

“You are most likely going to die from a mismatch disease. You are most likely to suffer from disabilities caused by mismatch diseases. And mismatch diseases contribute to the bulk of health-care spending throughout the world.” -Daniel Lieberman, *The Story of the Human Body*

### **CONTACT INFORMATION**

Dr. Robert Podolsky, 214 Grice Marine Lab, podolskyr@cofc.edu (contact by email preferred)

*Class time and location:* 3:00-4:15 M & W in SSMB 138

*Office hours:* after class until 5 p.m. or by appt. (in all cases email in advance to arrange)

### **OVERVIEW**

Modern humans suffer from a number of ailments that may be rooted in a mismatch between the conditions under which much of human evolution occurred (e.g., food scarcity, unprocessed diets, physical activity, unobsessive hygiene, sunlight-based schedules, earlier reproduction, bipedalism on a soft substrate) and the conditions of modern life. This seminar develops this idea by recounting the story of recent human evolution and two major modern changes (the transition to agriculture and industrialization) to understand the role of evolution in human disease. Students will research and report on a disease of particular interest, ranging among cancers, dietary diseases, metabolic conditions, skin conditions, visual impairment, and musculo-skeletal disorders. Students will also take part in debates about cultural practices related to human health. We will end with a look to the future, including the promise and ethical challenges of transhumanist technological approaches to overcoming human limitation.

### **CLASS EDUCATIONAL GOALS and LEARNING OUTCOMES**

Our goals are to address four main questions related to human evolution and health:

- 1) How did past conditions in which humans lived favor the evolution of particular traits?
- 2) How do current conditions and cultural changes create a “mismatch” with the past?
- 3) What diseases of humans may be manifestations of this mismatch?
- 4) What are some past and possible future solutions to these problems?

As a hard-working and engaged participant in this course, you will come to be able to:

- Construct a timeline of major players in hominin evolution over the past 6-8 M years
- Identify human traits that reflect key constraints imposed by their vertebrate history
- Identify environmental conditions that likely drove changes in hominin physical traits
- Describe the causes and consequences of repeated human dispersal out of Africa
- Explain how two modern events—agriculture and industrialization—radically altered the cultural and environmental landscape on which human traits were selected
- Explain how modern conditions can create a “mismatch” to past selection pressures
- Construct a conceptual map as an organizational and explanatory tool
- Use primary and secondary sources to develop and present arguments in a debate about a practice related to health and disease
- Use library resources to derive, evaluate, and synthesize information about a potential mismatch disease, present that information orally and develop a written summary

## FYE LEARNING OUTCOMES

By the completion of the First-Year Experience, a student will be able to...

- Identify and use the appropriate academic resources and student support services at College of Charleston. These would include the Addleston library, information technology, the Center for Student Learning, the Career Center, and other appropriate academic resources, student support services, and cultural resources.
- Use appropriate tools and search strategies for identifying particular types of information specific to the discipline.
- Evaluate the relevance, quality, and appropriateness of different sources of information
- Recognize and classify the information contained within a bibliographic citation
- Access and use information ethically and legally
- Use appropriate critical thinking skills and problem-solving techniques in appropriate disciplinary contexts
- Make connections across disciplines and/or relevant experiences

## CLASS POLICIES

Class attendance. Attendance is required, and attendance and participation at each meeting will form part of your grade. You will also lose points for coming late or leaving early. We will spend the semester building a chronological and conceptual understanding of human evolution, and missing a class or a reading will leave a big gap in that understanding. Classes will involve work, discussions and presentations--there will be no lectures to "make up" by getting notes.

Synthesis seminar attendance. Attendance and participation are required and will form part of your final grade for the class. The week of the library exercise is especially important.

Reading and preparation. You will have a reading assignment for most class meetings. Responses to readings will involve either completion of a preparatory discussion worksheet before class or construction of a concept map in class. It is therefore essential to do the reading and come prepared to participate according to the instructions for each meeting.

