BIOLOGY 112B: EVOLUTION AND THE DIVERSITY OF LIFE  
SPRING 2019 SYLLABUS

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Office Hours: Wed. 11-noon, Thursday: noon-1 pm  
I encourage you to make appointments directly with me or through messages delivered by e-mail, voice mail, or Laura Strong the department administrative assistant (879-2855).

Lecture: MWF, 10:00-10:50 a.m., Th-395

Labs: Lab sections, listed below, meet on weeks listed in the course schedule  
BA: Thursday, 1:00 - 3:50 p.m. in HA-245  
BB: Friday, 1:00 - 3:50 p.m. in HA-245

Required texts: if you took Biol 111 in fall 2018, you should already have these books.  
• A Student Handbook for Writing in Biology, Knisely 3rd ed (other editions are fine but any assigned page numbers will be off)

Course description
The diversity of life around us is remarkable. It exists in an amazing variety of forms from unicellular bacteria and protists to multicellular algae, fungi, plants and animals. Wherever we look on the planet (even in harsh environments like deep sea hydrothermal vents or high in the atmosphere) we discover life forms that have adapted to survive the particular conditions of their environment. How did this huge diversity of living things come to be? Why do they look the way they do? How do they function and reproduce? Why are certain species going extinct? Why are pests and human diseases developing resistance to our pesticides and antibiotics? These are some of the questions that we will explore in Biology 112. However, we can only begin to address the multitude of interesting questions concerning the diversity of life. So, the main goal of the course is to provide you with a conceptual framework for thinking about life’s diversity. Using the principles learned in this course, you should be able to frame any biological question in an evolutionary or functional context.

In Biology 112 we will begin with a general overview of the processes and mechanisms of evolution, then address the form and function of different organismal groups, and end with a discussion of human evolution and issues relating to the diversity of life and human society. In lecture, we will discuss concepts that are common to diverse taxonomic groups, and augment this information with specific examples from different organisms.

In laboratory sessions you will be introduced to the major groups of organisms, with an emphasis on those found in the variety of habitats in the Pacific Northwest. We will refer to these representative local species in lecture when using examples of concepts. The fundamental characteristics of the major groups of organisms will be examined in lab, and we will introduce you to the basic methods used to explore their structure and function.
General Learning Outcomes

You will gain experience toward some of the general curricular goals of the university: (1) the ability to think logically, analytically, and independently; (2) the ability to communicate clearly and effectively, both orally and in writing; (3) the ability to learn on one's own and as part of a group; and (4) depth of knowledge in a single field.

Specific Learning Outcomes

1. To develop an appreciation and understanding of the broad diversity of life forms found on this planet, especially the major groups of organisms found in the Pacific Northwest.
2. Develop your reasoning and analytical skills by applying the scientific method to study questions about the natural world.
3. Gain an understanding of evolutionary biology and how it provides a broad scientific explanation for the spatial (e.g., biogeography) and temporal (e.g., fossils) patterns in the diversity of life on earth, the development and morphology of organisms, and for many of the biological problems that humans are faced with today (e.g., loss of biodiversity, drug resistance in human diseases).
4. Understand the body plans of the major groups of organisms, and the basic physical (biomechanics) and physiological concepts (e.g., surface area to volume ratios) that explain the form and function of each group.
5. Learn to recognize many of the common organisms found in different habitats of the Pacific Northwest and be able to describe the major aspects of their natural history.
6. Conduct experimental studies in biology and write scientific papers.

Lecture

In lecture we will explore the concepts and supporting information presented in your textbook as well as additional supplementary material (handouts and material posted on Canvas). However, lecture sessions will not be a simple reiteration of the information presented in these sources. Reading assignments are associated with each lecture, and it is important that you read the material and come prepared to discuss the information during class. In lecture, we will also discuss specific scientific studies, and you will work in small groups to evaluate scientific theories and solve problems relating to the material. Come to class willing to participate in these activities and contribute to solving problems as part of a cooperative group.

Throughout the course I will use the blackboard and PowerPoint during lectures, depending on what is best for a particular topic. Important figures presented using PowerPoint will be posted on Canvas. You should take detailed notes and associate them with the PowerPoint slides and information in your text and readings.

I would like to emphasize that students do not compete with each other for a grade in this class. I believe that we can all learn from each other, and that this is best achieved by cooperating with everyone involved, sharing your views on a topic, respecting the views of others, and taking shared responsibility for learning in the classroom.

If you are having difficulty understanding the material discussed in lecture or lab, please talk to me as soon as possible. Once you start to get lost, the problem usually compounds itself since the understanding of one concept is necessary for comprehension of another. Please do not be shy about asking questions. If you have a question, it is likely others in class also have similar questions. If you do not like asking questions in lecture, then please talk to me outside of class or send me an email.
Canvas
The Canvas page I have developed for this class will contain essential material for both lecture and lab portions of the course. You should check the page before each lecture for any important announcements and reminders. You will also use the page to print out laboratory exercises (which will be posted on the Friday before the lab week). In addition, I will post supplementary readings or web links to resources that can help you to learn course material.

