SAM HOUSTON STATE UNIVERSITY
Department of Biological Sciences
Fall 2017 Semester

COURSE SYLLABUS
BIOL 4480 Molecular Biology (with laboratory)

Lecture:	M,W,F 10:00-10:50am, LDB 136
Lab:	W, 1:00-3:50pm, LDB 136
Instructor:	Christopher Randle
Office:	Lee Drain Building 141
Office Hours:	T, Th 8:30-11:00 am or by appointment
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Email:	randle@shsu.edu

Course Objectives: The study of molecular biology provides research tools applicable to many fields of biological inquiry, from molecular medicine to community ecology. In this course, we will 1) review principles of molecular biology, 2) apply molecular methods to test hypothesis in a hands-on laboratory setting, and 3) practice critical evaluation and documentation of experimental data. Cutting edge molecular biology is both expensive to do, and requires years of training. In this course we will focus on techniques that are used every day in molecular biology labs.

Prerequisites: Minimum grade of C in BIOL 1411 (1311/1111), BIOL 1413 (1313/1113), BIOL 2440, BIOL 3450, BIOL 3470, CHEM 2425 (2325/2125), and Junior standing.

Textbook: There is no textbook. You will be provided with lab modules on Blackboard.

Course Structure: The primary goal of this course is to allow the student to develop molecular biology skills in a research capacity. Lecture will be minimal, and will primarily serve to provide a review of the molecular biological principles that underlie laboratory experiments. You should come to each class and lab meeting prepared to work. While I will be present for all class meetings and available to assist you, you will be encouraged to explore the course material on your own to the greatest extent possible. To facilitate this, you will be assigned a laboratory partner. You will work with your partner to complete experiments, and should rely on each other in developing an understanding of course material. **However, your grade is your own. All work for credit must be in your own words and should be turned in separately from that of your lab partner. Plagiarism will not be tolerated. If you are confused about what plagiarism is, please see me before handing in any work for credit.**

Grading Scheme

Attendance: Attendance is mandatory. You will have a maximum of *three* excused absences (outside documentation required). Afterward, you will lose five percentage points from your final grade for each additional or unexcused absence.

Weekly Plan: At the beginning of each Wednesday lab meeting you are to turn in a one-page description of the lab *that you are about to do*. In this description you should first state the overall purpose of the lab exercise, and then provide a description of the major steps, and how each contributes to the over-all goal of the lab. The purpose of this is not to have you

regurgitate the steps as they appear in the lab manual, but rather, to ensure that you think about each step and how it relates to what we are actually trying to accomplish. Each of these will be worth **5 points.**

Please find an example of what I want in the "Syllabus and Intro Material" content folder on Blackboard.

Results write-up: Each Monday morning you will turn in a description of the results of the previous week's lab. Directions for each write up will appear at the end of the laboratory module provided to you on Blackboard. Each of these will be worth **15 points**

Blog: You will be required to maintain a web-log (or "blog") on the internet. A blog is a site that allows you to post your thoughts and allows other people to read and comment on what you have posted. Your blog posts must be, of course, about molecular biology. They could be a review of a paper, a report on some new discovery, an explanation of a technique, or really any other thing. They are in general shorter and more casual than a formal lab report. Good blogs do the following:

1) Communicate an idea clearly.
2) Provide novel insight—this should come from deep inside your own brain.
3) Provide links to sources for more in-depth reading.
4) Provoke discussion.

There are many sites that will host blogs for free (I use blogger.com), and you should get your blog set up as soon as you can. When your blog has been set up, send me your URL and I will link to it on blackboard and on my own blog. Send your blog URL to me no later than **September 1**.

Starting the week of **September 4**, you will be responsible for posting one blog entry per week, but feel free to post more. Each blog entry should be posted by no later than Friday of that week. Grading will be on a weekly basis, from Friday at midnight to the following Friday at midnight. You will also be required to comment on at least three other student blogs each week…see below for rules about commenting.

Blog posting schedule:

Post 1: September 8
Post 2: September 15
Post 3: September 22
Post 4: September 29
Post 5: October 6
Post 6: October 13
Post 7: October 20
Post 8: October 27
Post 9: November 3
Post 10: November 10
Post 11: November 17
Post 12: December 1

Each blog entry will be worth **10 points**. Ideally, they shouldn't be something that is graded, but rather a tool that you use to sharpen your own wit. However, I think in this case, a grade will serve as a good incentive to be engaged in thinking about molecular biology in a less stifling atmosphere than a formal classroom setting. Your grade will be based on the criteria above, and should a post be wanting for any of these criteria, I will let you know through my own commentary. I will offer up to **5 points** extra credit per week for additional blog posts, or other

efforts above and beyond what is expected. Any extra credit will be solely at my discretion. Keep in mind that all sanctions against plagiarism hold in regard to your blog. Your blog should consist only of your words.

Blog grading criteria: You get one point for each comments or question on other people's blog, *only if comments indicate your investment as a reader*. "I really enjoyed this" or "Nice job" won't earn you any points at all. For each blog entry you will earn

7 points: insightful, engaging, and well-written
6 points: relevant, logical, and well-written
5 points for an entry that suffers in one of the following categories (relevance, logical progression, writing)
4 points for an entry that suffers in two of those categories, etc.

