

Term Information

Effective Term Autumn 2022
Previous Value Autumn 2015

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

Inclusion in Origins and Evolution Theme.

What is the rationale for the proposed change(s)?

The course meets ELOs for the Origins and Evolution Theme.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

None.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Anthropology
Fiscal Unit/Academic Org	Anthropology - D0711
College/Academic Group	Arts and Sciences
Level/Career	Graduate, Undergraduate
Course Number/Catalog	5600
Course Title	Evolutionary Medicine
Transcript Abbreviation	Anth-Evol Medicine
Course Description	Biomedical and biosocial influences on problems of human health throughout the world, focusing upon the evolutionary implications of those problems.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus, Lima, Mansfield, Marion, Newark, Wooster
<i>Previous Value</i>	<i>Columbus</i>

Prerequisites and Exclusions

Prerequisites/Corequisites

Exclusions

Previous Value

Not open to students with credit for 601.01.

Electronically Enforced

No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code

26.0102

Subsidy Level

Doctoral Course

Intended Rank

Junior, Senior, Masters, Doctoral

Requirement/Elective Designation

Origins and Evolution

The course is an elective (for this or other units) or is a service course for other units

Previous Value

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Within an evolutionary framework, students will draw on theories, methods and knowledge from a range of scientific disciplines including biology, physiology, psychology, nutrition and medicine.
- This course will challenge students to critically assess the role and practice of medicine in our society.

Content Topic List

- Social environment
- Globalization
- Gender inequality
- Immigration
- Social organization
- Culture
- Adversity
- Human biology
- Biocultural
- Political economy
- Disease

Sought Concurrence

No

COURSE CHANGE REQUEST
5600 - Status: PENDING

Last Updated: Vankeerbergen, Bernadette
Chantal
06/15/2022

Attachments

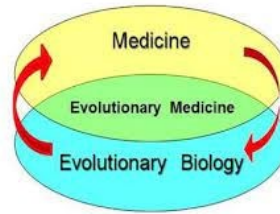
- Anthropology 5600 Evolutionary Medicine Syllabus Spring 2022 Crews.docx: Syllabus
(Syllabus. Owner: Guatelli-Steinberg, Debra)
- Anthropology 5600 Evol Anthro OE submission questions.docx: OE Submission Questions
(Other Supporting Documentation. Owner: Guatelli-Steinberg, Debra)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Guatelli-Steinberg, Debra	06/07/2022 02:47 PM	Submitted for Approval
Approved	Guatelli-Steinberg, Debra	06/07/2022 02:50 PM	Unit Approval
Approved	Vankeerbergen, Bernadette Chantal	06/15/2022 02:28 PM	College Approval
Pending Approval	Cody, Emily Kathryn Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Hilty, Michael Vankeerbergen, Bernadette Chantal Steele, Rachel Lea	06/15/2022 02:28 PM	ASCCAO Approval

Anthropology 5600 Evolutionary Medicine



Spring 2022

Instructor: Douglas E. Crews crews.8@osu.edu

Smith Laboratory 4025

Office hours: Tuesday/Thursday 10-11am & by appointment

What this course is about

Evolutionary Medicine (EM) explores how adaptive responses to previously prevailing environments influenced and continue to influence growth, development, health, and life spans among hominins and humans from ancient to modern. As a field within Biological and Medical Anthropology, EM supports evidence-based medicine by applying evolutionary models to explore why modern humans are susceptible to specific illness, diseases, injuries, and causes of death, while showing species-wide and local responses to specific stressors. EM explores ill health as a dysfunctional state related to stressor responses evolved originally to improve human neurological, cardiovascular, and physiological functioning, mobility, immune and metabolic responses. Thus, evolutionary forces influenced and patterned all aspects of human development and biology. The viewpoint of evolutionary medicine is that one path to understanding human biology, health, ill health, and support evidence-based medicine is to explore the evolutionary basis of health and ill-health.

EM focuses on current evolutionary understanding and research at the intersection of modern medical knowledge and evolutionary biology. This approach has a long history, with the concept being articulated by Darwin and other 19th and 20th century writers. We briefly review these early models, however current research in EM is our main interest. We begin by reviewing how genomic and genetic factors influence and structure all human phenotypes and review several standard DNA-based phenotypes (e.g., sickle-cell, Huntington's, Trisomy 21, lactase persistence) to assess how their allele frequencies may change over time. Next, we then proceed to explore how multiple health-related conditions likely reflect genomic and genetic modifications (e.g., mutations, DNA, RNA, epigenetics, protein processing errors and modifications), relationships of human phenotypes to those of other species, and explore hominin and human specific adaptations. The emphasis is on how adaptations reflect responses to environmental stressors and how new adaptations may alter existing adaptive balances, requiring phenotypic trade-offs and compromises, and lead to mismatches and increased risks for detrimental conditions.

