BIOLOGY 481

Experimental Evolutionary Ecology (E3)

Lecture: 325 HSEB, Tues/Thurs, 8:30-9:50am
Labs: 346 HCK, Tues, 10:30am-12:20pm, 12:30pm-2:20pm *OR* 2:30pm-4:20pm
Class website: http://depts.washington.edu/kerrpost/Bio481/HomePage

***Class Schedule*:**

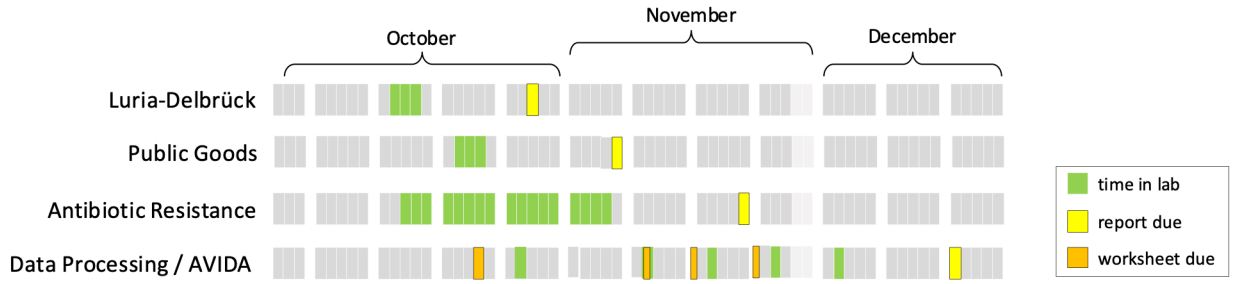
Date	Day	Lecture Topic	Instructor	Lab Topic
Oct. 1	Thursday	Course Overview	Kerr	
Oct. 6	Tuesday	The Nature of Selection	Kerr	Orientation Lab
Oct. 8*	Thursday	The Nature of Mutation	Kerr	
Oct. 13	Tuesday	Tradeoffs and Diversity	Kerr	Luria-Delbrück Lab (*start Antibiotic Resistance Lab*)
Oct. 15	Thursday	The Evolution of Cooperation	Kerr	
Oct. 20	Tuesday	Levels of Selection	Kerr	Public Goods Lab
Oct. 22	Thursday	Data Processing/Visualization	Kerr	
Oct. 27	Tuesday	Statistical Analysis	Kerr	AVIDA 0 / Data Processing
Oct. 29	Thursday	Historical Contingency	Kerr	
Nov. 3	Tuesday	Adaptive Landscapes	Kerr	Antibiotic Resistance Lab
Nov. 5	Thursday	The Problem of Drug Resistance	Kerr	
Nov. 10	Tuesday	The Evolution of Virulence	Kerr	AVIDA 1
Nov. 12	Thursday	Rock-Paper-Scissors & Restraint	Kerr	
Nov. 17	Tuesday	Major Transitions	Kerr	AVIDA 2 / Stats
Nov. 19	Thursday	Tradeoffs, Entrenchment, and Evolutionary Innovation	Kerr	
Nov. 24	Tuesday	Horizontal Gene Transfer	Kerr	AVIDA 3
Nov. 26	Thursday	Thanksgiving		
Dec. 1	Tuesday	The Evolution of Plasticity	Kerr	Office Hours / Practice Session
Dec. 3	Thursday	Niche Construction	Kerr	
Dec. 8	Tuesday	TA Research Updates	Duan, Scott, & Sheppard	
Dec. 10	Thursday	Final Presentations	You	

*Lectures indicated by light purple shading *require* in-class attendance (please see in-class attendance policy below)

Labs:

In the labs, you will be working in groups of five (you will choose these groups during the "Orientation Lab" on Oct. 6). Several of these labs will require (at least part of) your group to come to the laboratory outside of class. For instance, the Antibiotic Resistance Lab (in which your group will be evolving bacteria) runs for a total of 22 days. Thus, every day during these 22 days (excluding weekends), at least one member of your group must spend about 15 minutes in the lab transferring bacterial cultures. Below are a table and a schematic that give the start and end dates for each of the labs. The dates the lab reports are due are also listed. These reports should be submitted on-line (follow the link on the side bar of the class website) by **11:59pm** of the listed date (with the exception of two of the AVIDA handouts, which are due at **2pm**; and one worksheet due at the end of lab).

