat out tell everyone an exam question! You don't want to miss that!
- The most important announcements are made in the first 5 mins of class. "I was late that day" will never be an excuse for missing an assignment, quiz, points, etc.
- Going to class saves you time! If you miss a one hour class, it will take you at least three hours to teach that material to yourself.
- Class is expensive! You've paid ~\$100 per lecture.
- Higher attendance = Higher exam grades. Every time we've kept track, missing more than a class or two costs a letter grade!
- Higher attention span = higher grade. Attention spans are a learned skill and grow longer as we age. Students who can focus for an hour get As. This takes practice.

NO ELECTRONICS DURING LECTURE! *Take notes by hand!*

- Research has shown that taking notes by hand activates extra brain areas and helps you retain the material. Since you can't copy directly (as by typing), your brain must shuffle and condense the information. Also, the motor areas of your brain are activated as you move your hands, improving material retention.
- The easiest way to take notes in this class is to print out the slides ahead of time in the PowerPoint '3 slides' format with 'notes' on the side. That way you can directly take notes on the slides themselves during class.

- Go over your notes directly after class to make sure that they can be understood later.
- “Each time we shift attention, there is a metabolic cost we pay in glucose. We don’t actually do two, or three, or 10 things at once, we just switch from one to another. Some brain activities are more expensive than others, and switching attention is among the most expensive” -neuroscientist Daniel Levitin
This applies to electronics in lecture as well as multi-tasking while studying.

Do NOT make this course part of an ‘overloaded’ semester. This course requires a large time commitment. If you are taking significantly more than 15 credits, you may not have the time you need to dedicate to this course. ‘Overloaded’ students usually do not do well in this class.

Do well on the quizzes!

- By spending at least half an hour before each lab studying the material, you will significantly improve your grade, both on the quizzes and on the exam! Higher quiz grades = higher exam grades!
- Do not be late to lab! You’ll miss some of the time you need to take your quiz!

EAT before the exam. Your brain needs the glucose!

SLEEP before the exam.

DO NOT reply to class announcements for Blackboard! Start your own email chain or I will not respond!

Do not over-think an exam! Read the question carefully and thoroughly, and then go with your first instinct. Do not change an answer unless you have an epiphany! I always hear “I went back and changed some answers, and I changed them all to wrong”. I almost never hear about it the other way around, “I went back and caught a bunch of mistakes’. Trust your gut, and stick with your first choice.

Deal with test anxiety. Take practice tests. Write test questions to ‘get into the mind’ of a question writer. Take your time, read carefully and do not second guess yourself! #1 phrase heard in my office: ‘I just made a lot of stupid mistakes’

If you have a disability that affects how you test, Disability Support Services (now SAEO) is an option. Disability Support Services is in Student Commons, Room 102. You may take the test there. It is your responsibility to set work with them ahead of the exam, schedule your own exam, and send me a reminder to deliver the exam. This is required for each exam. <http://www.students.vcu.edu/dss/>

No practice tests, ‘crib sheets’, study guides, etc. will be provided. Please make them yourself; they will help you out.

All emails you send to any professor, TA or preceptor should be professional. Do not use ‘text chat’ abbreviations. “R u available” is neither profession nor polite. Also, avoid any ‘rant’ emails; these will not achieve the effect you desire.

Go over the slides once before class. If you having trouble keeping up in class due to the pace, this will make a world of difference.

You can either pay attention to lecture or you can pay attention to your cell phone. Scientific studies have shown that you cannot do both. And they’ve also shown that people *believe* they can do both, when they really cannot.

Watch out for ‘crab bucket!’ What is crab bucket, you ask? A large number of crabs can be kept in a shallow bucket, because as soon as one tries to escape, all the other crabs grab onto it and pull it back into the bucket. Think about the different groups of friends that you are in a bucket with; which of the following statements are you most likely to hear from those groups? ‘Ugh. Drug Biology has so much material, I am so stressed out! Even if I study all night I still won’t get an A, so let’s relax at the coffee shop for a while and then binge watch some Netflix’ OR ‘Ugh. Drug Biology has so much material, I am so stressed out! Let’s grab one of those sugary coffee drinks with the whip cream and a cookie at the coffee shop before we hit up the review session. And then we’ll binge watch some Netflix.’? Science has strongly shown that your peer group has major impacts on where you are going in life and even your health and body weight. Which group of friends is going to be where they want to be in 10 years? Choose wisely and ‘get ideas above your station’. Break out of the crab bucket! (I totally ripped this analogy off my favorite author, Terry Pratchett).

Lastly, **your most powerful study tool is each other.** Endeavor to make as many ‘study buddies’ as possible, especially during extra credit opportunities. Meet friends at review sessions or seminars. Invite classmates to the coffee shop or library to study. And then talk about this course. Talking about the materials with friends is the most effective way to retain material. Gossip about this class! Teach each other!

SYLLABUS ACKNOWLEDGEMENT

By signing below, I acknowledge that I have read the entire syllabus for Biology Capstone, BIOL476, and understand the expectations of this course and those of Virginia Commonwealth University.

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