Course objectives

During this course you will be introduced to evolutionary perspective on health and illness. You will gain a strong foundation in how growth, development, reproductive adulthood, health, illness, disease, dysfunction, and senescence reflect evolved strategies for maximizing phenotypic optimality and long-term reproductive success of individuals across our species. You will be familiar with how ill health may result when evolved responses prompting reproduction are exposed to new environments that stretch them to their extremes. Today this leads to conditions of obesity, metabolic disorders, cardiovascular

diseases, altered childhood development, and psychiatric conditions. Through in-class lectures, written quizzes, reading assignments and associated critiques, along with your personal review of a topic in EM and an in-class presentation thereof, you will hone your abilities to analyze, and critique published research reports within the context of larger research issues in EM. Finally, you should discover how theory, methods, and approaches within EM apply to your own future interests and specializations not alone within anthropology but the wider arenas of health, medicine, and biology.

Goals of the *Origins and Evolution* GE Theme are:

1. Successful students will analyze the origins and evolution of natural systems, life, humanity, or human culture at a more advanced and in-depth level than in the Foundations component.
2. Successful students will integrate approaches to the origins and evolution of natural systems, life, humanity, or human culture by making connections to their own experiences and by making connections to work they have done in previous classes and/or anticipate doing in the future.
3. Successful students will appreciate the time depth of the origins and evolution of natural systems, life, humanity, or human culture, and the factors that have shaped them over time.
4. Successful students will understand the origins and evolution of natural systems, life, humanity, or human culture, and the factors that have shaped them over time.

More specifically, the Expected Learning Outcomes for this theme are: Successful students are able to:

- 1.1 Apply their understanding of scientific methods to quantitative calculations.
- 1.2 Engage in critical and logical thinking about the origins and evolution of the universe, physical systems, life on earth, humanity, or human culture.
- 2.1 Identify, describe, and synthesize approaches to or experiences of origins and evolution questions in different academic and non-academic contexts.
- 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.
- 3.1 Illustrate the time depth of the universe, physical systems, life on earth, humanity, or human culture by providing examples or models.
- 3.2 Explain scientific methods used to reconstruct the history of the universe, physical systems, life on earth, humanity, or human culture and specify their domains of validity.
- 3.3 Engage with current controversies and problems related to origins and evolution questions.

4.1 Describe how the universe, physical systems, life on earth, humanity, or human culture have evolved over time.

4.2 Summarize current theories of the origin and evolution of the universe, physical systems, life on earth, humanity, or human culture.

Anthropology 5600 addresses (1) the origins and evolution of health and ill-health and (2) how understanding of our evolutionary development aids us in understanding how evolved patterns of childhood growth and adult development influence life-long health and disease risks in modern settings. Anthropology 5600 also addresses (3) evolution of natural systems, life, humanity, or human culture, and the factors that have shaped them over time and (4) the origins and evolution of natural systems, life, humanity, human culture, and factors shaping human health over time.

Through interactive lectures, readings and reviews of published articles, and viewing of online materials (Podcasts, TED talks, etc.) students will engage in critical and logical thinking about the evolved basis for human variation in wellness, illness, disease, and late-life survival as well as how our changing patterns of sociocultural interactions and niche construction have altered our diets, life styles, activity patterns, and life histories, and thereby our genomes. Lectures will include continued critical evaluation of different evolutionary scenarios for hominin and human responses to environmental pressures. These will include anatomical rearrangements of early hominins as they adopted bipedalism and related effects on skeletal structure that today led to back and joint problems and associate degeneration, illness, and disease. Examples will include rearrangements of skeletal architecture and changes in dentition that led to today's susceptibilities to dislocations, breakage, degeneration, and dental issues. Lectures and readings are designed to engage students in making logical inferences from evolutionary biology and past hominins to afflictions and illnesses among modern populations. Lectures and assignments are designed to engage students in developing logical inferences about how humankind's evolutionary history underlies our current health and survival. Throughout the semester, students read primary research articles, summarizing and critiquing them as models of research in evolutionary medicine, medicine, and evolution, thereby connecting subject matter to their own life experiences, other classes, and importantly to their future goals, while presenting their critiques in class. At semesters end all students complete a 10–15-minute presentation of their semester paper to class and integrate how evolutionary biology contributes to health and ill-health in modern settings.

Curriculum Fulfillment: Evolutionary Medicine is a core course in the Medical Anthropology Major and the Evolutionary Studies Minor. Information regarding majors and minors and related requirements may be found online at <http://artsandsciences.osu.edu/interdisciplinary> and the Department of Anthropology website.

Course Requirements:

Active class participation	10%
6 Reaction/Response Papers	30%
3 Quizzes	30%

Research paper	20%
Research paper presentation	10%

1) **Active Class Participation:10%**

1st: Attend classes. **2nd:** Presentations on readings - be prepared for your in-class presentations. **3rd:** Speak up, ask questions, state your opinions. **4th:** Be polite and respectful of all. Discussing theories, terminology, results, assumptions in readings is important to understanding. Be sure to read assigned papers and complete responses prior to attending class.

