"Nothing in biology makes sense except in the light of evolution."
--- Theodosius Dobzhansky

“Everything in biology makes more sense in the light of evolution.”
--- Peter Wimberger

Instructor: Peter Wimberger  
office: Th 295E (in back of Museum)  
phone: 879-2784  
email: wimbo@ups.edu

Lectures: Tu Th 1100 - 1220  
Office Hours: M 4-5, Th 3-4 or by appointment

This syllabus outlines the course requirements and provides a tentative schedule of lectures. Tentative means tentative because we may spend more or less time on different topics depending on your interest and understanding. And sometimes I get carried away… I will inform you of changes when they occur. Please read the syllabus carefully, as you are responsible for all of the information in it. If you have questions, make sure to ask me.

Course Description

Evolution is the best scientific explanation for the diversity of life. Using an evolutionary lens to examine biological questions has led to deeper understandings of problems in every area of biology. The reach of evolutionary ideas has now reached many other academic fields as well e.g. psychology, english, politics, religion, urban planning and education. Darwin's initial formulation of evolution by natural selection has become more complex and powerful as our understanding of inheritance and population processes has become more sophisticated. Despite the theory's simplicity, it is difficult to quickly reach an intuitive understanding of the process. My three broad learning objectives are: 1) to lead you to a more intuitive and nuanced understanding of how evolution works (the mechanisms leading to evolutionary change), 2) to examine how evolutionary scientists infer what has happened in the past (how do we know what we know?) and 3) to provide you with the ability to apply an evolutionary lens to a wide variety of topics, both inside and outside biology.

This course will focus on the theory, mechanisms and patterns of evolution. It is not a course describing the history of life on earth. The course considers scientific explanations for patterns of diversity and for the apparent "good fit" of organisms to the environment. Topics will include the theory of evolution by natural selection, population genetics, concepts of fitness and adaptation, modes of speciation, phylogenetics, molecular evolution, behavioral evolution, long-term trends in evolution and applications of evolution to human health. The course will consist of lecture, lab and discussion. Readings will be from our primary text, *Evolutionary Analysis* by Herron and Freeman, the primary and secondary literature, and Richard Dawkin’s classic book, *The Selfish Gene*. You will be able to access most non-text readings on Canvas. We will have discussions of primary literature in lecture.

COURSE REQUIREMENTS

*Evolutionary Analysis*
Assignments from the text are listed on the course schedule. Any additional readings for lectures and discussion will be announced in advance, and placed on Canvas. Evaluated work will consist of exams, problem sets, short written assignments, labs, class presentations, a research proposal, and discussion participation. If you need help accessing Canvas, talk to me or one of your classmates.

Expectations for what you will know entering this class

I will assume that you have at some point learned most of the basic genetic and evolution concepts in your Introductory Biology textbook. For this course a fundamental understanding of genetics is essential. You should understand basic Mendelian inheritance and be able to describe recombination and independent assortment and their effects on inheritance. You should understand meiosis and mitosis and the difference between ploidy levels. You should be comfortable with calculating allele and genotype frequencies and have a passing acquaintance with Hardy Weinberg equilibrium. You should know what mutations are. You should understand the “central dogma” of molecular biology, and the structure of DNA and proteins. You should know the basics about organelles such as mitochondria and chloroplasts. I will assume that you have the evolutionary biology background that appears in the two or three evolution chapters of Introductory Biology texts (basic evolutionary processes and speciation) that you learn in Biology 112. I realize that Biology 112 is not a prerequisite, but for those who have not had it, read the sections in the intro bio text.

Evaluated Work

1) Quizzes and Exams: The quizzes and exams will consist of short answer questions, population genetics and other types of problems, and longer essays. The quizzes are in-class, and the Final will be cumulative and take-home. The take-home exam will have more and longer questions. By the end of the course I will be looking for synthesis of the different material that we covered in the course. Some of the shorter answer questions will either come from, or be adaptations of the end of chapter questions in your text.

2) Readings: We will briefly discuss chapters from The Selfish Gene at the beginning of Tuesday class sessions. These discussions will be student-led. People not leading the discussion will be responsible for posting thoughts and questions to Canvas by 5 PM the evening before class. I will hand out a guide to writing better questions. Please use this. The student-led class discussions should raise difficult or controversial questions and issues raised by the readings, and they should be discussions, not lectures. Your presentations of The Selfish Gene should briefly summarize the main points of the chapters and use the summary as a jumping off point for class discussion. The discussions will be limited to 10 minutes. Presenters have 5 minutes to set the stage. The second 5 minutes is for the class to ask questions or deal with thorny issues. Your presentation, your work as commentators, and your participation in these short discussions will be evaluated. If it seems the reading isn’t getting done I will give quizzes or add a written component. Powerpoint does not usually add to the quality of the discussions unless you have material that complements the reading.

