

## PSL 439 sec 002: Evolutionary Medicine

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<u>Class Schedule</u>	<u>TOPIC</u>	<u>ASSIGNMENT</u>
Jan 11	INTRODUCTION TO EVOLUTIONARY MEDICINE	
Jan 18	<b><i>Martin Luther King Day – No class</i></b>	
Jan 25	INTRO TO EVOLUTION BY NATURAL SELECTION	<b><u>CH 2</u></b>
Feb 1	MENDELIAN GENETICS, MUTATION, AND THE MODERN SYNTHESIS	<b><u>CH 3</u></b>
Feb 8	EVO-DEVO: YOUR INNER FISH	<b><u>CH 4-1 TO 4-6</u></b>
Feb 15	GENETIC DISEASES (phenylketonuria; Lesch-Nyhan; cystic fibrosis; Tay-Sachs; sickle cell)	<b><u>CH 5</u></b>
Feb 22	COOPERATION (principles; mitochondria; microbiota; sociobiology)	<b><u>GEN DIS</u></b>
Feb 29	EUGENICS, EUPHENICS, EUTHENICS, EUTECHNICS & EUCHEMICS	<b><u>COOP</u></b>
Mar 7	<b><i>Spring Break – No class</i></b>	
Mar 14	GENETIC ENGINEERING (PGD; germline manipulation; treatments)	<b><u>EUG-EUPH</u></b>
Mar 21	CO-EVOLUTION 1: IMMUNOLOGY/MICROBIOLOGY (molecular mimicry; autoimmunity; antibiotic resistance) red queen principle	<b><u>GEN ENG</u></b>
Mar 28	CO-EVOLUTION 2: CULTURE & AGRICULTURE (eat like a caveman? lactose; beans?; alcohol; vaccinations [horse sera; chicken-influenza])	<b><u>CO-EVOL1</u></b>
April 4	MALE PHYSIOLOGY: (male galactorrhea; circumcision; prostate cancer)	<b><u>CO-EVOL2</u></b>
April 11	FEMALE PHYSIOLOGY: (menstruation; menopause; ART)	<b><u>MALE PHYS</u></b>
April 18	PAIN & PLEASURE: (CIPA, agnosia, addiction; etc.)	<b><u>FEM PHYS</u></b>
April 25	EVOLUTIONARY THEORIES OF DIABETES	<b><u>PAIN</u></b>
May 2	FINALS WEEK (NO FINAL)	<b><u>CH 8</u></b>

COURSE REQUIREMENTS: Students will give two 15 minute Powerpoint presentations on the evolutionary significance of some medical practice or disease. Each student will write two 5-8 page papers based on their presentations. Papers will be due TWO WEEKS AFTER the in-class presentation. Students will also write one abstract each week summarizing either the assigned readings from the textbook or the presentations made by the other students.

TEXTBOOK (REQUIRED): Gluckman, Beedle and Hanson, *Principles of Evolutionary Medicine*, Oxford University Press, 2011).

ABSTRACTS: Each **SET** of in-class presentations will be abstracted and the abstract graded. (See Abstract handout for details). These abstracts are due every Friday in class starting the fourth week of class. Abstracts cannot be turned in late without instructor permission (which will only be given in case of demonstrated illness, emergency, medical school interview, etc).

GRADING:

Grades will be calculated based on 320 possible points:

Abstracts on readings (10 points x 12):	120 points
Student in-class presentations (50 points x 2):	100 points
Report papers (50 points x 2)	100 points

Grades will be awarded on a percentile basis. The first abstract will be graded but will not count toward your grade. After that, the lowest abstract grade will be dropped. There will be no curve. There will be no extra credit. I will, however, pre-grade all assignments if they are submitted a reasonable time in advance of their due date.

95-100% = 4.0; 89-94% = 3.5; 83-88%= 3.0; 77-82= 2.5; 71-76%= 2.0; 66-70%= 1.5; 60-65%= 1.0; <60%= 0.0

HELP: I will read and comment on drafts of abstracts up to two days before they are due and presentation- and paper-drafts up to a week before they are due. In addition, I will provide feedback on in-class presentations within a couple of days of the presentation so that you have time to incorporate corrections and additions into you written version. So with a bit of planning, you can therefore achieve whatever grade you desire in this class!

Attendance is required and you are expected to be on-time. You will lose 10 points for each unexcused absence; 5 points for being tardy or having to leave early.