2) **6 one-page Reaction/Response Papers – 30% - 5% each of Total Grade**
Due Weeks 3, 5, 7, 8, 9, 12

Carefully read and write a one-page **double-spaced** response/reaction opinion of published papers listed in syllabus for previous weeks, lectures, and discussions. **You will present on response papers in class. Grade depends on how well you explain paper’s purpose, data/evidence, relationships to current medical, evolutionary, and anthropological issues, and support your opinion.** Opinions are not graded, say what you think. What was authors’ message? What did they seek to confirm? What did they conclude? Were conclusions supported? You may use text examples, but no long quotes to support your comments. These are **reactions not summaries or reviews.** Include your **name, date, and brief citation on topmost line.** Type paper with 1-inch margins, **12-point font.** **No** headers or titles. Include author and date of publication within 1st sentence (e.g., Smith 2022), **full reference on back of page.** Adhere to grammar, spelling, and citation standards. If you add **outside citations,** list on back of page. **Due in class Tuesday week assigned:**

3) **Quizzes 30%: 3 = 10% each - due Thursdays Weeks 5, 10, 15.** Quiz formats differ.

Quiz 1: weeks 1-4 – How have class materials thus far they relate to your interests

Quiz 2: weeks 5-9 – Synopsis of class readings and how they relate to your interests

Quiz 3: weeks 12-14 – Synopsis of 3 presentations by other students & relate to your interests

4) **Research Paper 20%**

Use your research paper and presentation to explore a topic in evolutionary medicine of interest to you and construct a short informative PP presentation for your classmates.

1) **Topic/Concept:** Provide a Title/Research Question & one sentence summary of topic. Think broadly across your interests and future goals for topic. **Due week 6.** Discuss in class.

2) **Abstract:** Concisely (50-100 words) describe your topic: background, goals, contribution to class knowledge, & list 3 relevant peer-reviewed articles. **Due week 12.**

3) **Paper: Due Dates: Graduating Senior 15 April – All Others 22 April**

Concise 5-page Word.doc. Papers are graded on your analysis of evidence on your topic, how it relates to Evol Med, and your career goals. And clarity, spelling grammar, and adherence to instructions. Include **minimum 1 figure, 1 table, number pages, section headings, title page, reference section minimum 10.** **Only text pages count towards 5-pages.** Be succinct!

Guidelines – Double-spaced with 1-inch margins, 12-point font. Follow **Harvard Style citation** format. Relate topic with class materials discussions. Provide sufficient background to support your conclusions. Include a minimum of 10 references. Internet websites may be used to support an opinion but generally **are not primary sources**, other than for example “.gov” sites. Keep in mind, failure to cite properly constitutes plagiarism. Whenever you relate an idea that is not your own, you must provide a citation, whether you are paraphrasing or not. Do not use direct quotes except for a few words to emphasize or introduce a subject. In text, cite Figures and Tables at end of any sentence addressing them (Figure 1). Include source on page with Fig/Table.

Paper Components:

- Title page with your name, class, and date
- Pages numbered consecutively, title page not included in 5-page text count
- At least one each figure & table, describe in text, include following references
- Use MAJOR HEADINGS in BOLD LETTERS and Minor Headings in This Style
- INTRODUCTION, METHODS, RESULTS, DISCUSSION, CONCLUSION BOLD:
You may use different headings, e.g. Introduction, Social Factors, Biological Factors, Evolutionary factors, Implications, etc. as fit your research.
- List all references cited in text following text in “References Cited” section

Research Paper Presentations: 10%: During last 1/3 of class, you will make a 10-12-minute presentation of your research. Grades will reflect quality, clarity, and creativity of your presentation, along with your responses to questions. All students are expected to attend all presentations and ask questions. Failing to attend presentations without a valid excuse will result in docking of participation points. Quizzes 2 & 3 are based partly on Research Presentations.

Class Format: First several weeks lectures, reading, & discussion. Then, student led reviews and discussions of published papers. Final weeks, student presentations and discussions. Be sure to have access to assigned readings during class. Please pay attention during class and participate. Do not surf internet or attend to other activities. Please maintain a professional demeanor, address others respectfully, and listen to them without interruption.

Grading: Letter grades are based on the total points you earn for all assignments. Grades are **earned – the instructor does not “give” them**. You may check your general progress by comparing your score against the following scale: 93-100=A; 90-92=A-; 87-89=B+; 83-86=B; 80-82=B-; 77-79=C+; 73-76=C; 70-72=C-; 67-69=D+; 60-66=D; <60=E. University rules, do not allow instructors to discuss grades over the phone or through e-mail. Do not call the Department of Anthropology office regarding grades, you will be directed to see your instructor. **Only points listed in this syllabus contribute to your final grade. There are no extra credit assignments available to improve your grade.**

Late Assignments: If you miss any assignment, e-mail me within 48 hours of the due date. Late assignments receive **full credit only if accompanied by appropriate documentation** accounting for each day late. Assignments turned in late without such will drop 10% of their total per day. One day is a standard calendar day, not a class period.

Academic Misconduct: All students should be familiar with the rules governing alleged academic misconduct. See the Code of Student Conduct, Chapter 3335-25, in The Ohio State

University Handbook for further details on what constitutes academic misconduct. All students should be familiar with what constitutes academic misconduct, especially as it pertains to plagiarism and test taking. Ignorance of the rules governing academic misconduct or ignorance of what constitutes academic misconduct is not an acceptable defense. Alleged cases of academic misconduct will be referred to the proper university committees.

