**BIOL101L MOLECULAR BIOLOGY LABORATORY**
Course Syllabus
UC Santa Cruz
Summer 2020

**Instructor:** Jimmy Shanks, Ph.D.
**Room:** My house
**Office Hours:** Tuesdays 1pm – 2:30pm (scheduled lecture time) and Thursdays from 2 – 4pm all on Zoom
**Email:** jshanks@ucsc.edu

*Please check the syllabus and Canvas for answers to common questions regarding course information, scheduling or resource access prior to emailing the instructor.*

**Lecture:** Available on Canvas by 2pm on the date scheduled, see schedule below.

**Teaching Assistants and their Office Hours:**
**TA:** Thomas Ng
**Office Hours:** Fridays from 2 – 4pm on Zoom
**Email:** tcng@ucsc.edu

**Sections:** Wednesday 11pm – 1pm and 1pm – 3pm will have dedicated discussions regarding that week’s materials on Zoom.

Article presentations will take place during your section time on August 26th on Zoom, guidelines will be posted in the Canvas modules.

**Anonymous message boards:** We will be using Piazza, in lieu of emailing content questions directly to the instructor or the TA please post your questions here. The TA and instructor will monitor these questions and provide answers as soon as possible. Please feel free to attempt to answer the questions posted, we will update your answers for accuracy.

**Prep Lab Staff:**
Kayla Higgs
222 Thimann Labs

**Enrollment Co/Prerequisite:** Prerequisite(s): Previous or concurrent enrollment in BIOL 20L or BIOL 102J, and BIOL 101 or BIOC 100A is required. Students cannot receive credit for this course and BIOL 102L. Enrollment is restricted to biochemistry and molecular biology, biology B.S., molecular, cell, and developmental biology, and neuroscience majors.
Course Format:

Lab lectures and lab experiment videos are available in the modules along with the lab protocols. The lecture videos will be made available according to the times on the syllabus (please see the schedule below).

Course Student Learning Outcomes:

1. Students will gain an increased proficiency in basic laboratory skills, including the ability to make standard laboratory solutions, an in depth understanding of sterile technique and safe handling of hazardous materials.
2. Students will become familiar with the proper use of basic lab tools and equipment, including micropipettes, balances, and centrifuges.
3. Students will gain practical experience with fundamental molecular biology techniques and have the ability to:
   a. describe and interpret a PCR experiment
   b. analyzes gel electrophoresis using a DNA standard
   c. interpret and summarize a restriction digest experiment
   d. evaluate basic DNA subcloning
   e. interpret and evaluate a Western blot experiment
   f. describe and summarize affinity chromatography and spectrophotometry
4. Students will be able to demonstrate proficiency using basic bioinformatics tools.
5. Students will develop and apply techniques for effective group work as well as demonstrate teamwork by working in teams of two or more to produce written work and present a cutting-edge scientific journal article.
6. Students will generate a well-organized laboratory notebook that will allow them to illustrate their understanding of the lab experiments.
7. Students will learn to compose and properly format scientific reports and improve their technical writing skills.

Course Materials:

There is no textbook or reader/lab manual for this course that can be purchased ahead of time. The online course management system, Canvas, will be used, and all course materials (Lecture videos, lab experiment videos, Power Point slides, lab protocols, handouts etc.) will be made available for download in Canvas. Lectures will be posted no later than 2pm on the day they are scheduled to be made available, please see the schedule below.

Students are expected to know how to use and navigate Canvas as well as check it and their email regularly.

Students are required to keep a detailed laboratory notebook using a word processing program capable of saving files as a PDF (e.g. Microsoft Word, OSX Pages, Google Docs, etc.)
Grading and Assessment:

Grades for BIOL101L will be based on Canvas quizzes, a lab notebook, a journal article presentation, one written lab report draft of your paper and a final lab report which will encompass the entire quarter including lab videos 2-6 and the Snapgene exercise. Final grades will not be adjusted for any other reason than grading errors.