MISSED WORK:

**Missed work is expected to be made up when possible. If you must miss class to perform in an athletic or other event, or if you have a professional interview, please let the professor know in advance and arrangements will be made to excuse you from the work or to make it up in a appropriate matter.**

**Grief Absence Policy:** Last year, academic governance developed and approved a university-wide grief absence policy that provides clearer direction of student and faculty rights and responsibilities for students who have lost an immediate family member or suffer a similar serious bereavement. Please see the following website for university policy regarding missed work:

<http://splife.studentlife.msu.edu/regulations/student-group-regulations-administrative-rulings-all-university-policies-and-selected-ordinances/grief-absence-policy>

## **WRITING ABSTRACTS – PSL439 – DR. ROOT-BERNSTEIN**

The purpose of writing an abstract is to condense the material you have read into the most succinct form. To abstract is to pare away the unnecessary elements of an argument or its presentation to discover its essence. Since every narrative contains many levels of discourse and many themes, abstracting requires you to make informed decisions about what elements are most important. These decisions will depend on the questions you are asking and the problems you are trying to solve. You can't do a good job of abstracting until you have a clear question or problem in mind! Before you start reading, ask yourself what you want to know. Keep your question or problem in mind as you read! (For example, the Who, What, Where, When, Why, How that we just discussed in class.)

It is often easiest to write out whatever comes to mind in answering your question without regard to length and then to go back and pare away at it to make it suitably short.

If you have done your job well, your abstract should be able to achieve the brevity of a TV Guide description of a movie plot. It should state the basic problem and its resolution: "Man meets married woman, kills her husband, who turns out to be his twin brother who was adopted out at birth." A line this succinct should form the first sentence of your abstract. The abstract itself should then consist of a short paragraph or two (no more than a page, single spaced – double preferred!) that describes the most important elements of the plot line you describe in your first sentence. Try to balance generalizations with one or two specific examples.

Your abstract must include:

- 1) the main argument or arguments made by the author(s);
- 2) the key concept(s) upon which they base their argument(s);
- 3) the main points or data that support their argument(s).

You need to write one abstract for each reading that is assigned, and for each set of presentations that we have in class.

Abstracts are due in class the week the reading is listed in the syllabus, and the week after the class presentations. When more than one presentation is made, your abstract should compare and contrast the major points, rather than simply summarizing each presentation. Do some intellectual work – digest the material!

## **Presentation and Paper Guidelines**

Bear in mind at all times that this course is about the influence of evolution on human physiology and the ways in which adaptations can result in medical conditions that require treatment. Also bear in mind that medical interventions can alter the processes of natural selection and can therefore have intentional or unintentional evolutionary consequences. When devising your presentation and papers, you must therefore focus on how evolution shaped the physiological process that you are discussing and what evolutionary consequences may result from medical interventions in these processes.

For example, if we were to discuss birth control, the focus of a presentation/paper would not be on methods of birth control and how they work, but on why human females may have evolved to be almost continuously sexually receptive (unlike most animals); the physiological adaptations that make this continuous receptivity possible; the risks and benefits associated with continuous receptivity; and the evolutionary consequences of regulating fertility.

So, every presentation and paper must address the following issues:

- 1) What is the basic physiology/biology of the phenomenon being discussed?
- 2) What is the evolutionary context in which the phenomenon evolved and why may it have been selected? (These questions may often involve comparative physiology.)
- 3) What are the biomedical benefits and risks associated with the phenomenon?
- 4) What types of medical interventions are possible?
- 5) What are the possible evolutionary consequences of these medical interventions?

Papers are expected to be referenced and to use legitimate scientific sources such as journal articles, reviews, textbooks, etc. You will be graded on the quality and extensiveness of your references!

Presentations should be appropriately illustrated. Most people remember what they are shown better than what they are told. If you illustrate something, take the time to explain what is being shown and how the illustration is pertinent to your presentation. Short videos can also be effective.

You are also encouraged to do “hands on” activities if they are appropriate. People remember what they do even better than what they see.

You will also be graded on the quality and clarity of your writing. See the handout on writing papers for suggestions.

## **Focus Questions for Note-Taking and Abstract Writing**

This is an evolution course, so the focus of presentations (and therefore notes and writings) should be on evolutionary processes. In addition, this is also a physiology/medicine course, so an additional focus is how evolution affects human health and how our health system affects evolution. (Note-taking and writing in other courses would have different foci!)

### **Evolutionary processes require four key elements:**

- 1) Inheritable variation of traits. (So: What is the source of variation? What trait is affected? How inherited?)
- 2) Trait variations must affect fitness (So: Is fitness affected positively or negatively or both? How is fitness reflected in prevalence of trait?)
- 3) Non-random selection among variations. (So: What are the selection pressures? How do these affect trait prevalence?)
- 4) Different environments select for different traits (So: Does geographic or ethnic origin matter?)

### **Medical issues and interventions raise four related additional elements:**

- A) What is the typical function of the trait in human health and how can it manifest itself in disease?
- B) How can medical or public health interventions alter inheritability?
- C) How can medical or public health interventions alter the fitness related to the trait?
- D) How can medical or public health interventions alter selection among variations?