Lecture exams and quizzes
There are six lecture quizzes, three mid-term exams, and one final exam in this class (see Lecture Schedule for dates). Some of the quizzes may be take-home quizzes. Exams and quizzes will include multiple choice, definitions, graphing, experimental design, drawings, and short essays. Questions will be based on lecture or laboratory material. Some questions will require you to apply concepts to novel situations not specifically covered in lecture or lab.

There are no make-up quizzes or exams in this class. However, adequate consideration will be given and adjustments may be made if there is a medical or family related emergency. Written documentation of the nature of the emergency may be required. Be on time for all lecture quizzes and exams; arriving late will mean that you will have less time to complete them.

The final exam will be given on Monday, May 7 from 8-10 am. In keeping with University policy, the final exam will be given ONLY at the designated time.

Laboratory
As in all science classes, lab is a big part of this course. Each student must register for a lab section of the course, and attendance in lab is mandatory. Lab handouts will be available on the course web page on or before the Friday before the lab meets.

To get the most out of the lab, you must come prepared. Careful preparation before the lab will (1) allow you to get more out of the lab, (2) make it much more likely that you will enjoy the lab, and (3) increase the probability that you will finish on time. Here is how to prepare:
1. DOWNLOAD and PRINT the appropriate lab materials from Canvas.
2. READ the assigned text sections (indicated on the lab handouts) before lab.
3. COMPLETE ANY ASSIGNED PRE-LAB PRIOR to coming to lab (see individual lab handouts). Information from the pre-labs may appear on lecture exams and quizzes.
4. READ the appropriate lab exercises prior to coming to lab. Know what is coming and prepare yourself.

The main objective of the laboratory part of this course is to introduce you to the diversity of life forms on this planet, and to have you learn how to identify them and understand their fundamental characteristics (e.g., where they live, how they obtain energy, how they reproduce). There will be a variety of exercises for you to do in lab that will allow you to engage the material more directly and relate the information to concepts discussed in lecture. Some of the labs will require written reports, and in others you will present your findings to the class.

During the first few weeks of the course we will become familiar with the major groups of organisms present in the local area along with some representative species. We will visit different local habitats to see where they live, and we will work together to gain an understanding of how to identify an organism and learn some basic aspects of its natural history.

There are a lot of taxonomic names to remember in this course (about 100, including Domain, Kingdom, Phylum, Class, and common names), many of which you are likely already familiar with. Why should you know them? There are a variety of reasons, both academic and practical. First, there is a language for every academic discipline. In chemistry, part of this language is the periodic table. In history it involves known names, dates, places, and institutions. In biology, the names of organisms and their higher taxonomic groupings are part of the language that allows you to provide examples and understand the concepts related to the diversity of life. For example, if you try to
explain to someone from another country where you live, first you would tell them that you live in the United States (phylum), in the state of Washington (class), in the city of Tacoma (order), in the north end (family), on a particular street (genus), and finally at a particular address (species). By knowing the names of organisms in a similar fashion you will be able to explain how they fit into the world map of the tree of life. Learning this information will prove useful in not only your academic career, but also in your everyday life during your interactions with other organisms (e.g., choosing what you eat, brushing your teeth, taking a walk across campus, or fighting off an infection).

In extenuating circumstances, you may attend a different lab section, provided you first check with me. Labs cannot be made up after the last lab section of the week has met (Thursday afternoon).

Laboratory Exam

There will be one lab exam in this course (see Lecture Schedule). This exam will consist of numerous "stations" set up around the lab room, each exhibiting organisms that you will need to identify, and for which you will need to know taxonomic information. The format of the lab exam is very different from lecture exams. As with lecture exams and quizzes, make-up lab exams will not be given and it must be taken during your scheduled lab time. Be on time for the lab exam; arriving late will mean that you will have less time to complete it.

I will expect you to know the material learned in lab so that you can apply it toward lecture exams. I will not question you on specific details of the lab during lecture exams, but I will expect you to be able to apply the concepts learned in lecture to specific organisms that you have learned about in lab. Thus, you should be able to name organisms, identify structures, and specify their functions when asked for examples of concepts on lecture exams.

Turning in Assignments

Assignments are due at the start of lecture or lab as indicated on the individual assignments and course schedule. Most lab assignments are due in paper hard copy form. Most assignments for lecture will be due in digital format and submitted on Canvas. Please don’t e-mail me your completed assignments unless we have made prior arrangements for you to do so. If you are turning in a late assignment that is not accepted on Canvas, you may e-mail it to me to show me when it was actually completed and receive a “time-stamp”.

