EVOLUTIONARY BIOLOGY (BIO 426)

COURSE SYLLABUS WINTER 2016

Dr. Kerry Byrne
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Office Hours: T 3-5 pm, R 1-2 pm, F 3-4 pm, or by appointment (email first)

Lecture: MWF 2:00 – 2:50 pm in DOW E240

Catalog Description: Principles of evolutionary science, including speciation, biogeography, biodiversity, population genetics, natural selection and coevolution.

Course Objectives: in this course, students will:

- Learn the fundamental principles of evolutionary patterns and processes.
- learn how biologists reconstruct the evolutionary history of life on earth;
- learn how biologists infer the processes that result in evolution;
- understand that evolutionary patterns and processes are fundamental to many disciplines of biology
- gain practice reading, writing, and presenting about primary scientific literature

Textbook Freeman, S. & J. C. Herron. 2013. Evolutionary analysis. Fifth Edition. Prentice Hall
The textbook for this course is ***REQUIRED***. Read the assigned chapter before coming to class. When studying for exams review the "*Summary*" at the end of each chapter and look back at things you do not understand. Also quiz yourself and others with the "*Questions*" section, also found at the very end of the chapter. The publisher's website also has many questions and resources available (http://wps.aw.com/bc_freeman_evol_5/239/61342/15703574.cw/index.html)

Student Assessment*: three in-class examinations, a research note presentation, homeworks, a term paper, and a final examination will provide the basis for assessing student performance. Course grades at Oregon Tech follow a "whole grade" structure:
A = 100-90%, B = 89-80%, C= 79-70%, D = 69-60%, F < 60%.

Component	% of grade
Exams (3)	40
Research Note	5
Homeworks	10
Term Paper	15
Final Exam	30

* If you feel your answer was graded incorrectly on a test, quiz, or other assignment, you have **one week** after the test is returned to contest. You must return your original assignment with a typed statement of why you think your answer is correct and why we should consider it for regrading.

Students must purchase BLUE *scantron sheets* for all exams and bring them to class on the day exams are scheduled. You may purchase these at the student bookstore.

Notes about Student Assessment

In-class & Final Exams: The in-class exams are not cumulative. The final exam *is* cumulative. The format may include TF, multiple choice, short answer, and essay questions.

Research Note Presentation: Each student will sign up for a slot to present a full-length article from the primary literature to the class. This presentation will be a **5-10 minute summary** of the question addressed by the paper, the methods used, the relevant results reported, and how the paper's findings relate to material presented in lecture (if they do). If there are pertinent figures or tables that need to be projected, you may present a short powerpoint with these graphics. In addition to the oral presentation, each student will submit a one page written summary (research note) of the summary items listed above, along with a copy of the journal article they have chosen *at the time of their class presentation*. Each article may only be presented once, so it behooves you to sign up for an early slot so no one "steals" your article.

List of some evolutionary journals available through our library:

Evolution
Nature
Molecular Biology and Evolution (look for the open access articles)
Journal of Molecular Evolution
Journal of Evolutionary Biology …and many other journals!

Homeworks: will be assigned on occasion throughout the quarter to help students learn key concepts.

Term Paper: you are required to write a term paper on some aspect of evolutionary biology. It must be *no more* than 5 pages long (double spaced; not including literature cited or tables/figures), and it must cite at least 10 references from the primary literature. All assignments will be submitted on blackboard, and are due by 2 pm on the day due. The term paper will count for 15% of your final grade, broken down as follows:

- topic choice – 0.5% (due Fri., 1/29)
- annotated bibliography – 1.5% (due Fri., 2/5)
- outline - 2% (due Fri., 2/19)
- finished paper – 11% (due Fri., 3/11)

Topic Choice **(due 1/29):** one to two typed sentences describing your topic, along with three relevant articles in the primary literature (using the format described below).

When picking a topic, keep in mind that your term paper must consist of a thorough review of the literature on your chosen topic. Therefore, your topic should not be too broad. It would be impractical to do a thorough review on a broad topic such as "the invasion of terrestrial habitats by non-native plants," because that topic would yield hundreds to thousands of articles in the primary literature. Instead, pick a topic that is narrower. For example, "the invasion of semiarid steppe by Mediterranean annual grasses" might be narrow enough. The important thing is to choose a topic that is both narrow, and interesting to you.