### **Finally, if you are asked to compare and contrast presentations or readings, you should focus on discovering common principles:**

- i) What are the common principles that guide the evolutionary process across the set of material that is being compared?
- ii) If there are exceptions, what makes them exceptional and what additional principle makes them so?

**Not all nine of these focus questions will be relevant to every presentation or abstract, but one should still consider each one to make sure!**

## **MAKING ORAL PRESENTATIONS – PSL 439 – DR. ROOT-BERNSTEIN**

The content of an oral presentation is like writing a paper:

- 1) Tell the audience what you are going to tell them (i.e., begin with an abstract of your talk outlining the flow of your key points or arguments)
- 2) Fill in the details, one key point or argument at a time. Think of the presentation in terms of paragraphs, with ONE topic per paragraph, which means ONE major slide per point.
- 3) When you are done, recap the “take home points” – these should go on one slide. This is what you want your audience to remember.

Tell a story. Every discovery and invention has a plot. Imagine it as a movie:

- 1) Begin with a problem, and explain when it was a problem, why it is a problem and to whom.
- 2) Introduce your characters – what do they bring that is unique to the problem, or how do they rethink the problem in new ways
- 3) What challenges must they overcome to solve their problem? Resources? Funding? Lack of data, techniques, materials, collaborators?
- 4) How do the key characters overcome each obstacle, one at a time?
- 5) What results from their struggles: a new technique? Data? Theory?
- 6) How does this invention or discovery solve their problem – or have they serendipitously discovered a different one altogether?
- 7) How is their discovery or invention received by others?
- 8) Who gets credit for the work?
- 9) What new problems and opportunities does the discovery or invention pose for subsequent investigators?

Don't read from a script

- 1) It is best to know your material well enough to work from notes – spontaneous speaking is much more effective than reading from a script.
- 2) If you must write out your talk to feel comfortable, go ahead – but then make notes of the talk and use the notes, not the full text.
- 3) NEVER read your talk unless you are so pressed for time, or your argument is so intricate, that you need to make every word and slide count.
- 4) Practice! Good speakers practice their talks in advance, preferably before a friendly audience. This way you can make your mistakes or find your oversights in advance and without embarrassment!

Use visual aids effectively

- 1) Don't put your text on your slides
- 2) NEVER EVER read your slides (even if you need to read your talk)
- 3) At most, put brief phrases on your slides such as you would take for notes

- 4) Use pictures, graphs, tables, etc. that supplement your text rather than text itself
- 5) If you use graphs, tables, models or other illustrations, make sure you take time to explain them: just showing a slide without describing what is important about it is not sufficient!
- 6) If there is more information on a slide than you need, try to modify the slide, or carefully point out what is important and what can be ignored
- 7) In general, use only one slide per point
- 8) In general, put up only one slide per minute (average)
- 9) Rather than address controversial points in the talk, just make your point, but bring extra slides to which you can refer if someone from the audience questions you on such points.

#### Talk to your audience

- 1) Talk to everyone in the room
- 2) Make your voice loud enough for the furthest person to hear you easily – project!
- 3) Speak slowly and clearly – take your time, don't hurry.
- 4) Make eye contact – pay attention to how your audience is receiving your pearls of wisdom!
- 5) Appear confident and speak confidently, no matter how you actually feel – public speaking is a form of acting! If you appear to be convincing, you will be convincing!
- 6) Better to put too little in a talk and generate questions than to put in too much and not finish.
- 7) Better to make your key points clearly and well than to overwhelm your audience with so much information they don't know what you told them.

#### Timing your presentation

- 1) In general, one slide per minute.
- 2) In general, two to two-and-one-half minutes per page of written out text.
- 3) Cut your content to the bare minimum. Better to finish early and be able to expand on your talk than not to finish.
- 4) So put things you had to take out of the main body of your presentation at the end of your presentation (after its conclusion) that you can address in a question and answer period.

## Use of Social Media Derived from the Classroom

As members of a learning community, students are expected to respect the intellectual property of course instructors. All course materials presented to students are the copyrighted property of the course instructor and are subject to the following conditions of use:

1. Students may (may not) record lectures or any other classroom activities and use the recordings only for their own course-related purposes.
2. Students may (may not) share the recordings with other students enrolled in the class. Sharing is limited to using the recordings only for their own course-related purposes.
3. Students may (may not) not post the recordings or other course materials online or distribute them to anyone not enrolled in the class without the advance written permission of the course instructor and, if applicable, any students whose voice or image is included in the recordings.
- 4. Any student violating the conditions described above may face academic disciplinary sanctions.**