Late Policy

Turning in an assignment late will reduce the maximum credit available by 5% per day (including weekends; see info about e-mailing me late assignments), down to 50%; when the maximum point value reaches 50%, just turn the assignment in as soon as you can and the maximum score you can receive is 50% of the original value. However, I cannot accept written assignments after the start of our final exam. Work turned in late on the same day that it is due will be considered ½ day late and 2.5% of the points possible will be deducted from your earned grade. I will waive this penalty only if there is a medical or family related emergency. Written documentation of the nature of the emergency may be required. Only under extenuating circumstances or if I specifically ask will assignments be accepted by e-mail.

Extra-curricular activities, travel, or work in other courses are not valid excuses for late work. If you are going to have to miss class for one of these reasons, it’s your responsibility to check the lecture schedule and assignment guidelines to determine if anything is due in your absence. Please check with me if you are unsure. Absences for a bona fide medical reason will require written evidence.

Academic Honesty, Plagiarism, and Scientific Integrity

Academic honesty, which includes the topics of plagiarism and scientific integrity, is a fundamental principle of higher education and its institutions. Policies on academic honesty, established to protect honest students and researchers, should guide all your actions in all courses you take at Puget Sound. As you learned when you started at Puget Sound, academic dishonesty is not tolerated at this university. You also learned that it is your responsibility to read and understand the University of Puget Sound policies on Academic Dishonesty and Plagiarism.
See the Puget Sound web site for information sources on Academic Honesty:

- **Policies Academic Honesty**: This page contains general information on academic honesty, definitions of plagiarism, and the policy for dealing with incidences of academic dishonesty. Please note the university requires every incident of academic dishonesty to be reported to the Registrar. It’s not only useful to visit this site, it’s required.

- **Plagiarism**: This is a great page for learning exactly what counts as plagiarism. I encourage you to study the material on this site carefully because some forms of plagiarism are quite subtle. Several forms of academic dishonesty are especially relevant to this class and deserve highlighting:
  - Cheating on exams or quizzes.
  - Alteration, fabrication or misrepresentation of data.
  - Plagiarism on any assignment, including lab exercises. This includes written work and laboratory drawings.

**Plagiarism includes direct copying of or paraphrasing of a source. It also includes using another person’s ideas (content) or organization (format) without adequate credit to the source.**

**Plagiarism applies both to taking information / ideas from someone you know (i.e. a fellow student) AND to using information / ideas from someone you don’t know (i.e. the author of a book, scientific paper, or web page).**

As stated above, any incident of academic dishonesty must be reported to the Registrar. Any penalty applied with respect to this course will depend on the severity of the violation. Again, it is your responsibility to make sure that you understand this issue. I encourage you to ask me if you have any questions.

Classroom Emergency Response Guidance

Please review university emergency preparedness, response procedures and a training video posted at [www.pugetsound.edu/emergency/](http://www.pugetsound.edu/emergency/). There is a link on the university home page. Familiarize yourself with hall exit doors and the designated gathering area for your class and laboratory buildings.

If building evacuation becomes necessary (e.g. earthquake), meet your instructor at the designated gathering area so she/he can account for your presence. Then wait for further instructions. Do not return to the building or classroom until advised by a university emergency response representative.

If confronted by an act of violence, be prepared to make quick decisions to protect your safety. Flee the area by running away from the source of danger if you can safely do so. If this is not possible, shelter in place by securing classroom or lab doors and windows, closing blinds, and turning off room lights. Lie on the floor out of sight and away from windows and doors. Place cell phones or pagers on vibrate so that you can receive messages quietly. Wait for further instructions.

Office of Accessibility and Accommodations

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Peggy Perno, Director of the Office of Accessibility and Accommodations, 105 Howarth, 253.879.3395. She will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Copyright and Fair Use

Course materials are subject to the copyright law of the United States (Title 17 U.S. Code). They are for educational purposes only and limited to students enrolled in the course. Further reproduction or distribution is prohibited.
Grading

Final grades will be determined based on the total points accumulated by each student. The maximum number of points possible is shown below.

