

Principles of Evolution

Spring

2019

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hours: MW 1-3 or by
appointment.

Class Times

Mondays and Wednesdays
from 8:00 - 9:15 in CBB
269. Labs meet on Friday
from 8:00-9:50 in TNR 461.

Resources

Required textbooks:
Evolutionary Analysis by
Herron and Freeman /
Writing in the Biological
Sciences by Hofmann

What will we do in principles of evolution and what will I learn?

“The scientist is not the person who gives the right answers, he is the one who asks the right questions.” – Claude Levi-Strauss

The lecture portion of the course has two primary objectives. First we will engage topics in evolution, primarily through lectures, discussions, and case studies. Second we will engage ourselves by working on skills that matter in the marketplace. These include reading assigned portions of the text prior to class and uploading lecture notes. In this way you can more readily contribute to classroom discussions. The laboratory portion of the course will focus on research, writing, and oral communication skills.



Learning Outcomes

Generalize how micro---and macro---evolutionary processes are responsible for historical and contemporary patterns of biological diversity within and among species.

Demonstrate the ability to write and orally present biological information that is articulate and grammatically correct with properly organized and documented data and ideas.

Critique your own and others' writing and oral communication skills by providing and applying useful feedback.



Art by Josh Keyes

“You can't even begin to understand biology, you can't understand life, unless you understand what it's all there for, how it arose - and that means evolution.”

- Richard Dawkins

Principles of Evolution and the Bigger Picture

UWSP and the Department of Biology revised their curriculum to include 6 credits of writing in the major, of which this course covers 4 of those credits. Skills learned in principles of evolution are applicable to every aspect of biology from medical fields, genetics, wildlife and organismal biology, etc. They are also applicable to other fields like psychology and business.

This course fulfills 4 credits of writing in the major, a core general education program requirement, as well as being a core requirement for a BS in Biology.

Grading

Your grade in this class is determined by 1 laboratory report, a group research activity, daily notes uploaded to D2L, 2 homework assignments worth 25 points each (50 points), and 2 exams. The lab report is worth 50 points, and the group research activity is worth 100 points. Lecture notes will be graded 20 times during the semester and each worth 5 points ($20 \times 5 = 100$ points). Download note outlines from D2L and use your textbook or listen to required podcast to fill in pertinent information. You will upload your notes to d2l and can print a copy to bring to class. By completing notes before class everyone should know what we're talking about and be prepared to discuss the topic in class. Notes that are uploaded late will receive 0 points. There will be two non-cumulative lecture exams each worth 100 points ($100 \times 2 = 200$ points). Thus, a total of 500 points can be earned in this class. The final points will be added up, divided by 500, and multiplied by 100; the percentage obtained will determine your grade.

Group Research Assignment (100 points)

Why? (watch *Start With Why* TED talk by Simon Sinek)

It turns out that employers are not interested in your ability to complete a lab assignment or dazzle them with your knowledge of Hardy-Weinberg Equilibrium and the Competitive Exclusion Principle. They are looking for good communication skills, the ability to work in teams, positive attitude, and problem solving skills. Knowing what employers are looking for in college graduates is important since it offers you, the student, an opportunity to work on these basic skills in all of your classes. Employers will give you specific projects to work on and you will be expected to solve problems, communicate findings, and make recommendations. You are only valuable to the company if your solutions work. Knowing this, the student that does not take a classroom assignment seriously does so at their own peril, and worse, the peril of the team.

College is a four-year job interview. One of the most profound trends over the past few decades has been a sharp shift toward

scientific teamwork. We rely on group creativity because we live in a world of very hard problems and many of the most important challenges exceed the capabilities of the individual imagination (read *Imagine* by Jonah Lehrer). Because the best research now emerges from groups (consider the author lists from any primary literature paper you read this semester), the student that resists working in groups risks not developing a number of important job skills. Susan Cain, author of *Quiet: The Importance of Introverts in the Workplace* also believes it's vital for individuals to work on problems alone before coming to the group. This assignment is designed to develop skills employers are interested in. You will be asked to think creatively as an individual, think creatively as a team, bring your unique perspective to the team, be held accountable by the team, solve problems, and communicate findings.