2 Lab Papers
- Peer reviewed Lab Report Draft: 20%
- Final Lab Report: 35%

Lab Notebook: 20%
All Canvas quizzes: 15%
Journal Article Presentation: 10%

Grading scale:
A+ 97.0 - 100%
A  93.0 – 96.9%
A- 90.0 – 92.9%
B+ 87.0 – 89.9%
B  83.0 – 86.9%
B- 80.0 – 82.9%
C+ 77.0 – 79.9%
C  70.0 – 76.9%
D  60.0 – 69.9%
F  0.00 – 59.9%

Please note the Drop and Withdraw Deadlines for the quarter (https://registrar.ucsc.edu/calendar/academiccalendar.html). The assignment of an Incomplete grading option requires a student to be in passing standing, and a Medical withdrawal can only be pursued through your College (for more information see https://registrar.ucsc.edu/navigator/index.html). Both are reserved for extremely rare circumstances.

There is no extra credit and there are no alternative ways to earn points.

Academic Integrity

Students are expected to be familiar with UCSC Undergraduate Academic Misconduct Policy (see https://ue.ucsc.eduacademic-misconduct.html ). Academic misconduct includes but is not limited to cheating, fabrication, plagiarism, or facilitating academic dishonesty or as further specified in the Student Policies and Regulations Handbook (see https://deanofstudents.ucsc.edu/student-conduct/student-handbook/index.html, sections 102.01-102.016 and 105.15).
In the event of academic misconduct, a student(s) may face both academic sanctions imposed by the instructor of record and disciplinary sanctions imposed either by the provost of his or her college or the Academic Tribunal convened to hear the case.

Academic misconduct of any form will NOT be tolerated in this course. The instructor is responsible for determining the academic sanctions to be imposed in the event of misconduct and submitting an academic misconduct report to the college provost who is responsible for determining disciplinary sanctions. Academic sanctions may include reduced scores on assignment(s), a reduced grade in the course or failure of the course for all students involved.

Specific to 101L: All assignments you submit must be entirely you and your assigned partners own work. You are not allowed to collaborate with other students when actually writing your papers, unless explicitly allowed by the instructor. You may not use any other student’s paper as a template for your own. You may not fabricate data under any circumstances, and you may not use unassigned data. Any sharing of data or papers is allowed only with prior approval of the instructor. Sources of information used in your paper must be cited appropriately. Everything you turn in must be stated in your own words even if you cite the source. Changing just a few words or rearranging the words in a sentence from a book, journal article, or internet website is not saying it in your own words; it still constitutes plagiarism. Additionally, if you have taken this course before and are retaking it, you may not submit your own old work for credit. If you allow another student to copy your work or you help another student write his/her paper, you will also be violating the University’s academic integrity policy and can be subject to disciplinary action. These penalties will apply even if you say you did not understand the rules, so be sure to ask Dr. Shanks if you have any questions about this policy.

To assist in enforcing this policy, and to be check that you aren’t using papers from other students (including from previous quarters), papers you have previously submitted in another quarter, or from other sources on the web, all assignments are required to be submitted to Turnitin.com.

Submission of papers to Turnitin.com:

Turnitin.com submission deadline is the same as the hardcopy turn-in deadline. This means that students must submit their electronic file to Turnitin.com and upload it to Canvas. You also MUST upload the Turnitin.com receipt to Canvas. I will demonstrate all of this in lecture and provide the enrollment key and password for Turnitin.com.

The electronic file submitted to Turnitin.com must be in PDF format and identical in content and formatting to the one a student has submitted for grading, or a zero score will be logged for that assignment. Students will not receive credit for an assignment, or have the assignment returned to them until they have submitted the assignment to Turnitin.com.
Late Submission of Quizzes, Papers, and Lab Notebooks

All Canvas quizzes including in lecture quizzes, lab experiment video quizzes, and end of week quizzes might have due dates, please check the syllabus schedule below.

Unless otherwise indicated, papers and notebooks are due at the assigned date and time according to the syllabus schedule.

Papers and notebooks submitted late will have points deducted according to the following:

- Each day late will incur a 10% deduction of total points possible for that assignment (including weekends).

Students MUST submit their papers to Turnitin.com and they will not be considered complete until the Turnitin.com submission receipt is uploaded to Canvas.

Exceptions to these point deductions will only be made by Dr. Shanks by providing a valid excuse (see attendance policy for details).

Disability Accommodations:

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to the instructor privately, during office hours or by appointment, within the first two weeks of the quarter. At that time, we can discuss ways to ensure your full participation in the course.