When first entering a field, it is often difficult to begin by reading the primary literature. Beginners are not the target audience of most publications. Instead, consider beginning with a very useful type of journal article called a review article. They appear in many journals dedicated to primary literature and are so popular that there are now entire journals dedicated to review articles. A review article will act as an introduction to a specific topic in evolutionary biology. The target audience for these articles are biologists not familiar with the primary literature in the area but with considerable background in biology.

I suggest that you access the journal "Trends in Ecology and Evolution" from a campus computer (OIT has a subscription to this journal). Using the search option in the database, find a review on the

topic you chose. Download it and read it. Then reassess your choice. If you did not understand the review or were not interested in the topic, go back and choose another. Do this until you have a topic that you understand and you are excited about doing some additional research on it.

Next, find some primary articles (articles that have original datasets; not just reviews) that are related to the topic that you have chosen. You can do this in a number of ways. You might choose some of the articles discussed in the review. If the review is a few years old, you might want to search for a newer article. This can be done by going to databases that OIT subscribes to. Pick articles that you can download or give yourself enough time to get it from interlibrary loan. Once again, read these articles and decide if the topic is interesting and understandable to you.

You could also come up with a topic from something you've read in a newspaper or magazine, or heard about in one of your other classes. You could read some internet blogs that focus on evolution- it is up to you to choose your topic, and use the library's databases to do a thorough review of the primary literature on the topic.

Annotated Bibliography **(due 2/5):** submit a typed list of references (10) on your topic. A half percentage point will be deducted for each day it is late. The references must be in alphabetical order by first author, and they must be in the format shown below. Below each reference, write a *one paragraph* summary of each article in a way that will be useful to you. This should be in your own words – not a re-write of the article abstract (see syllabus for information on plagiarism).

Your list of references should be thorough, including important articles on your specific topic. Look at the initial three papers you found on the topic, and find every relevant reference that they cite. Also look up some of the older papers in the library database and see who has cited them. Keep doing this--for every paper you get, see who they cite and who has cited them--until you're not seeing anything new.

Your reference list will be graded based on its format (see the examples below) and its thoroughness. If I can quickly find references that are very relevant to your topic that you haven't listed, you'll get points off. For many topics in evolution, even very old references are important. In some other fields of biology, such as cell and molecular biology, laboratory techniques are so important and improve so rapidly that papers from 20 years ago are only of quaint, historical interest. Don't limit yourself to recent publications, even though the older ones may be harder to obtain.

As you assemble your list of references, you should start obtaining them so you can read them. Some will be available online, and some you'll have to obtain via Interlibrary Loan. **Don't wait until the last minute to obtain your references**; the ones you get by Interlibrary Loan, in particular, may take a while to arrive.

You may include web pages on your list, but they do not count towards the 10 references. **You may not include Wikipedia;** it can be a valuable place to start looking for some kinds of information, but you should trace the information back to its original source and cite that instead. If you are having trouble finding 10, keep in mind that you'll want some more general references in addition to everything on your narrow topic. For example, if you were researching the adaptive radiation of Hawaiian spiders, you'd want a few references on the general topics of adaptive radiations, a few references on spiders, and a few references on the geologic history of the Hawaiian islands, in addition to all of the references you can find that are specifically about the adaptive radiation of Hawaiian spiders.

You will not need to use all of this initial list of references in your final paper--as you read them, you may find that some are not as relevant as you originally thought. You may add additional references between now and writing the paper.

Paper Outline **(due 2/19):** submit a thorough outline of your research paper. A half percentage point will be deducted for each day it is late.

One of the things I'll be looking for in the term paper is clear organization. You may want to organize your paper chronologically, starting with the earliest research on your topic and moving forward. You may want to organize by different techniques used to address your topic, or by different

aspects of the general topic, or by different individuals or groups of people who have investigated your topic- there is no strict format. The important thing is that there be some kind of clear organization, not just a random jumble of unconnected facts.

When writing your outline, you can use Roman numerals for the top level, then capital letters, then numerals, then lower-case letters. You don't have to have four levels. This format is not required; you can use any outline format you want, as long as the hierarchy of topics and subtopics is clear.

You should probably have one line at the lowest level of the outline for each paragraph in the final paper. At this level, you should include some of the citations you'll use, in the format shown below.