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From Darwin's Journal or Researches December 7th, 1834, Chiloe Island, Chile

7th In the morning we stopped for a few minutes at a house at the extreme North point of Is^d of Laylec. This was the last house; the extreme point of S. American Christendom; & a miserable hovel it was. — The latitude is about 43° 10', which is considerably to the South of the R. Negro on the Atlantic coast of America. The people were miserably poor & as usual begged for a little tobacco. — I forgot to mention an anecdote which forcibly shows the poverty of these Indians; some days since, we met a man who had travelled 3 & ½ days on foot, on bad roads, & had the same distance to return to recover the value of an axe & a few fish! How difficult it must be to buy the smallest article, where such trouble is taken to recover so small a debt. — We had a foul wind & a good deal of swell [502] to struggle with, but we reached the Island of S. Pedro, the SE extremity of Chiloe, in the evening. When doubling the point of the harbor, M^{rs} Stuart & Osborne landed to take a round of angles. — A fox (of Chiloe, a rare animal) sat on the point & was so absorbed in watching their mænœvres, that he allowed me to walk behind him & actually kill him with my geological hammer.



Achievement = Skill X Effort

Angela Duckworth believes that everyone is ambitious. She defines skill as the product of talent x effort and defines achievement as skill x effort. Effort counts twice.

How?

It begins with questions. The pioneering anthropologist Claude Levi-Strauss said a scientist isn't the person that gives the right answers; he's the one who asks the right questions. Asking good questions takes lots of practice. The ability to translate observations from nature into questions that can be answered defines scientific creativity. If you are wondering if you should go to graduate school, you need to ask yourself, "Do I ask good questions? What questions interest me?" A good scientific paper begins with a good question (usually found in the introduction) and ends with more good questions (usually found in the discussion). Part of this assignment asks the question, "Do squirrels behave differently at different times of the year?" You will be collecting data and adding to data collected last semester by students in Biol 270.

What?

You will develop your question and make a final presentation to the class. The presentation can be a PowerPoint, Google Slides, or Prezi and should be approximately 12-15 minutes in length.

Assessment

This assignment is worth 100 points; the equivalent of a full exam grade or 2 lab report. It is 20% of your final grade in the class.

Data collection (25 points): You and your team will be responsible for collecting data on squirrels for two different experiments, both of which will be shared nationally with other students conducting these same experiments.

Group participation points (25 points): This idea comes from years of putting students in groups and having to hear complaints that one or two people are doing all the work. Then I watched The Last Lecture by Randy Pausch (check it out - very inspirational - we will watch it later this semester) and learned that he always incorporated a peer assessment element into his group projects. This can be very difficult, as it requires a certain amount of objectivity that does not come naturally for most people. The natural thing to do is to reward your friends and to punish your enemies, but that behavior should be reserved for politicians, not scientists. You will assign rankings to your teammates anonymously. **Including yourself (self-assessment)**, you will rank each team member on a scale of 1-5, with 5 being contributed much, and 1 being contributed little to the final product.

“Education is the passport to the future, for tomorrow belongs to those who prepare for it today.”

- Malcom X

Team points (50 points): *Alienus Non Diutius* is Latin for “Alone no longer”. It is displayed prominently at Pixar, one of the most innovative and creative movie studios in the world. My brother's (ex) girlfriend worked for Pixar on The Incredibles, and as I watched the credits looking for her name the number of people that worked on that movie impressed me. That individual product required a lot of teamwork. Your team will receive a group grade for the project, meaning all members of the team will get the same grade. I will post a rubric for you to follow regarding the distribution of these points.

Academic Dishonesty

Any form of cheating on exams, quizzes, home works, or any misrepresentation of your work will result in zero (0) points being recorded for that graded component of the course. **This includes plagiarism of published works.**

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How do I succeed in this course?