Lab	Start Date	End Date	Due Dates
Orientation Lab	Oct. 6	Oct. 6	
Luria-Delbrück Lab	Oct. 13	Oct. 15	Wednesday, Oct. 28 (Lab Report)
Public Goods Lab	Oct. 20	Oct. 22	Friday, Nov. 6 (Lab Report)
Data Processing	Oct. 27	Oct. 27	Thursday, Oct. 22 (Google Practice Sheet: *before lecture*)
Antibiotic Resistance Lab	Oct. 14	Nov. 5	Friday, Nov. 20 (Lab Report)
AVIDA Lab	Oct. 21	Nov. 25	End of Lab, Tuesday, Nov. 10 (Experimental Ideas Handout) 2pm on Sunday, Nov. 15 (Experimental Plan Handout) 2pm on Sunday, Nov. 22 (Experimental Re-Design Handout) Monday, Dec. 14 (Group Lab Report)
Final Presentations	Dec. 10	Dec. 10	



Grading:

This table shows how the 165 total points for the course will be awarded. There are no exams in the course.

	Total Points
Lab Reports (12 points each)	48
Final Presentation (graded, in part, by other lab groups)	30
In-Class Questions (using Poll Everywhere)	30
Reading Comprehension Surveys	18
Pre-Lab Assignments (3 points each)	12

Participation (in lecture, lab, discussion boards, and with instructors)	8
Lab Execution (3 points for each main wet lab)	9
Peer evaluation (by your lab group mates)	5
Out-of-class talk summary	5

Final grades will be calculated in the following manner, which assures that all students who master the material in the course will receive a good grade. Indeed, it is perfectly possible for everyone in the class to get a 4.0. We assure you that this outcome would please all of us! The 4.0 grade will be set no lower than 0.96 of the point total. To get a passing grade (0.7) you must get ½ of the possible points in the class. The point scores between the grades of 4.0 and 0.7 will be divided into approximately equal intervals to assign the remaining grades.

Lab Reports (≈29% of your grade):

Structure: Please use the following headers:

- **Background:** This lab report should begin with a few paragraphs (no more than 1 page) discussing, in your own words, the central aim of the lab. You will state your hypotheses (biological theory the lab is addressing) and predictions (experimental result you will obtain, and how it supports your hypotheses).
- **Methods:** You will briefly describe the methods for this lab. We already have a detailed protocol, so you should focus on highlighting crucial steps. You should also discuss any statistical methods you used.
- **Results:** You should then present your data either in a graph or in tabular form. Then you should discuss and interpret your data. Specifically, you should explain what the data shows, showing any relevant calculations (long-hand is fine) and results of statistical tests.
- **Discussion:** You should interpret your data, connecting back to the hypotheses and broader questions you proposed in your Background. You should also discuss any future directions to the lab.
- **Questions:** Finally, there will be about 3 questions to answer at the end of most of the labs. Your answers should be both succinct and complete. Please number your answers to correspond with the relevant question numbers. "Bonus questions" are worth 1 point if answered correctly-- these bonus questions are meant to be challenging.
- **AI Use Statement:** Include a brief statement on if you used AI, how you used it, and reflect on whether this usage was beneficial or detrimental for your learning.

Grading criteria: Lab reports will be scored for content, clarity, and style. Lab reports should be an individual effort. You should feel free to discuss your data and questions with the instructor, the TAs, your lab group, and other lab groups, but the writing must be your own. Proper attribution must be given to all sources of ideas, text, and data. You should know and follow UW policies regarding plagiarism and other academic misconduct. The complete lab report rubric will be made available to you.

Formatting: Your name, email address, group name, and lab title should appear at the top of the first page (it doesn't hurt for your name to be in the header on every page). Please use 12 pt. font, single spaced, with 1 inch margins. Any figures or tables should be clearly organized, have legends, and be in high resolution. The maximum length of the report is 5 pages, not including figures, citations, or questions.

Deadline: The lab report must be submitted through canvas by 11:59pm on the relevant date listed on canvas. If you turn in your report late, one full point will be deducted from your total for each day past the due date (up to five days).

Each lab group will meet with their assigned peer facilitator on either Oct. 20 or Oct. 27 (before the first lab report is due). This meeting will be to discuss the format of the lab reports generally and to address any questions. There are a total of four lab reports to turn in over the quarter.

In-Class Questions (≈18% of your grade):

The weekly questions (using Poll Everywhere) will be short (usually less than 5 minutes) and will be given every Tuesday and Thursday during lecture and during lab. The lecture questions will cover any assigned reading. The lab questions will cover the lab protocol(s) for the current lab(s). These questions should not cause you any undue stress—if you have read the relevant material, they should be fairly easy for you. Sometimes we will post some hints (with the online reading comprehension questions—see below).