CLASS NEWS AND CANCELLATIONS: In case of unexpected instructor absences, check departmental website <http://anthropology.osu.edu/news/coursenews.php>. This site should be consulted in the event of inclement weather to check for possible class cancellations or delays. **Do not call the department, check website. and look for an email from me.**

Lecture, Reading, Assignment Schedule

Changes to scheduled readings and assignments will be announced in class and by email. If you miss a class, it is your responsibility to contact the instructor regarding announcements you may have missed and a fellow student for any class notes. All course readings may be found online through OSU by searching the university library catalogue of electronic journals or ISI.

This is a class in **Physical/Biological Anthropology**. **Emphasis two aspects human biology:**

1. **Evolution:** humans as a zoological species within **class Mammals, order Primates**
2. **Human Population Biology:** study of entities and populations within *Homo sapiens*

Class Schedule

Week	Date:	Topics:	Due Dates:
1	1/10 – 1/14	Introductions, Syllabus, Evolutionary/Darwinian Medicine Evolutionary Perspectives, Why Anthropology	
2	1/18 – 1/21	Evolutionary & Medical Terms, Concepts, Intersections & Medical Anthropology Readings: Williams & Nesse 1991; Grunspan et al 2017 Note: Weekly Readings Listed after Class Schedule	
3	1/24 – 1/28	Evolution, Biology, Health, Ill Health & Medicine Readings: Trevathan 2007; Ellison 2014; Nesse et al. 2010	Reading Report 1 due
4	1/31 – 2/4	Current Research Directions in Evolutionary Medicine Readings: Nesse & Williams 1998; Nesse 2011; Lea et al.	
5	2/7 – 2/11	Readings: Dishakjian et al 2020; McDade et al 2016; Straub & Schradin 2016; Turke 2017	Reading Report 2 due Quiz 1 2/11

6	2/14 – 2/18	Readings: O’Keefe & Cordain, 2004; Fox et al 2013; Leonard 2018; Wander et al 2009	
7	2/21 – 2/25	Readings: Cepon-Robins et al 2021; Davenport 2017	Reading Report 3 due
8	2/28 – 3/4	Readings: Bogin et al 2007; Bateson & Laland 2013; Nesse 2019; Walsh 2021	Reading Report 4 due
9	3/7 – 3/11	Readings: Hyman 2009; Juster et al 2016; Sterling 2018 Schedule Presentations for 3/28/22 on	Reading Report 5 due
10	3/14 – 3/18	NO CLASS: Spring Break	
11	3/21 – 3/25	NO CLASS: American Association of Biological Anthropologists, Human Biology Association, Paleopathology Meetings	Quiz 2 3/25
12	3/28-4/1	Readings: Brune & Hochberg 2013; Ellis & Del Giudice 2013; Ruhli & Henneberg 2013 Presentations: 3/28: Presentations: 3/31:	Reading Report 6 due
13	4/4 – 4/8	Presentations: 4/5: Presentations: 4/7:	
14	4/11 – 4/15	Presentations: 4/12: Presentations: 4/14:	
15	4/18 – 4/22	Graduating Seniors Final papers due 22 April Presentations: 4/19: Presentations: 4/21:	Quiz 3 4/22
Exam Week	4/25 – 5/3	Non-Graduating Students Final papers due 25April	

Readings:

Week 2:

Williams GW, Nesse RM: The dawn of Darwinian medicine. The Quarterly Review of Biology, 66:1-22, 1991. <http://www-personal.umich.edu/~nesse/Articles/DawnDarwinianMed-QRB-1991.pdf>.

Grunspan DZ, Nesse RM, Barnes ME, Brownell SA. 2017. Core principles of evolutionary medicine: A Delphi study. *Evol Med Public Health* 2018(1):13-23.
DOI: <http://dx.doi.org.proxy.lib.ohio-state.edu/10.1093/emph/eox025>

Week 3:

Travantham 2007: Evolutionary Medicine. *Annual Rev of Anthropology* 2007, 36:139-154.
https://moodle.swarthmore.edu/pluginfile.php/32474/mod_resource/content/0/Trevathan-Evolutionary_Med_Ann_review.pdf

PT Ellison 2014. Evolutionary Tradeoffs. *Evolution, Medicine, and Public Health* p. 93.
<http://emph.oxfordjournals.org/content/2014/1/93.full.pdf+html?sid=24bbe3ad-3c78-453a-bcf7-916fce03d6a6>.

Nesse RM, Bergstrom CT, Ellison PT, et al Sterns S, Valle D. 2010. Making evolutionary biology a basic science for medicine. *PNAS*. 107(Suppl.1): 1800-1807.
https://www.pnas.org/content/pnas/107/suppl_1/1800.full.pdf

Week 4:

Nesse RM, Williams GC. 1998. Evolution and the Origins of Disease. *Scientific American* 279(5): 86-93. Access Go through OSU Libraries.x <https://pubmed.ncbi.nlm.nih.gov/9796548/>

Nesse RM. 2011. Ten questions for evolutionary studies of disease vulnerability. *Evolutionary Applications*. 4(2):264-77,. <http://www-personal.umich.edu/~nesse/Articles/Nesse-TenQEvolStudiesDisease-EvApps-2011.pdf>

Lea AJ, Tung J, Archie EA, Alberts SC, Developmental plasticity: Bridging research in evolution and human health. *Evolution, Medicine, and Public Health* 2017(1): 162–175.
<https://doi.org/10.1093/emph/eox019>.