<table>
<thead>
<tr>
<th>ASSIGNMENT</th>
<th>POINTS POSSIBLE</th>
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<tbody>
<tr>
<td>Labs</td>
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<tr>
<td>Diversity of Puget Sound I</td>
<td>15</td>
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<tr>
<td>Diversity of Puget Sound II</td>
<td>10</td>
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<tr>
<td>Microevolution Pre Lab</td>
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<tr>
<td>Microevolution Post Lab</td>
<td>15</td>
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<td>Slater Museum of Natural History</td>
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<tr>
<td>Phylogenetics</td>
<td>15</td>
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<tr>
<td>Microbial Diversity</td>
<td>15</td>
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<td>Wing lab preparation</td>
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<tr>
<td>Motile Animals</td>
<td>15</td>
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<tr>
<td>Plankton and Suspension Feeding</td>
<td>15</td>
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<td>Spore producers</td>
<td>15</td>
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<tr>
<td>Seed producers</td>
<td>15</td>
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<td>Wing Lift Lab Report (total)</td>
<td>75</td>
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<tr>
<td>Lab Exam</td>
<td>40</td>
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<td>Lecture Quizzes (5 @ 15 pts each)*</td>
<td>75</td>
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<tr>
<td>Lecture Exams (3 @ 75 pts each)</td>
<td>225</td>
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<td>Final Exam (cumulative)</td>
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<td>Case study questions (3 @ 5 pts each)</td>
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<td>Lecture Participation **</td>
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<tr>
<td>Lab Participation ***</td>
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<td>**COURSE TOTAL</td>
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* If you have taken all six lecture quizzes, I will drop your lowest score. A quiz missed for any reason (including illness, school-related activity, or unexcused absence) will be considered your lowest score and will be dropped. It is still a good idea to have documentation for all absences due to illness, athletic events, etc., as I may consider them in assigning your final grade.

** Your lecture participation grade will be based on attendance, level of apparent preparation, and your willingness to contribute to class discussions. Attendance in lecture may be evaluated by unannounced mini-quizzes given at the start of a lecture.

***Your lab participation grade will be based on your level of apparent preparation for lab, your ability to work independently and purposefully, the respect with which you treat all laboratory organisms, and your general lab citizenship.
HOW TO SUCCEED IN THIS COURSE

1. **Before lecture**: Read the assigned pages in your textbook and other readings. REMEMBER, studies show that you retain very little of what you read. A better form of learning involves taking short or point form notes on the material you have read. If you are more of a visual learner try creating a flow diagram of the main concepts. Refer to the glossary (or a dictionary) for an explanation of any unfamiliar terms. Concentrate on chapter and section titles to get a sense of the focus of the reading. Pay particular attention to the chapter summaries, as they are the keys to the main ideas. Focus on visual explanations (e.g. diagrams, tables) and figure legends to familiarize yourself with the terms that will come up in class. Test your understanding by taking the quizzes on the textbook websites and go over other associated exercises and materials (e.g., videos). If there were questions assigned in the previous lecture, you should try and think about your answers to these questions before coming to class.

2. **Attend every lecture**: Studies show that you retain less than 20% of what you hear, so take detailed notes. This is also important since some of the lecture material is not in your textbook. PowerPoint slides are NOT meant to substitute for complete notes. Mark the spots where you have questions. If you don't feel comfortable asking questions in lecture, at least you'll know where you were befuddled so you can ask after class. But remember, if you don't understand, chances are great that there are others in class that also don't understand, so ask.

3. **Participate in class activities and share your ideas and thoughts with the class**: Come prepared to participate in lecture by asking questions, talking about the subject material, and helping to solve problems. Studies show that you learn more by talking about course content and expressing your views verbally.

4. **After lecture**: I recommend that you recopy your notes after lecture and relate them to the PowerPoint slides discussed in lecture. At least, read over your notes multiple times and write comments and questions in the margins as you read. Refer to your text (where possible) to correct mistakes. If you are unsure about something, come to office hours as soon as possible. Read the assigned chapters thoroughly to obtain another viewpoint on the material.

5. **Study your notes frequently**: Some hints on how to do this are: 1) Recopy your notes, 2) Make index cards with key words, life cycles, and other processes, 3) Study with a friend, asking questions and making up quizzes, 4) Ask how the material in class and lab relate to each other.

6. **Study actively**: Ask yourself questions and be critical of your answers. Once you have finished studying, discuss the material with someone else in the class or try teaching the material to someone. Just think of the fun you can have at dinner by explaining to your guests that sea stars evert their stomach into prey items and digestion occurs outside the sea star's body, or you could explain the anatomy of your roast chicken, describe the sex life of a flea, or explain why we still haven't been able to create a vaccine for the common cold.

7. **Ask questions**: Do not be afraid to ask questions at any time, before, during, or after lecture/lab. Asking questions will let me know where you need help and where I may have been unclear. Also, talk to the instructor assistants in the lab to obtain help on course work.

8. **Spend time in lab and out in nature** outside your normal class hours. Observe the shapes, colors, sounds, and behaviors of organisms. Quiz yourself about what an organism is and how it functions.

9. **Experience the life all around you**: Open your eyes, ears, and nostrils to the many different types of life that surround you, from fungi to birds, worms to flowers, pond scum to slugs, jellyfish to whales. What do these organisms have in common, how are they different? How do they gather energy, move, and reproduce? How have they evolved over time? You are surrounded by the subject of this course. Let yourself be amazed!