Other assignments: I reserve the right to assign homework when I think it is needed.

Final grades will be determined by the percentage of total points earned for the course. 90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, < 60% = F.

Conduct

Academic Dishonesty: Any violation of the university code of conduct concerning academic integrity will automatically result in an "F" for the semester. https://www.shsu.edu/dotAsset/728eec25-f780-4dcf-932c-03d68cade002.pdf

Lab Safety: In this course, you will be using many different reagents and pieces of experimental equipment. The course is set up to maximize your safety while allowing you the freedom to try new things. This will only work, however, if each lab member cooperates. Each lab module emphasizes safety concerns associated with each experiment, and I will emphasize these as well. Additionally, there are University safety guidelines that must be followed at all times. Failure to comply with these will result in your dismissal from the lab room.

1. Only shoes with a closed toe may be worn in the lab.
2. No food or drinks may be brought into the laboratory.
3. Gloves may not be worn outside the laboratory.
4. Gloves, pipette tips, and other consumables should be tossed in biohazard-marked containers only. They should not be put in regular trash.

Lab Citizenship: We will be working together closely (and in close quarters) for the entire semester, and the quality of the experience will depend in part on how well we all get along. I hope that the following seems obvious to you, but I would like to make a few recommendations toward this end.

1. Treat other members of the lab with respect. This doesn't mean that you need to agree with them, but rather that you express your disagreement in a way that promotes resolution.
2. At times, a TA may be present in the lab. You are to treat the TA with the same respect that you would treat me.
3. You should leave the lab as clean as or cleaner than you found it. This means that all equipment and reagents should be cleaned and put away at the end of the lab, benches should be wiped down, and any trash should find its way to the appropriate receptacle. Under no circumstance should trash ever be left in the sink.

4. Other courses are taught in room 136. You may be required to work independently in the laboratory at times other than class meetings. Be as diligent in maintaining order at those times as if I were in the room, and keep in mind that other students in other classes may need to do the same.
5. Room 135 is my research lab, not a prep-lab for this course. You may only enter that room when invited to do so by me. Do not take any equipment/consumables from that room without my express permission.

Blog commentary:

1. The purpose of commenting on a blog is to engage the topic by asking questions and providing insight. Your comments can be critical of the blog post, but please criticize respectfully. A good rule of thumb: Ideas are fair game for shredding, but people are not. Direct all criticisms toward the ideas presented in the blog and other commentary, rather than the authors of those ideas.
2. Once you have posted, you may not remove the post until the end of the semester. Edit your post by adding an addendum or note of correction to them.

Tentative Schedule of Topics and Due Dates

Week 1	23-Aug	Wednesday	Introduction
Week 2	28-Aug	Monday	Discussion: Strong Inference (Platt 1964)
	30-Aug	Wednesday	Micropipetting
Week 3	6-Sep	Wednesday	Quantitative Enzyme Assay
Week 4	11-Sep	Monday	Discussion: Write your own lab for amylase/stress hypothesis
	13-Sep	Wednesday	Do what you wrote! 25 points
Week 5	18-Sep	Monday	SDS Page Discussion
	20-Sep	Wednesday	SDS Page and Western Blot
Week 6	25-Sep	Monday	Introduction to Western Blot Detection
	27-Sep	Wednesday	Western Blot Detection
Week 7	2-Oct	Monday	DNA Technology: Extraction to sequencing
	4-Oct	Wednesday	DNA Extraction/ plants and bacteria
Week 8	9-Oct	Monday	Cloning and induced expression of cloned genes
	11-Oct	Wednesday	Operation Taq Faqtory: Isolation of bacterial lysate
Week 9	16-Oct	Monday	Operation Taq Faqtory: Protein fraction equilibration by dialysis
	18-Oct	Wednesday	Fun with PCR
Week 10	23-Oct	Monday	Introduction to Sanger Sequencing
	25-Oct	Wednesday	PCR verification, isolation of PCR products, Sequencing reactions
Week 11	30-Oct	Monday	Introduction to Geneious 8.0 for sequence analysis
	1-Nov	Wednesday	Sequence reaction cleanup and autmated sequencing

Week 12	6-Nov	Monday	Introduction to southern blotting
	8-Nov	Wednesday	Southern blotting: Restriction Digest, Agarose gel and Transfer
Week 13	13-Nov	Monday	Detection of DNA, DNA-Hybrids
	15-Nov	Wednesday	Southern Blotting: Block Membranes/hybridize probe
	20-Nov	Monday	No Class
Week 14	27-Nov	Monday	I don't know what we'll do on this day, but I'll think of something
	29-Nov	Wednesday	Southern Blotting: detect probes

Holidays/Important Dates

Monday, September 4: Labor day. No class.
Friday, September 8: Last day to drop without a "Q" and receive 100% refund.
Wednesday, November 22 – Friday, November 24: Thanksgiving break. No Class.
Friday, November 10: Last day to drop with a Q