Final Presentation (≈18% of your grade):

During the final class of the quarter, each lab group will give a final presentation that will last 18 minutes (including questions). Each group will be (randomly) assigned to present one of the labs executed during the quarter. Each group member should speak during the presentation. We suggest that you aim to spend 16 minutes on the presentation and allow 2 minutes for questions. You might organize your presentation as follows (where each group member could speak for 3-4 minutes):

1) Introduction to the Ecological or Evolutionary Concept(s)
2) Overview of the Experiment (Design & Execution)
3) Presentation of the Data and Interpretation
4) General Implications of Results for Original Concept(s)

Presentations will be scored for content, clarity, and effective use of visual aids in conveying information. PowerPoint slides (or equivalent) are strongly recommended. We also strongly recommend that you practice your presentation as a group (to work out transitions and timing). At least part of your grade for this final project will come from the evaluations of other laboratory groups.

Each lab group will meet with their assigned peer facilitator on Nov. 30, Dec. 1, Dec. 2, Dec. 3, Dec. 4, or Dec. 7 (before the final presentation). This meeting will be to discuss the format of the presentation generally and to address any lingering questions. We recommend that the group runs through a version of the presentation with their peer facilitator during this meeting.

Reading Comprehension Surveys (≈11% of your grade)

Comprehension of the readings, including lab protocols, will be assessed on-line (each worth 1 point). (Note all readings and protocols are provided on our course website for download). This will occur through canvas quizzes, which are due at **11:59pm** the day before the lecture or lab covering the assigned reading. Follow the link on the side bar of the class website.

Pre-lab Assignments (≈7% of your grade):

Worksheets for the AVIDA Lab and Data Analysis Lab (Google Practice Sheet) will also be collected online, each worth 3 points. These worksheets must be submitted by **2:00pm** on the day listed in the above table (unless otherwise indicated).

Participation (≈5% of your grade):

The instructors and TAs will monitor your level of participation during lecture, lab, on-line discussions, office hours, group projects, as well as meetings with your peer facilitators. We would like all students to participate in at least one of these venues, but there is certainly no expectation that students will participate in all venues (e.g., we recognize that some students feel more comfortable asking questions in class, while others prefer to do so on a discussion board, while others prefer to connect during office hours). Participation can involve many different things (asking questions, answering questions, posting ideas on discussion boards, volunteering to perform extra tasks for labs, etc.) and can occur in many different ways (on-line, virtually, in-person, etc.).

Lab Execution (≈5% of your grade):

Attention to detail as your group executes each lab is important to the quality of your experimental results. Because we will generally ask you to analyze the full class data for your lab reports, your results also impact other groups. For three of the labs (Luria-Delbrück, Public Goods, and Antibiotic Resistance), we will award 3 points for how the lab is executed. One of these three points will be awarded if your group's data reflected proper execution, processing, and entry. We know that many students are learning the relevant skills for the first time (and mistakes do happen). If your group encounters problematic data (e.g., zero colony counts, an uncountably high number of colonies on a plate, the appearance of the wrong strain of bacteria, missing data on class data sheets, etc.), this execution point will now "hang in the balance." In order to earn this point, you will need to explicitly discuss the problems in the relevant lab report and offer concrete solutions to remedy the issues. The other two execution points will come from short "logs" that you will share with your group mates and TA when you execute a portion of the lab at a time when the whole group is not present. More information about the format of these logs and their due dates will be given by your TAs.

Peer evaluation (≈3% of your grade):

You will be doing several group lab projects during the quarter, and your fellow group members are counting on you to participate (both in, and outside of, the laboratory sessions). At the end of the quarter your lab group mates will assign you a grade for the quality of your participation. Similarly, you will evaluate your lab group mates. All evaluations will be done online before Dec. 14, **11:59pm** (an email will be sent towards the end of the quarter about this).

Out-of-class Talk Summary (≈3% of your grade):

In order for you to get exposure to current topics within biology, we are asking you to attend one research talk outside of class. There will be many opportunities throughout the quarter (and a listing of links to departmental seminar series can be found by following the out-of-class talks link on the class website). After attending the talk, you will write a short summary (**no more than 1 page**). You will want to include the following information:

- Name of presenter, title of presentation, and the date of the talk
- A brief summary of the talk itself (including the question(s) driving the research, the experiments or data relevant to exploring the question(s), and the presenter's interpretation of the results). This should be no more than a few paragraphs.
- Pose a question that the talk stimulated for you

This summary is due on Dec. 14.