Office hours. You will be required to meet with me at least once while preparing your individual mismatch disease presentation as well as once as a group to prepare for debates. I am also happy at any time to help you to better understand material we cover.

Late assignments. Assignments are due at the date and time indicated. Assignments completed past the deadline without prior approval will have **approx. 5% per day deducted.**

Academic misconduct. Lying, cheating, attempted cheating, unauthorized collaboration, plagiarism, and re-use of work done by you previously are all violations of the honor code. Be sure that you understand the definition and consequences of all potential violations, including intentional and unintentional plagiarism, as described in the student handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>. **It is far better to turn in poor work for a poor grade than to receive an XXF (failure for cheating) and a suspension,** which are automatic sanctions for intentional plagiarism. Members of the honor board, mostly students, take these issues seriously.

Electronics. Cell phones and other communication devices must be turned off at the start of class. Mine will stay on in case of a CougarAlert. After one warning, your phone may be held at

the front of the room and returned at the end of class. Please show respect to me and your peers by giving your full attention and effort during the class period.

How to succeed, in education & life. **Work hard and show determination (grit).** Studies show these are greater predictors of success than innate intelligence. Also, keep in mind Socrates' view of what we are doing: "Education is the kindling of a flame, not the filling of a vessel."

## RESOURCES

Texts. Most of the readings are from two required books. Others will be posted online.

- Shubin, Neil (2009). *Your Inner Fish*. Vintage: New York (abbreviated "YIF").
- Lieberman, Daniel E. (2013). *The Story of the Human Body*. Vintage, New York ("SHB").

OAKS. I will use OAKS to post news, schedule changes, readings and assignments as well as to accept submitted work. **You must register to receive notifications for when I post news, as this will be the major way I communicate with you.**

Center for Student Learning. The CSL, located on the first floor of Addlestone library, offers a wide variety of resources that support many courses offered at the College. Services include walk-in tutoring, by appointment tutoring, study strategies, Peer Academic Coaching (PAC), and Supplemental Instruction (SI). I will give extra credit for up to 3 Study Skills Workshops that you attend. Schedules are posted on the CSL website <http://csl.cofc.edu/>, or call 843.953.5635.

Disability services. I will provide reasonable accommodation for any student with a documented disability who has been approved through SNAP (Students Needing Access Parity), located in the Lightsey Center, Suite 104. Please talk with me during office hours.

## RESPONSIBILITIES

The following is a comprehensive list of your responsibilities for the semester. The two major assignments are marked by an \*asterisk.

Readings. There will be a reading assignment for nearly every class meeting. You are responsible for doing every reading, as there will be an assignment connected to each of them.

Discussion questions. For some readings you will be required to submit written responses to a set of questions before class, and then use them to contribute to in-class discussions. Your responses should be condensed and informative rather than carefully-crafted essays.

Concept mapping. For other readings you will be required to construct a concept map in class as a group. You must come prepared by carefully completing the reading and taking notes. Your score on each concept map will be based in part on peer evaluations of your contribution.

In-class assignments. There will be occasional worksheets, freewriting, cartooning, or flash lecture assignments to complete in class in response to material presented in class.

\*Mismatch disease presentation and written summary. Based on your preferences, you will be assigned a mismatch disease that you will research. From your research you will prepare and deliver an in-class presentation as well as a written summary. Details to follow.

\*Debate and written summary. You will participate as a presenter in one in-class debate on a topic related to human cultural practices. Each debate will involve two teams, one pro and one con, formulating and delivering a set of arguments as well as rebutting the arguments of the other side. Your team will also prepare a written summary of your arguments. Scores will be based in part on peer evaluations. Details to follow.

Popular depictions. You will be responsible for submitting several unique examples of humans have been portrayed in art and pop culture, in terms of both their evolutionary past and their future. Details to follow.

Exam. There will be a final exam (Wednesday Dec 13, 4-7 pm). Details to follow.