The first key to success in this course is getting into the rhythm of assigned reading, upload class notes to D2L, attend and participate in lectures, download and read lab materials, and attend and participate in labs. This rhythm alone will get you 100 “free” points. This might be short of the axiom that 95% of success is simply showing up, but it’s a start.

The second key to success is embracing the material and the assignments. If you grudgingly work at a class you are probably interested in, what will happen when your employer gives you a task that does not challenge you? Attitude matters and college is a relatively safe place to work on attitude.

Finally, you will probably have to study - [stupid college classes©!] This is designed to be a writing intensive course. I give essay exams in lecture so look for 2 or 3 big ideas from each lecture that could be the basis of an essay question.

Date	Topic	(Before Class)
January	22	Introduction
	24	Why Evolution is True (Watch Jerry Coyne upload notes)
	26	Lab 1: Intro to lab
	29	Understanding HIV (upload notes Ch. 1)
	31	Estimating evolutionary trees (upload notes Ch. 4)
February	2	Lab 2: Tree thinking: taxonomy and phylogeny
	5	The pattern of evolution (upload notes Ch. 2)
	7	The pattern of evolution
	9	Lab 3: Introduction to experimental design
	12	Evolution by natural selection (upload notes Ch. 3)
	14	Variation among individuals (upload notes Ch. 5)
	16	Lab 4: Hardy-Weinberg lab
	19	Fundamentals of scientific writing I (Hof Ch. 3)
	21	Selection and mutation (upload notes Ch. 6)
	23	Lab 5: Fundamentals of writing II (Hof Ch. 4)
26	Migration, drift, nonrandom mating	
March	28	Yale lecture on drift (upload notes)
	2	Lab 6: Peer review: Using <i>Track Changes</i> in Word
	5	Evolution at multiple loci (upload notes Ch. 8)
	7	EXAM I
	9	Lab 7: Excel 101: Introduction to biostatistics
	12	Quantitative genetics (upload notes Ch. 9)
	14	Studying Adaptation (Upload notes Ch. 10)
	16	Lab 8: Posters I (Hofmann Ch. 13)
	19	Spring Break
	21	Spring Break
	23	Spring Break
	26	Start with Why; the power of persuasion
	28	Sexual Selection (upload notes Ch. 11)
30	Lab 9: Posters II	
April	2	The evolution of social behavior (upload notes Ch. 12)
	4	Life history evolution (upload notes Ch. 13)
	6	Lab 10: Life tables cemetery visit
	9	Overpopulated/ introduction to Gapminder
	11	Gapminder (upload Overpopulated notes)
	13	Lab 11: How to tell a story using data
	16	Evolution and human health (upload notes Ch. 14)
	18	Case study: Frankenfoods
	20	Lab 12: Big Interview II
	23	Speciation (Upload notes Ch. 16)
25	deQuieroz paper discussion: A Unified Species Concept	
27	Lab 13: Excel 102: Pivot tables	
May	30	The history of life (upload notes Ch. 17)
	2	Evolution and the fossil record (Upload notes Ch. 18)
	4	Lab 14: Oral presentation prep on squirrels
	7	Development and evolution (upload notes Ch. 19)
	9	Human evolution (upload notes Ch. 20)
	11	Lab 15: Final Presentations
16	Final Exam – 10:15-12:15	

The top 10 skills employers say they seek in college graduates in order of importance.

1. Ability to work in a team.
2. Ability to make decisions and solve problems.
3. Ability to plan, organize and prioritize work.
4. Ability to communication with people inside and outside an organization.
5. Ability to obtain and process information.
6. Ability to analyze quantitative data.
7. Technical knowledge related to the job.
8. Proficiency with computer software programs.
9. Ability to create and / or edit written reports.
10. Ability to sell and influence others.

Source: The National Association of Colleges and Employers (NACE)



*“Individual
commitment to a group
effort – that is what
makes a team work, a
company work, a
society work, a
civilization work.”
- Vince Lombardi*

If updates are made to this syllabus the most recent syllabus will be posted on D2L. I will also send any updated syllabus to the class via email as an attached file.