Policy Surrounding Late Assignments and Missed Lectures:

Our expectation is that you will submit your assignments by the due date listed in this syllabus. The instructions, and in some cases the grading rubrics, for assignments will generally be made available via canvas a few weeks before the assignments are due. As a deadline approaches, if you are unsure about the format or content of an assignment, we encourage you to reach out to the instructor and/or your teaching assistant for help as early as possible. We would like to simultaneously reward you for meeting deadlines while also offering a bit of flexibility if you encounter unexpected challenges to your schedule.

In order to provide you with a bit of flexibility, you can do the following without loss of points:

1. Miss up to two in-class questions (e.g., due to either a missed lecture, missed lab, or mistakes in answers submitted)
2. Miss a single reading comprehension (i.e., due to either an unsubmitted survey or mistakes in the survey)
3. Have a total of two "late days" to turn in any lab report. That is, you could turn in your second lab report one day late and your third lab report one day late and not lose any points. Alternatively, you could turn in the first lab report two days late and not lose any points. However, once the two days are used the late policy below will apply.

We strongly encourage you to "bank" the above options and to strive to attend lectures and labs and submit your assignments on time. Please note that if you manage to meet all the deadlines, a few bonus points are available:

1. If you answer all in-class questions (despite the accuracy of the answers), you will receive a bonus point. [Please note that if a PollEv answer is a choice that is not one of the available options on the relevant slide in the lecture, this answer will be treated as a non-response (and neither credit for the question nor the bonus point for answering all questions will be applied).]
2. If you submit all lab reports and online assignments (e.g., worksheets and handouts) before their deadlines (despite the grades received for these assignments), you will receive a bonus point.

After both "late days" are applied, the late submission policy for assignments will be as follows:

- For each day that passes after the deadline, one point will be deducted from the point total. For instance, a lab report turned in three days late (after the two "late days" have been previously used) would have three points from the total of 12 points automatically deducted, giving nine points as the maximum grade for that report.
- No lab report can be submitted more than five days after its due date (in order to give our teaching assistants time to grade and return your report with other student reports).
- Please note that we do not have "late days" apply to handouts and worksheets, as our instructional team will need these items by their due date in order to give lab groups feedback on their projects at key time points over the quarter.

The "late days" and allowances for missed questions or surveys fall into a "no questions asked" category. These are meant to help you if your schedule becomes unexpectedly busy or if you fall under the weather at an inopportune time. However, we realize that some students will face exceptional circumstances (e.g., a family emergency, a preplanned interview for graduate school, a prolonged illness, religious observance, etc.). If such circumstances apply to you, please reach out *before the assignment is due* or *before the relevant lecture or lab* to discuss options with the instructor and your teaching assistant. No retroactive adjustments to the late policy are possible; thus, we encourage you to connect with us as soon as you know about an exceptional circumstance that will cause problems for you to attend lecture or lab, or to turn in an assignment on time.

Accommodations for Absences:

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at Faculty Syllabus Guidelines and Resources. Accommodations of this kind must be requested within the first two weeks of this course using the Religious Accommodations Request form available at:

https://registrar.washington.edu/students/religious-accommodations-request/

Virtual policies:

UW-specific guidance:
Following UW guidance, this class is conducted in-person. Students are expected to participate during lecture and lab to fully benefit from course activities and meet the course's learning objectives. Our working assumption is that students registering for this class are planning to attend in-person. The current UW policy makes face covering optional (the instructional team will inform students if there is a change in UW policy). Regarding face masks, we encourage each student to do what they feel most comfortable with, and we ask that everyone respect each other's decisions. In order to further protect fellow students, faculty, and staff, students who feel ill or test positive for COVID should not physically come to class. Please contact the instructional team before the relevant class or lab if you have to miss it due to illness. For some lectures (and rare labs), there will be an option to attend virtually if you are feeling up to that (see below).

Virtual lecture and make-up work:
For students not feeling well enough to come into lecture, but feeling well enough to virtually attend, we will plan to host the lecture at this Zoom link. Most lectures will have this virtual option. But there are ~5 lectures that will not have this option (these are indicated in light purple shading in the table on the first page of this syllabus); it is critical that students attend these lectures in person. To be clear, it is our expectation that students will be attending lectures in person. However, we will allow students to attend two lectures virtually with no questions asked. After two virtual lectures, any additional virtual attendance must be okay'ed by the instructional team *before the lecture* (please write both your TA and the instructor); after the two allowed virtual lectures, each unexcused virtual attendance will lead to a deduction of 1 participation point. For any lecture that you attend virtually, you can ask questions as well as answer in-class questions using Poll Everywhere. If you are not feeling well enough to attend the class in any format (either in-person and virtual options), first and foremost, please take care of yourself. Please inform the instructor as soon as you are able in the case of an unexpected absence. Please see above for our policy surrounding missed classes. Again, please note that the Zoom option is available for *occasional use* (i.e., Zoom is not intended to be used for a significant portion of the lectures).