Week 5:

Dishakjian V, Fessler DMT, Sparks AM. 2020. Live Fast, Die Young, and Sleep Later: Life History Strategy and Human Sleep Behavior. *Evolution, Medicine, and Public Health*. DOI: 10.1093/emph/eoaa048.

McDade TW, Georgiev AV, Kuzawa CW. 2016. Trade-offs between acquired and innate immune defenses in humans. *Evolution, Medicine, and Public Health* 2016(1): 1–16.
<https://doi.org/10.1093/emph/eov033>.

Straub RH, Schradin C. 2016. Chronic inflammatory systemic diseases: An evolutionary trade-off between acutely beneficial but chronically harmful programs. *Evolution, Medicine, and Public Health* 2016(1): 37–51. <https://doi.org/10.1093/emph/eow001>.

Turke PW. 2017. Childhood food allergies: An evolutionary mismatch hypothesis. *Evolution, Medicine, and Public Health* 2017(1): 154–160. <https://doi.org/10.1093/emph/eox014>.

Week 6:

O’Keefe, Jr. JH, Cordain L. 2004. Cardiovascular disease resulting from a diet and lifestyle at odds with our paleolithic genome: how to become a 21st-century hunter-gatherer. *Mayo Clin Proc* 79(1):101-8.

Fox et al 2013. Hygiene and the world distribution of Alzheimer’s disease. *Evolution, Medicine, and Public Health* 171-186.
<http://emph.oxfordjournals.org/content/2013/1/173.full.pdf+html?sid=af60d513-5a3e-4956-9497-3841cc687437>

Leonard WR. 2018. Centennial perspective on human adaptability. *Am J Phys Anthropol.* 165(4):813–833.
file:///C:/Users/crews.8/Downloads/Centennial_perspective_on_human_adaptabi.pdf

Wander K. 2009. Evaluation of iron deficiency as a nutritional adaptation to infectious disease: an evolutionary medicine perspective. *AJHB* 21 (2)172-.
PMID: 18949769 DOI: 10.1002/ajhb.20839 Alexis n Haruko
http://journals.ohiolink.edu/ejc/pdf.cgi/Wander_Katherine.pdf?issn=10420533&issue=v21i0002&article=172_eoidaaidaemp

Week 7:

Cepon-Robins TJ, Blackwell AD, Gildner TE, Liebert MA, Snodgrass J. 2021. Pathogen disgust sensitivity protects against infection in a high pathogen environment. *PNAS* February 23, 2021 118(8) e2018552118. <https://www.pnas.org/content/118/8/e2018552118>

Davenport ER, Sanders JG, Song SJ, Amato KR, Clark AG, Knight R. 2017. The human microbiome in evolution. *BMC Biology* 15(1):1-12.
<https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-017-0454-7>

Week 8:

Bogin B, Silva MIV, Rios L. Life history trade-offs in human growth: adaptation or pathology? *AJHB* 19:631-642. <https://onlinelibrary.wiley.com/doi/abs/10.1002/ajhb.20666>

Nesse RM. 2019. Tinbergen’s four questions: Two proximate, two evolutionary. *Evolution, Medicine, and Public Health* 2019(1):2. <https://doi.org/10.1093/emph/eoy035>. **Read only This is not an article for Reaction Paper, only 1 page.**

Bateson P, Laland KN. 2013. Tinbergen’s four questions: an appreciation and an update. *Trends in Ecology & Evolution* 28(12):712-718. <http://dx.doi.org/10.1016/j.tree.2013.09.013>.

Walsh D, McCartney G, Minton J, Parkinson J, Shipton D, Whyte B. 2021. Deaths from ‘diseases of despair’ in Britain: comparing suicide, alcohol-related and drug-related mortality for

birth cohorts in Scotland, England and Wales, and selected cities. *J Epidemiol Community Health* 75(12):1195-1201.

Week 9:

Hyman SE. 2009. How adversity gets under your skin. *Nature Neuroscience* 12(3): 241-243.
<https://www.nature.com/articles/nn0309-241.pdf>.