### GRADING

<u>Description</u>	<u>Grading Scale</u>	<u>Percentage of grade</u>
Synthesis seminar score	0-100	10
Class attendance/participation	Check (1-5)	10
DQ worksheets	Check (1-5)	14
Concept maps	Check (1-5)	14
Other in-class exercises	0-100	8
Mismatch disease project	0-100	17
Debate project	0-100	11
Depictions of human past and future	Check (1-5)	2
Final exam	0-100	14

### CLASS SCHEDULE (subject to change)

Week	Date	Topic	Reading	Due
<b>Part I. Introduction</b>				
1	W Aug	23	What is human?	---
2	M	28	Darwin and human descent	Darwin (1871)
	W	30	Basics of evolution	Dennett (1995)
3	M Sep	4	Hominin timeline	Hawks (2016)
<b>Part II. Your Inner Fish: human bodies reflect their vertebrate history</b>				
	W	6	Shubin 1: vertebrate limbs	YIF Ch. 2
4	M	11	Shubin 2: vertebrate heads	YIF Ch. 5
	W	13	Shubin 3: vertebrate noses and ears	YIF Ch. 8 & 10
5	M	18	Shubin 4: the vertebrate legacy	YIF Ch. 11
<b>Part III. Story of the Human Body: evolutionary forces in the paleolithic</b>				
	W	20	Lieberman 1: human adaptation	SHB Ch. 1
6	M	25	Lieberman 2: apes and bipedalism	SHB Ch. 2
	W	27	Lieberman 3: Australopith junk diets	SHB Ch. 3
7	M Oct	2	Lieberman 4: <i>Homo</i> hunter-gatherers	SHB Ch. 4

	W		4	<b>Debate I: Does hunting make us human?</b>		Depictions of past*
8	M		9	Lieberman 5: climate change & energetics	SHB Ch. 5	CM4
	W		11	Lieberman 6: migration & colonization	SHB Ch. 6	CM5
9	M		16	Fall break		
	W		18	Special topic	TBA	
10	M		23	Lieberman 7: agriculture & industrialization	SHB pp. 180-202, 209-224	CM6
	W		25	Lieberman 8: mismatch & dysevolution	SHB Ch. 7	CM7

#### Part IV. Mismatch diseases

11	M		30	Presentations 1-3	---	
	W	Nov	1	Presentations 4-6	---	
12	M		6	Presentations 7-9	---	
	W		8	Presentations 10-12	---	
13	M		13	Presentations 13-15	---	
	W		15	Presentations 16-18	---	
14	M		20	<b>Debate II: Proper role of government policy?</b>		Depictions of future*
	W		22	Thanksgiving break	---	

#### Part V. The Future

15	M		27	What is the human future?	SHB Ch. 13, Groff (2015)	DQs8
	W		29	<b>Debate III: Limits on technology for human enhancement?</b>		
16	M	Dec	4	Fixed: The Science/Fiction of Human Enhancement		

#### Readings

YIF = Shubin, Neil (2009). *Your Inner Fish*. Vintage: New York

SHB = Lieberman, Daniel E. (2013). *The Story of the Human Body*. Vintage, New York

Darwin, C. D. (1897). *The Descent of Man*, Chapter 1, pp. 5-25.

Dennett, Daniel C. (1995). *Natural Selection as an Algorithmic Process*, in *Darwin's Dangerous Idea*. Touchstone: New York, pp. 48-51.

Groff, Linda (2015). *Future Human Evolution and Views of the Future Human: Technological Perspectives and Challenges*. *World Future Review* 7 (2-3): 137-158.

Hawks, John (2016). Ch. 3: *Human Evolution*. Pp. 31-45 in *How Evolution Shapes our Lives, Essays on Biology and Society*, eds. Losos J.B. and Lenski R.E., Princeton: Princeton University Press.

\* Depictions (in artwork, humor, the media, commercials, entertainment, etc.)—of humans in their evolutionary past and in the future—can be uploaded anytime up to these dates.