Suggested Topics for Molecular Biology Blogs

Evolutionary Origins of the Universal Genetic Code
Discovery of the Universal Genetic Code
RNAi and Gene Therapy
CRISPR technology
Next Generation DNA Sequencing
Development of Polymerase Chain Reaction
DNA Microarray Technology and Applications
Epigenetic Inheritance
Protein Structure Prediction
DNA Barcoding
Prion Diseases
The Discovery of the Structure and Function of Insulin
The Discovery of the Structure and Function of Hemoglobin
The Discovery of the Structure and Function of [our favorite protein]
Eukaryote Cloning
Unraveling the Human Genome
Understanding Human Evolution through Genomics
Molecular Applications in Forensic Science
The Role of Post-transcriptional and Post-translational Modifications in Protein Diversity
The Molecular Basis of [insert disease here]
Fine Structure Mapping
The Life and Work of [insert your favorite molecular biologist here]
The Role of Transposons in Generating Biological Diversity
Function and Characterization of Ribozymes

Appendix 2: Writing a molecular biology blog

There are many science blogs out there, covering all kinds of different subjects. You may find many of them at http://scienceblogs.com, a group managed by National Geographic and also at http://blogs.discovermagazine.com, a website run by Discovery magazine. The topics on which you will likely write will be as variable as your interests (as confined within the over-arching theme of molecular biology), and that's how I think they should be.

Here are some good ways to get started:
-Issues in the news always make for a timely blog. For example, why are they saying on CNN this week that coffee may be worse for you than previously thought? What part of coffee? What scientific study supports this? What refutes it? Does CNN have the story right? There are even sites devoted to reporting science news, such as http://www.sciencedaily.com . *Such sites should only serve as a starting point, however.* If you want your blog to be an accurate and thoughtful account of a scientific development, you should avail yourself of the primary literature—peer reviewed articles written by the scientist(s) responsible for the interesting finding. *A blog or new-service that doesn't cite its sources is not trustworthy, and you should ignore it in favor of ones that do.*

Blog Styles
-The hobbyhorse: A good way to get into the primary literature is to commit to blogging about one topic. Each week choose a recent paper from the primary literature. What were the findings of that paper? More importantly why were they interesting? How do they add to a broader picture scientifically?

-Not all blog entries must report science…rather you may choose to deal with the implications of scientific advances—the impact that they have on the lives of real people. What if gene therapy allowed those who could afford it to live to be 300 years old? Would that be an advance? A problem? What would be the repercussions of the economy?

Try to have fun with it.

ACADEMIC DISHONESTY:

All students are expected to engage in all academic pursuits in a manner that is above reproach. Students are expected to maintain honesty and integrity in the academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. The University and its official representatives may initiate disciplinary proceedings against a student accused of any form of academic dishonesty including but not limited to, cheating on an examination or other academic work which is to be submitted, plagiarism, collusion and the abuse of resource materials. For a complete listing of the university policy, see:

Dean of Student's Office

STUDENT ABSENCES ON RELIGIOUS HOLY DAYS POLICY:

Section 51.911(b) of the Texas Education Code requires that an institution of higher education excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. Section 51.911 (a) (2) defines a religious holy day as: "a holy day observed by a religion whose places of worship are exempt from property taxation under Section 11.20…." A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence.

University policy 861001 provides the procedures to be followed by the student and instructor. A student desiring to absent himself/herself from a scheduled class in order to observe (a) religious holy day(s) shall present to each instructor involved a written statement concerning the religious holy day(s). The instructor will complete a form notifying the student of a reasonable timeframe in which the missed assignments and/or examinations are to be completed. For a complete listing of the university policy, see:

/dept/academic-affairs/documents/aps/students/861001.pdf

STUDENTS WITH DISABILITIES POLICY:

It is the policy of Sam Houston State University that individuals otherwise qualified shall not be excluded, solely by reason of their disability, from participation in any academic program of the university. Further, they shall not be denied the benefits of these programs nor shall they be subjected to discrimination. Students with disabilities that might affect their academic performance should register with the Office of Services for Students with Disabilities located in the Lee Drain Annex (telephone 936-294-3512, TDD 936-294-3786, and e-mail disability@shsu.edu). They should then make arrangements with their individual instructors so that appropriate strategies can be considered and helpful procedures can be developed to ensure that participation and achievement opportunities are not impaired.

SHSU adheres to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations for students with disabilities. If you have a disability that may affect adversely your work in this class, then I encourage you to register with the SHSU Services for Students with Disabilities and to talk with me about how I can best help you. All disclosures of disabilities will be kept strictly confidential. NOTE: No accommodation can be made until you register with the Services for Students with Disabilities. For a complete listing of the university policy, see:

http://www.shsu.edu/dept/academic-affairs/documents/aps/students/811006.pdf

VISITORS IN THE CLASSROOM:

Only registered students may attend class. Exceptions can be made on a case-by-case basis by the professor. In all cases, visitors must not present a disruption to the class by their attendance. Students wishing to audit a class must apply to do so through the Registrar's Office.