Juster R-P, Russell J, Almeida D, Picard M. 2016. Allostatic load and comorbidities: A mitochondrial, epigenetic, and evolutionary perspective. *Psychopathol* 28(4pt1):1117-1146.
<https://www.nature.com/articles/nn0309-241.pdf>

Sterling, P. 2018 Predictive regulation and human design. *eLife* 2018;7:e36133.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6025954/pdf/elife-36133.pdf>

Week 12:

Brune M, Hochberg Z. 2013 . Evolutionary medicine – the quest for a better understanding of health, disease and prevention. *BMC Med* 11:116. **Read only. Not an article for Reaction Paper, only 2 pages.** Editorial introducing Evolutionary Medicine : clinical medicine from an evolutionary perspective, a collection of papers.
<https://link.springer.com/content/pdf/10.1186/1741-7015-11-116.pdf>

Ruhli Fj, Henneberg M. 2013. New perspectives on evolutionary medicine: the relevance of microevolution for human health and disease. *BMC Medicine* 2013, 11:115
<http://www.biomedcentral.com/1741-7015/11/115>. - Kayla Hamm n Julia

Ellis BJ, Giudice MD. 2014. Beyond allostatic load: Rethinking the role of stress in regulating human development. *Development and Psychopathology* 26(1):1 – 20. Olivia n Rhea
DOI: <https://doi.org/10.1017/S0954579413000849>.

Weeks 13-15: Student Presentations

Anthropology 5600: Evolutionary Medicine: Spring, 2022 Syllabus

Submitted for approval for the new theme Origins and Evolution

Background: Evolutionary Medicine presents an evolutionary perspective on how evolved aspects of human phenotypes may today place us at risk for disease, illness, functional deterioration, and death. By focusing on changes and repatterning of physiological, morphological, and functional phenotypic alterations as hominins evolved new life history and reproductive strategies, evolutionary medicine examines how selective responses to earlier environments may have led to trade-offs and compromises in human phenotypes that in current environmental settings leave us susceptible to multiple infectious, parasitic, chronic, and degenerative conditions. From our skeletons and dentition to our neurological capabilities and emotions, nutritional requirements, and taste sensors, adaptive responses to ancestral environments may produce mismatches with modern human environments. This course reviews several well documented instances of genetic factors influencing human phenotypic variation (e.g., sickle-cell, Huntington's, Trisomy 21, lactase persistence), illustrating their variable frequencies and distributions among modern humans. Our emphasis is on how previous adaptations reflect responses to previously prevailing environmental stressors and new adaptations may alter previous adaptive balances and compromises, requiring additional phenotypic trade-offs and compromises and possibly generating new health issues. We use evolutionary models to explore multiple health-related conditions as reflecting genomic and genetic modifications (e.g., mutations, DNA, RNA, epigenetics, protein processing errors) and relationships of how human phenotypes have responded to environmental variation with specific local adaptations. Evolutionary medicine encompasses multiple subfields within biological anthropology, including human biology, medical anthropology, bioarchaeology, and paleopathology. Overall, this course presents an overarching evolutionary approach to understanding modern human variation in health and disease, by examining variation in light of natural selection pressures.

Expected learning outcomes specific to the course: Successful students will: (1) gain familiarity with and practice in the basic methods of population genetics (Hardy-Weinberg), causes for human phenotypic variation, determinations and assessments of evolutionary influences on health/ill health, evolutionary basis of metabolic disorders, cardiovascular diseases, childhood development, psychiatric conditions, (2) analyze and critique reports on the evolutionary basis of disease in the context of larger research issues in medicine and evolutionary theory, and (3) discover how methods and/or approaches from evolutionary medicine, human biology, medical and biocultural anthropology apply to their own interests and specializations.

(I) How Anthropology 3300 meets ELOs shared by all themes

ELO 1.1 Engage in critical and logical thinking.	Through interactive lectures, in-class exercises, and reading of referred journal articles, students engage in critical and logical thinking about health, illness, evolutionary biology, and medicine, and what we can learn from mismatches of our ancient biology with modern settings, changing diets, and life histories.
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Course subject & number

	<p>a) In class discussions involve critical evaluation of different evolutionary scenarios based on lectures and assigned readings. For example, how/why did the human appendix evolve and what is its function? Why do humans show specific responses to infectious pathogens? What are the evolutionary bases for human physiological variation? Which of these evolved characteristics came first? Which are shared with other hominins or apes? How have human cultures influenced patterns of disease and illnesses? Students are asked to think about the logical implications of these questions as they are discussed during lectures. When discussing possible trade-offs, mismatches, and compromises as evolutionary scenarios for medical conditions we will consider multiple factors: genes, environments, and sociocultural settings, as intersecting and mediating factors. Students will evaluate these models based on modern human biology, genetics, and human variation, thereby tying health to evolution and sociocultural factors.</p> <p>b) Requirements for this course include 6 reaction/response papers, 3 quizzes, and a research paper with an in-class presentation, along with active class participation. All class activities are designed to engage students in making logical inferences about evolutionary processes, past and current human environmental and sociocultural settings, and the patterning of health across populations and individuals. As an example, in class, we will look at several genotypes associated with specific conditions (e.g., sickle cell alleles/malaria) and explore how such alleles may increase or decrease in different populations based upon their location, migration history, or sociocultural setting. Students are then asked to critically evaluate ideas and concepts presented in lecture, their assigned readings, and knowledge of selection pressures to evaluate how the latter continue to influence human variation in today's settings.</p> <p>c) Papers and discussions: Through weeks 2-12 of the semester, students read a series of primary research articles, summarizing, and critiquing 6 papers in light of course content and other articles on the same topic assigned each week. These are referred to as Reading Reports 1-6 in the syllabus. Students will present their research and paper critiques in class.</p>
<p>ELO 2.1 Identify, describe, and synthesize approaches or experiences.</p>	<p>Students are asked to identify, describe and synthesize approaches throughout the course. For example, on the topic of what our early ancestors ate, and how what we eat today may reflect a mismatch of available foods with our evolved appetites. Students are exposed to a variety of approaches (more approaches than they are exposed to in Anthropology 3301, although 3301 is not a</p>