In addition to the short Selfish Gene presentations we will have paper discussions. Parts of these will be student led. The goal of these paper discussion is for everyone to understand what the paper is asking, how they answered the question and what the results mean. We will often focus on the results, their implications and the questions they lead to.

When you present to the class – you are the teacher. Be prepared. Use these opportunities to practice or try out what you believe to be the best practices in teaching. Be aware of your language – we all have idiosyncratic tendencies – “like,” “uh,” “so,” “and so forth,” etc. Use these sessions to be aware what you do when making oral presentations.
3) Research Proposal. To fund their research biologists have to write grant proposals. The major writing assignment in this course is to write a grant proposal on an evolutionary topic of your choice. Based on your general interests you will write a full-fledged research proposal of your own design. **The proposal must have an evolutionary question at its core.** The ability to write grants – really it’s about selling a question or an idea - is important whether you work in the sciences, business, government, or the non-profit sector. The proposal process is modelled on the National Science Foundation’s process for getting grant funding. The proposal writing will be scaffolded with multiple assignments leading to the final proposal. The final proposals will go through a review panel (your classmates) and a few proposals will receive funding (in the form of chocolate bullion).

4) Assignments: There will be some computer simulation and phylogenetics assignments that will be used to illustrate concepts and introduce you to useful tools.

5) Participation: We will be discussing additional readings during classes and labs. Participation in these discussions is mandatory. Your grade for discussions will be based on your mastery of the material, and the degree to which you contribute to these discussions and bring questions and insights to class. Excessive class absences will lead to withdrawal (WF) from the course. Each absence after two absences will result in a 5 pt deduction from your participation points. This decision is up to the instructor.

I will give unannounced quizzes if it seems as though people haven’t done the reading for class. These quiz scores will be incorporated into your grade.

**Turning in assignments:** Deadlines, unless otherwise stated, are 5 PM the date something is due. Turn assignments in on Canvas. 5% will be deducted for each day an assignment is late.

**Grading:** You will be graded on your performance on a variety of assignments, exams and lab exercises and your participation in class. There will also be a number of small ungraded assignments that will figure into your participation/discussion points. The grading breakdown follows:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes (20 pts ea, lowest dropped)</td>
<td>100</td>
</tr>
<tr>
<td>Final</td>
<td>150</td>
</tr>
<tr>
<td>Assignments</td>
<td>60</td>
</tr>
<tr>
<td>Smaller Proposal Project Assignments &amp; Reviews</td>
<td>70</td>
</tr>
<tr>
<td>Proposal Draft</td>
<td>50</td>
</tr>
<tr>
<td>Final Proposal</td>
<td>100</td>
</tr>
<tr>
<td>SG Presentation</td>
<td>10</td>
</tr>
<tr>
<td>Paper Presentation</td>
<td>10</td>
</tr>
<tr>
<td>Participation (includes paper discussions, etc)</td>
<td>50</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>600</strong></td>
</tr>
</tbody>
</table>

**Academic Honesty:** Violations of Academic Honesty will result in dismissal from the course with an F. Cheating is unfair to yourself and others. It cheats the cheater of learning and ends up consuming too much time and emotion for everyone. Cheating is a waste of your time and mine. You will learn nothing from doing it. All assignments must be written individually. **You are responsible for understanding what constitutes plagiarism and academic dishonesty.** Refer to the University of Puget Sound Academic Handbook (in the Logger) for a definition and examples if you are unclear.

**Late Policy:** It is important to get your work in on time. I have tried to space the assignments out to help you get the project done in a timely fashion. For the draft proposal, late papers will receive half of the full credit score you would have received. If you turn in a final proposal late it will not be considered for funding and will receive a 0.
Classroom Emergency Response Guidance

Please review university emergency preparedness, response procedures and a training video posted at 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.

Student Accessibility and Accommodation

If you have a physical, psychological, medical or learning disability that may impact your coursework, please contact Peggy Perno, Director of Student Accessibility and Accommodation, 105 Howarth, 253.879.3399. 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.