Students who receive accommodations that extend further than time extensions for assessments must make arrangements to meet with the instructor to discuss those accommodations.

Authorizations must be submitted prior to receiving any accommodations.

We encourage all students who may benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.
**Schedule:**

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<th>Week</th>
<th>Dates</th>
<th>Lecture</th>
<th>Lab</th>
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| 1    | July 27<sup>th</sup> - July 31<sup>st</sup> | Lecture 1 available Monday 7/27 and Lecture 2 available Thursday 7/30 | **Lecture topics or Laboratory experiments/papers due**  
**Lecture 1 video:** Course syllabus, experimental overview, laboratory solutions, pipettes, accuracy vs. precision, BSA spot test, contamination assay, etc.  
**Lecture 2 video:** Central dogma of biology, restriction endonucleases, molecular sub cloning, bacterial transformation, expression vectors, gel electrophoresis, and gel red  
**Weekly quiz DUE** Sunday Aug 2<sup>nd</sup> by Midnight  
**Assign** journal presentation partners for XXXX et al., 2020 |
|      |              | All lectures will be available by 2pm on the date noted |   |
| 2    | Aug 3<sup>rd</sup> - Aug 7<sup>th</sup> | Lecture 3 available Monday 8/3 and Lecture 4 available Thursday 8/6 | **Lab 1 video:** Use of Micropipettors/Balances/Centrifuges  
Making Serial Dilutions, BSA spot test, Contamination Assay, Gravimetric Analysis  
**Lab 2 video:** Ligation of EGFP into pET41a+ expression vector, agarose gel electrophoresis of ligations, transformation of ligated plasmid into BL21DE3 E. coli  
**Weekly quiz DUE** Sunday Aug 9<sup>th</sup> by Midnight |
|      |              | Available Monday 8/3 and Thursday 8/6 |   |
| 3    | Aug 10<sup>th</sup> - Aug 14<sup>th</sup> | Lecture 5 available Monday 8/10 and | **Lecture 3 video:** Data discussion regarding ligation agarose gel, DNA fragment migration, plasmid isolation, glycerol stock prep, nano-drop spectrophotometry, restriction digests, ligation efficiency  
**Lecture 4 video:** Data discussion of restriction digest experiment, PCR fundamentals discuss first written assignment, Snapgene exercise  
**Lab 3 video:** Miniprep (plasmid isolation) from transformants, quantitation of isolated plasmid and DNA restriction digest of recombinant plasmids and agarose gel electrophoresis of restriction digest  
**Lab 4 video:** PCR screening of transformants and Agarose Gel Electrophoresis of PCR products and Turnitin.com review |
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<th>Week</th>
<th>Dates</th>
<th>Lecture 6 available Thursday 8/13</th>
<th>Lecture 6 video:</th>
<th>Weekly quiz DUE Sunday Aug 16th by Midnight</th>
<th>1st Lab notebook check, Methods assignment, and peer reviewable lab report draft DUE Friday Aug 14th at Midnight (Canvas)</th>
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<td>4</td>
<td>Aug 17th - Aug 21st</td>
<td>Available Monday 8/10 and Thursday 8/13</td>
<td>Lab 5 video: Inoculate cultures for Western Blot and Protein Immunoblot (Western Blot) 1 SDS/PAGE Electrophoresis &amp; Transfer (blotting) and Protein Immunoblot (Western Blot) 2: Antibody Detection of EGFP</td>
<td>Lab 6 video: Purification of EGFP-GST Fusion Protein by Affinity Chromatography and Protein Quantification of EGFP Levels by Bradford Assay</td>
<td>Lecture 7 video: Review Western Blot, Discuss Antibody detection, Horseradish peroxidase, Lecture 8 video: Discuss Protein purification via affinity chromatography, Glutathione-S-Transferase, Bradford assay, discuss second written assignment Weekly quiz DUE Sunday Aug 23rd by Midnight Completed lab report draft due Wednesday Aug 19th by midnight</td>
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<td>5</td>
<td>Aug 24th - Aug 28th</td>
<td>Available Monday 8/24</td>
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<td>Data discussion and analysis of all experiments</td>
<td>Wednesday 8/26 Extended Office hours</td>
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<td>Friday Aug 28th</td>
<td>Final paper and second Lab notebook check DUE at midnight Fri Aug 28th (Canvas)</td>
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