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	<p>pre-requisite for this course) to assessing why humans experience the illnesses and chronic conditions they do. Possible approaches include functional morphology, skeletal and neurological biology, and physiological stressor responses. They are asked to evaluate what these different lines of evidence mean and how they might be reconciled. They also complete three quizzes reflecting on how the previous 5-weeks lectures, journal readings/reports, and student presentations relate to their previous and current courses, personal backgrounds, future goals and anticipated careers, thereby integrating course materials with their own lives and experiences.</p>
<p>ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.</p>	<p>Weekly writing assignments, 3 quizzes, and the final paper are the main vehicles by which students develop a sense of themselves as learners. The primary literature they read for the paper assignments requires students to make connections between previous learning in the course and new, often challenging research. Reading report, quiz, and paper instructions are provided in the associated syllabus on page 3. Note that one requirement of the paper is to relate peer-reviewed research articles students are summarizing and critiquing to broader issues discussed in course lectures and discussions. Thus, they must reflect on what their chosen research article means. When students present these reports on articles in class, the entire class shares in considering what this new information means for our understanding of broader issues in medicine, health, and human evolution. These can be stimulating discussions in which students develop a sense of how they can use what they have learned in their future careers and to evaluate related research reports.</p>

(I) How Anthropology 3300 meets ELOs of the Origins and Evolution Theme.

<p>ELO 1.1 Apply their understanding of scientific methods to quantitative calculations.</p>	<p>Throughout this course, students apply their understanding of scientific methods to quantitative calculations. For example, students must apply their understanding of allele frequency changes using Hardy-Weinberg modeling across a series of environmental scenarios designed to illustrate adaptive advantages and disadvantages of sickle-cell alleles. They must recognize, compare, and determine why various allele frequencies prevail in differing environmental settings.</p>
<p>ELO 1.2 Engage in critical and logical thinking about the origins and evolution of the universe, physical systems, life on earth, humanity, or human culture.</p>	<p>Through interactive lectures, readings, and quizzes students engage in critical and logical thinking about human evolution and the effects of evolution on health conditions affecting humans worldwide. We do this by exploring how aspects of our biological evolution, such as changing diets and new life history patterns, have</p>

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	<p>altered human-environment interactions and risks for illness and disease.</p> <p>a) Lectures often involve critical evaluations of different evolutionary scenarios. For example, how did human bipedalism evolve and how do those changes influence health and physical frailty in modern settings? Or what effect did changing diets have on modern risks for chronic and degenerative conditions? And what are some advantages and disadvantages of vomiting and diarrhea? Students are asked to explore the logical implications of how changes in skeletal and other somatic structures, sociality, and diets may influence humankind's risks for chronic diseases, phenotypic deterioration, and frailty in modern settings. Students are asked to evaluate these models based how we view human variation and response to environments today.</p> <p>b) There are 10 writing assignments in this course. Each is designed to engage students in reviewing, interpreting, and critiquing lectures, primary literature, and applications of evolutionary medicine to health issues. Students explore the logical inferences of multiple models of how evolutionary processes may reflect phenotypic compromises and left "scars of evolution" on human bodies and biology. These issues are integrated and explored throughout course materials, illustrating the time depth of evolutionary medicine as we explore modern health issues. In this case, several times during class activities students are tasked with developing timelines and models for how major evolutionary and sociocultural changes e.g., bipedalism, endurance running, use of fire for cooking, or the transition to agriculture influenced and continue influencing human health.</p> <p>Students will compare lifeways, ages, and causes of death proposed for past populations to similar information on modern humans. Based on these data they will evaluate likely influences on presence and ranges of modern human variation and susceptibility to specific illness, diseases, and causes of death over time. Further, they will critically evaluate ideas presented in lectures and readings for what observed differences may suggest regarding past and present selection pressures and human health.</p>
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	<p>c) Papers and discussions: Students will complete multiple weekly writing assignments, along with 3 essay quizzes, and a final research paper based upon their interest areas. The primary literature they read for the paper assignments requires students to make connections between published data and course lectures/discussions. Throughout the semester, students are engaged in reading primary research on evolutionary biology and medicine. These are summarized and critiqued with reference to course content and similar articles on related topic. These are referred to as Reading Responses 1-6 in the syllabus. Students are also present their research and critiques in class. They will write an original research paper, present, and discuss their results during class.</p>
<p>ELO 2.1 Identify, describe, and synthesize approaches to or experiences of origins and evolution questions in different academic and non-academic contexts.</p>	<p>Students are asked to identify, describe and synthesize evolutionary and other approaches throughout the course. For example, on the topics of what activities our early ancestors and what they ate, students are exposed to a wide variety of approaches (more approaches than they are expose to in Anthropology 3301, although this is not a pre-requisite for this course). Through interactive lectures, in-class exercises, and reading of referred journal articles, students engage in critical and logical thinking about how our ancient ancestors diets and activity patterns continue to influence our health, illnesses, evolutionary biology, and medicine today. They learn altered life ways since our remote ancestors may now underlie mismatches of our ancient biology with modern diets, changed environmental settings, and altered life histories.</p> <p>a) Lectures often involve critical evaluation of different evolutionary scenarios based on lectures and assigned readings. For example, how/why did the human appendix evolve and what is its function? Why do humans show specific responses to infectious pathogens? What are the evolutionary bases for human physiological variation? Which of these many evolved characteristics came first? Which are shared with other hominins or apes? How have human cultures influenced patterns of disease and illness? Students are asked to think about logical implications of these questions as they are discussed during lectures. When discussing possible trade-offs, mismatches, and compromises as evolutionary scenarios for medical conditions we will consider multiple areas: genes,</p>