Here's part of an outline of a paper on adaptive radiations in Hawaiian spiders. I've made up some citations, since this is only an example:

I. What is an adaptive radiation?
  A. History of the concept (Schluter 2000)
  B. Classic examples of adaptive radiations
    1. Galapagos finches (Darwin 1859; Lack 1940; Grant and Grant 2003)
    2. Lake Victoria cichlid fish (Kornfield and Smith 2000; Salzburger et al. 2005)
II. Evolution of spiders in general
  A. Systematics (Parker and Jameson 2003)
  B. Fossil record (Spinne and Makari 2007)
  C. Anatomy
    1. Feeding structures (Araña and Geomi 1983; Kumo 2009)
    2. Web-spinning structures (Anlalawa 2000)
III. Spiders in Hawaii
  A. Geological history of the Hawaiian islands (Pele and Haleakala 1982)
  B. etc., etc.

The final paper **(due 3/11):** one percentage point (out of a possible 11) will be deducted for each day that the paper is late. The file should either be in word or .rtf format, and the name of the file must be your name (such as "JaneStudent.doc"). Each paper will be run through the blackboard plagiarism detection software before I read it.

The paper must be typed and no more than 5 full pages of double-spaced text, not including figures or the reference list. Do not use narrow margins, small font, or change the line spacing to achieve the 5 page limit. In my experience, I have found that writing more text does not usually increase the quality of the writing – be organized and succinct in your writing.

Your paper should summarize the literature on your topic. It should be clearly organized, either chronologically or by sub-topic. For example, the Hawaiian spider paper could start with the oldest studies on adaptive radiation in Hawaiian spiders, then work up to the most recent research; or it could have different sections for different groups of spiders, or different islands, or different adaptations.

In addition to the results of the different studies, describe how those results were obtained. If you are struggling to fill 5 pages, this is probably what you need more of. What kinds of experiments and observations did people make? How did they interpret them? What were the competing hypotheses? Have later researchers interpreted earlier results in different ways, or come up with new hypotheses?

Do not use jargon that your classmates would not understand without explaining it. In particular, do not use phrases that you have read if *you* don't understand them. If you can't figure something out, ask me and I'll try to help.

The reference list must include at least 10 references from the primary literature, strictly following the format shown below.

One of the key things I'll be looking at is the thoroughness of your literature research. I will pick one or two key references on your topic, then take a quick look at their reference lists, and the papers that have cited them. If I find some papers that you didn't cite that are very relevant to your topic, you'll get points off.

Citation Format: citations in the text of the paper and a literature cited page are absolutely necessary. Any paper without them will receive a zero for a grade.

In-Text Citations: citations are put into the body of the paper to note where an idea, fact, or quoted material has come from. Your papers and presentations, since you are re-packaging what information you have gathered from others, should be chock full of citations. Failure to do so is considered plagiarism and will result in a 0 for the paper, so put them in and follow your paper or outline with a literature cited page.

Be sure to place **quotes** around all phrases taken from the literature, but do not include any quotes as long as a sentence - write things in your own words. **Cite any ideas or facts taken from the materials** (Byrne, 2011)**, even if you are not taking it word-for-word**. Literature citations are to be done by placing the last name of the author and the year of the materials publication in parentheses at the end of the sentence or paragraph in which the material is mentioned (Byrne and Lauenroth, 2013). When you are introducing several things from a single source in a series of sentences as part of a paragraph, then wait until you have presented them all before including a citation (this saves space and makes for less repetition). Examples for 1, 2, and 3-or-more authors (in order): (Byrne, 2011) for a single author, or (Byrne and Lauenroth, 2013) for a pair, or (Byrne et al., 2014) for more than two.

The **literature cited section** should come at the end of the text, must alphabetically list all materials consulted and should use the following formats:

1) **Book:** Author's Last Name, Initials. Year. Title. Publisher. City and country of publication, pages of interest (if not the entire book).
2) **Article from a Book:** Author's Last Name, Initials. Year. Title of article. Ed. Editor of book. Title of book. Publisher. City and country of publication, page numbers of article.
3) **Journal Article:** Author's Last Name, Initials. Year. Title of article. Journal name, Volume number: pages (of entire article).
4) **Internet material:** Author's Last Name, Initials. Year. Title of article/Name of site. Internet site URL, date accessed.

A few final comments:

1. All topics must be pre-approved by the instructor. It is okay to change your topic after the topic assignment is due, but you must okay the change with me.
2. No quotations can be as long as a sentence in length. I want to know what you know in your own words, not what your sources know.
3. Cheating and plagiarism are strictly enforced in all aspects of this course. See the section on the "the honor code" below for more information.