Virtual lab and make-up work:
For an optimal learning experience, students should attend labs in-person. For students not feeling well enough to come into lab, but feeling well enough to virtually attend, we will allow a member of the student's lab group to host the physically absent student via Zoom on their laptop, tablet, or phone (the idea would be for the student to see the procedures and interact with their lab mates). If you attend lab virtually, you can still ask and answer questions as well as answer in-class questions using Poll Everywhere or Canvas. If you are not feeling well enough to attend lab in any format (either in-person and virtual options), first and foremost, please take care of yourself. Please inform the TA and your lab group as soon as you are able in the case of an unexpected absence. Please see above for our policy surrounding missed classes. It is our expectation that students will be attending labs in person, and that virtual attendance will only occur in very rare circumstances.

Please communicate any concerns to us:
If you have health or safety concerns, please feel free to contact the course instructor, the teaching assistants, or DRS.

Use of AI in this Course:

We do not prohibit the use of AI tools in this course, but any use of AI in preparing an assignment must be explicitly and substantively acknowledged. Your acknowledgment should describe specifically how AI was used—for example, "For my lab report, I used AI to suggest a possible flow for the paragraphs in my Discussion section, to check my references for accuracy, and to help develop a metaphor for the Introduction." We strongly recommend that you first develop your own draft or substantive ideas without AI and, if you choose to use AI, we recommend that you use it iteratively with information-rich prompts, critically evaluate its responses, and progressively edit and tailor the resulting material in your own words. Regardless of whether and how AI is used, you are responsible for understanding and being able to explain everything you submit. The instructional team

reserves the right to discuss any submitted assignment with a student (or, for group assignments, with members of the group) if sentences or arguments are unclear, if the work raises questions about unacknowledged AI use, or for any other reason related to assessing your understanding. If you are unable to clearly explain the meaning or reasoning behind material you have submitted, the assignment will receive a grade of zero. Both inside and outside the classroom, AI is clearly a very powerful tool—our policy for this class is meant to encourage you to use it responsibly where it complements (rather than substitutes for) your learning. If, at any point, you are struggling with your understanding as you are putting together an assignment, we strongly recommend attending office hours or contacting one or more members of our instructional staff for help.

Letter of Recommendation Policy

Because I receive many requests from students for letters of recommendation (and because I take this task seriously) I have to limit the number of letters I can commit to. This has led to a policy about letters. Specifically, at the end of the quarter, I will write the following students with an offer to write them a letter of recommendation:

- The two students with the top point totals from the class
- One additional student that distinguished themself via participation in lecture, office hours, or on discussion boards
- Three additional students, where a single student is recommended by each of the three TAs based on their performance in lab and on the assignments.

If some of these students decline to have a letter written, then that will open up a letter slot for another student. To check whether there are slots available, please go directly to the following site (the password is "LETTER"):

http://kerrlab.org/PI/LettersOfRec

The Expected Form of Interaction in this Course:

Throughout lecture, labs and on our discussion boards, we will all benefit tremendously from an atmosphere in which the ideas and perspectives of all individuals involved in this course can be shared with consideration and respect. Meaningful and productive dialogue requires a commitment to civility and a willingness to listen to each other. Our entire instructional team is dedicated to promoting an environment in which respect for individual differences is maintained and in which everyone can benefit from courteous and constructive exchange of viewpoints.

Instructional Team:

Name	Role	Email	Office / Office Hours
Ben Kerr	Instructor	kerrb@uw.edu	LSB 5th floor kitchen area, Thursdays, 10:00-11:00am
Elizabeth Duan	TA	esd4@uw.edu	By appointment
Maddy Scott	TA	mtscott321@gmail.com	By appointment
Ben Sheppard	TA	bdshep@uw.edu	By appointment
Prokriti Basu	PF	pbasu@uw.edu	
Xin Cen	PF	xc88@uw.edu	
Debora Kahssay	PF	debork@uw.edu	
Cyrus Lagerberg	PF	lagerc@uw.edu	
Elizabeth Leung	PF	exyl@uw.edu	
Nikita Namilakonda	PF	nikita05@uw.edu	
Bridget Reed	PF	breed123@uw.edu	
Sophia Sancon	PF	ssancon9@uw.edu	