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	<p>environments, and sociocultural settings, as intersecting and mediating factors. Students will evaluate these models based on what we know today about modern biology, genetics, and human variation, thereby tying health to evolution and sociocultural factors.</p> <p>In terms of non-academic contexts, class discussions include questions and commentaries on how ancient human diets and physical activities likely influenced our evolution and current health and illness spectrum and how ancient traits are now portrayed in popular culture. In particular, we consider how actually knowledge of our ancestors diets compare with popular conceptions of what our ancestors ate, such as the “Paleo Diet” and fasting.</p>
<p>ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.</p>	<p>Weekly writing assignments, 3 quizzes, and the final paper are the main vehicles by which students develop a sense of themselves as learners. The primary literature they read for the paper assignments requires students to make connections between previous learning in the course and new, often challenging research. Reading report, quiz, and paper instructions are provided in the syllabus on page 3. Note that one requirement of the paper is to relate the peer-reviewed research students are summarizing and critiquing to broader issues discussed in the course. Thus, they must reflect on what their research article means. When students present these articles in class, the entire class shares in considering what this new information means for our understanding of broader issues. These are stimulating discussions in which students are developing a sense of how they can use what they have learned outside the classroom and to evaluate research elsewhere.</p>
<p>ELO 3.1 Illustrate the time depth of the universe, physical systems, life on earth, humanity, or human culture by providing examples or models.</p>	<p>Lectures often involve critical evaluation of different evolutionary scenarios based on lectures and assigned readings. For example, how/why did the human appendix evolve and what is its function? Why do humans show specific responses to infectious pathogens? What are the evolutionary bases for human physiological variation? Which of these evolved characteristics came first? Which are shared with other hominins or apes? How have human cultures influenced patterns of disease and illnesses? Students are asked to think about the logical implications of these questions as they are discussed during lectures. When</p>

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	discussing possible trade-offs, mismatches, and compromises as evolutionary scenarios for medical conditions we will consider multiple factors: genes, environments, and sociocultural settings, as intersecting and mediating factors. Students will evaluate these models based on what we know today about modern biology, genetics, and human variation, thereby tying health to evolution and sociocultural factors.
ELO 3.2 Explain scientific methods used to reconstruct the history of the universe, physical systems, life on earth, humanity, or human culture and specify their domains of validity.	Evolutionary biology is used to reconstruct the past through understanding hominin and human evolution. Through examinations of evolutionary mismatches with modern environments, phylogenetic inertia, trade-offs, and compromises to maintain reproductive success in a changing environment throughout the course, students consider how differing environmental and sociocultural pressures have shaped and are shaping human health variation.
ELO 3.3 Engage with current controversies and problems related to origins and evolution questions.	Most lectures and discussions focus on current controversies and problems regarding the evolution of human variation in health and disease. Examples of this were mentioned above (ELO 1.2) with respect to the origins of human variation and responses to changing environmental pressures over hominin and human evolution. We also discuss many controversies and problems with evolutionary scenarios during lectures on reconstructing human diets, life history evolution, and patterning of mortality and aging across populations.
ELO 4.1 Describe how the universe, physical systems, life on earth, humanity, or human culture have evolved over time.	This course focuses on how hominins and humans have evolved physically and mentally through influences of both changing physical and sociocultural environments. Many of the medical conditions, including injuries, illnesses, chronic conditions, and debilitations experienced by humans today reflect our evolutionary ancestry from early bipedal apes to modern humans. Students are tasked with examining and describing these processes and changes within a series of written reports, quizzes, and a final paper.
ELO 4.2 Summarize current theories of the origin and evolution of the universe, physical systems, life on earth, humanity, or human culture.	Students are asked to summarize and evaluate theories at various points throughout the semester. As mentioned in ELO 4.1, they must evaluate possible evolved compromises and trade-offs in physiology, skeletal structures, and stressor responses that may compromise health and predispose humans to specific chronic conditions and injuries. They also will consider multiple possible influences on evolved aspects of human variation possibly contributing to medical problems today, including selection for bipedalism, the

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	advent of cooking, and possible mismatches of ancient adaptations with modern environments.
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