General Details

Make up exams or deadline extensions: Assignments and exams may not be made up unless you have a a letter from the funeral home, physician, or other authority on appropriate letterhead. Likewise, signed excuses for university-sanctioned activities (competitions, events and professional meetings in which students are officially representing OIT) will be accepted.

Attendance: teaching faculty are required to report non-attendance during the first two weeks of the term from a class if the student has not attended. Students will be administratively withdrawn from the course based on non-attendance.

Statement on Recording Lectures and In-Class Discussions: Please be advised that this class may be recorded. HOWEVER, if you would like permission to record this class you must speak with the professor prior to making any recordings.

Disrupting the academic environment: obstruction or disruption of teaching, research, administration, disciplinary procedures, or other institutional activities, including the Institution's public service functions or other authorized activities on institutionally owned or controlled property is strictly prohibited by Oregon Tech's code of student conduct and may result in disciplinary action.

Student success center: http://www.oit.edu/academics/ssc

The Student Success Center provides a wide range of student support services including Testing Services which promotes academic success by working with faculty by providing testing services for any of the OIT academic courses as well as specialized testing services such as those needed for accommodations for students with disabilities, a computer lab, and Career Services, which offers career advising, resume writing, job interviewing workshops, job search assistance, career fairs, and job listings. They also provide peer consulting services, which provides free course assistance to all OIT students in most subjects. Finally, they house the Disability Services office, which coordinates academic adjustments and aids for students with disabilities.

If you may need a course adaptation or academic accommodation because of a disability, or if you might need special arrangements in case the room or building must be evacuated, please see me as soon as possible.

I rely on the Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you have not previously contacted that office, I encourage you to do so. Staff will assist in communicating information about needs and adjustments to instructors.

The Honor Code: cheating and plagiarism are strictly enforced in this course. Students with "wandering eyes" during exams will be asked to move seats one time, after that you will be asked to leave the exam and receive a 0 grade. Students may work together on homework assignments, but each individual is expected to contribute equally, not rely on the work of others, and turn in the assignment written in their own words. Students caught cheating will receive a zero on the exam or assignment and will be reported to the Dean of Students.

Plagiarism means to:

- to steal and pass off (the ideas or words of another) as one's own
- to use (another's production) without crediting the source
- to commit literary theft
- to present as new and original an idea or product derived from an existing source

All of the following are considered plagiarism:

- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit
- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation
- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not (see our section on "fair use" rules)

For more information on plagiarism and how to properly cite scientific works and writings contact your instructor or visit www.plagiarism.org

Tentative Lecture Schedule

This is a tentative schedule of lecture topics; check on blackboard and come to class to get updates from Dr. Byrne as the quarter progresses. *The in-class examinations, due dates for term paper assignments, and final examination date will not change*.

WEEK	DATES	TOPICS	READING
1	4-Jan	Course Logistics & Introduction	
	6-Jan	Patterns of Evolution	Chpt. 2
	8-Jan		
2	11-Jan	**NO CLASS**	
	13-Jan	Evolution by Natural Selection	Chpt. 3
	15-Jan		
3	18-Jan	**NO CLASS - Holiday**	
	20-Jan	Systematics	Chpt. 4
	22-Jan		
4	25-Jan	**EXAM 1**	
	27-Jan	Genetic Variation	Chpt. 5
	29-Jan	**term paper topic choice due**	
5	1-Feb	Population Genetics I: Selection & Mutation	Chpt. 6
	3-Feb		
	5-Feb	**term paper initial reference list due**	
6	8-Feb	Population genetics II: Migration, Drift, & Nonrandom Mating	Chpt. 7
	10-Feb		
	12-Feb	**EXAM 2**	
7	15-Feb	Quantitative Genetics	Chpt. 9
	17-Feb		
	19-Feb	**term paper outline due**	
8	22-Feb	Studying Adaptation	Chpt 10
	24-Feb		
	26-Feb	Evolution of Sex	Chpt. 8 pp. 314-324
9	29-Feb	**EXAM 3**	
	2-Mar	Sexual Selection	Chpt. 11
	4-Mar		
10	7-Mar	Social Behavior	Chpt. 12
	9-Mar		
	11-Mar	Speciation, **term paper due**	Chpt. 16
FINAL EXAM	14-Mar	2 - 4 pm in normal classroom	