


# HUMAN EVOLUTIONARY BIOLOGY
# FALL 2022

## Pre-Semester Packet

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-Pre-Semester Checklist
-8 Semester Academic Planner
-HEB Requirements Worksheet
-HEB-MBB Requirements Worksheet
-HEB Courses Fall 2022

**Pre-Semester Checklist**

1. Review your academic progress towards the HEB degree on my.harvard.edu.

2. Use the 8 Semester Academic Planner and the Requirements Worksheet to assess which requirements you plan on completing this semester.

3. Review the HEB courses offered this semester. Current offerings are compiled in the Pre-Semester Packet with links to their Canvas sites. The HEB course list can also be found on our website and through the Course Catalog.

4. Set a meeting with Andrew to talk about your semester plan and overall academic plan. He will lift your advising hold on your Crimson Cart.

5. Submit your Crimson Cart on my.harvard.edu!

# HEB 8 Semester Academic Plan

**Name:** **Class Year:**

Indicate the courses that you have taken, are currently enrolled in, and are planning to take in future terms.

H = Courses that you intend to take to fulfill Harvard College Curriculum requirements (i.e. Gen Ed courses)
C = Courses that you intend to take to fulfill Concentration requirements
E = Courses that you intend to take as Electives

**First-Year**

| Fall | |
|---|---|
| Courses | H, C, E |
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| | |

| Spring | |
|---|---|
| Courses | H, C, E |
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**Sophomore**

| Fall | |
|---|---|
| Courses | H, C, E |
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| Spring | |
|---|---|
| Courses | H, C, E |
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**Junior**

| Fall | |
|---|---|
| Courses | H, C, E |
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| | |

| Spring | |
|---|---|
| Courses | H, C, E |
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**Senior**

| Fall | |
|---|---|
| Courses | H, C, E |
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| Spring | |
|---|---|
| Courses | H, C, E |
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| | |
| | |

| Summer | |
|---|---|
| Courses/Experiences | H, C, E |
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| Considerations while Creating a Plan: |
|---|
| Sequencing and availability of courses<br>Other academic plans (secondary field, citation, study abroad, research, electives, etc.)<br>College Curriculum courses (General Education and Divisional Distribution requirements) |

# Human Evolutionary Biology
# Requirements Worksheet

| Name | Class Year |
|---|---|
| | |

| | | Course | | Term/Year | Options: |
|---|---|---|---|---|---|
| **Foundation Courses**<br>4 Courses | 1 | Life Sciences 1a or LPSa or LS 50a | | | Required |
| | 2 | Life Sciences 1b or LS 50b | | | Required |
| | 3 | HEB 97 – Sophomore Tutorial | | | Required; Sophomore spring |
| | 4 | Junior Research Seminar | | | See Course List; selected HEB seminars count |
| **Subfield Courses & Electives**<br>5 courses<br><br>Three of the five courses must fulfill distribution requirements via specific courses in each of the areas listed. | 1 | **Evolution** | | | See course list each semester for options |
| | 2 | **Anatomy/ Physiology** | | | See course list each semester for options |
| | 3 | **Behavior** | | | See course list each semester for options |
| | 4 | **2 HEB Electives** | | | Any course from the HEB Course List |
| | 5 | | | | |
| **Related Fields:**<br>4 courses<br><br>These courses allow you to further explore your interests within the sciences. **These courses must be approved by your advisor.** | 1 | | | | **Choose from:**<br>HEB<br>Archaeology<br>Biomedical Engineering<br>Chemistry and Physical Biology<br>Chemistry (including Physical Sciences 1)<br>Human Developmental and Regenerative Biology (SCRB)<br>Molecular and Cellular Biology<br>Neurobiology<br>Organismic and Evolutionary Biology<br>Math<br>Physics (including Physical Sciences 2 and 3)<br>Statistics/BioStats<br>Computer Science<br>Mind, Brain, and Behavior<br>**Approved** Psychology courses<br>**Approved** History of Science courses<br>**Approved** Global Health and Health Policy<br>**Approved** Science of the Living Systems or Science of the Physical Universe courses (Limit: one course) |
| | 2 | | | | |
| | 3 | | | | |
| | 4 | | | | |
| **Optional Honors requirements**<br>See Honors Guide on LS website for more info. | 1 | | | | **Thesis Honors**:<br>HEB 99a & 99b, both semesters of Senior year<br>**Non-Thesis Honors**:<br>Two approved upper-level courses |
| | 2 | | | | |

# HEB COURSES

# FALL 2022

# HEB Fall 2022 Class Schedule

| | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|---|---|---|---|---|---|
| 8:00 | | | | | |
| 9:00 | | | | | |
| 10:00 | PSY 1 | HEB 1353 | PSY 1 | HEB 1353 | PSY 1 |
| 11:00 | | HEB 1480 | HEB 1306 | HEB 1480 | |
| 12:00 | FRSEMP 50P | Neuro 80 | HEB 1600 | Neuro 80 | LS 2 |
| 1:00 | | LS 2 | LS 2 | | |
| 2:00 | LS 2 | HEB 1330 | HEB 1200 | HEB 1330 | HEB 1200 |
| 3:00 | HEB 1245 | LS 1a | HEB 1245 | LS 1a | |
| 4:00 | | HEB 99a | | HEB 1381 | |
| 5:00 | HEB 1304 | | | | |
| 6:00 | | HEB 1328 | HEB 1378 | | |
| 7:00 | | | | | |
| 8:00 | | | | | |

## FOUNDATIONAL REQUIREMENTS

### Life Sciences 1a — An Integrative Introduction to the Life Sciences

What are the fundamental features of living systems? What are the molecules imparting them and how do their chemical properties explain their biological roles? The answers form a basis for understanding the molecules of life, the cell, diseases, and medicines. In contrast with traditional presentations of relevant scientific disciplines in separate courses, we take an integrated approach, presenting chemistry, molecular biology, biochemistry, and cell biology framed within central problems such as the biology of viral infections.

T/Th
1:30pm - 2:45pm

*Kahne, Gaudet, Brewster, Verschave, LaCroix*

### PSY 1 — Introduction to Psychological Science

MBB req. only

Psychology 1 is not just an introduction to the field of psychology but an owner's manual for the human mind — and an opportunity to explore some of the most fascinating issues in intellectual life. After laying a foundation in concepts about the brain, evolution, information, nature and nurture, and scientific approaches to psychology, the course covers specific topics including perception, cognition, attention, learning, memory, emotion, decision making, consciousness, development, language, personality, individual differences, psychopathology, social cognition, cooperation and conflict, and love and sex.

M/W/F
10:30am - 11:45pm

*Mitchell*

### Neuro 80 — Neurobiology of Behavior

MBB req. only

An introduction to the ways in which the brain controls mental activities. The course covers the cells and signals that process and transmit information, and the ways in which neurons form circuits that change with experience. Topics include the neurobiology of perception, learning, memory, emotion, and neurologic disorders. This year we are combining interactive, didactic lecture videos with live Tuesdays and Thursdays featuring guest lectures, hands-on demonstrations, and review sessions in addition to small discussion sections.

T/Th
10:30am - 11:45pm

*Lichtman, Quast*

## SUBFIELDS

Life Sciences 2 **Evolutionary Human Physiology and Anatomy** — Anat. & Phys.

Why is the human body the way that it is? This course explores human anatomy and physiology from an integrated framework, combining functional, comparative, and evolutionary perspectives on how organisms work. Major topics, which follow a life-course framework, include embryogenesis, metabolism and energetics, growth and development, movement and locomotion, food and digestion, stress and disease, and reproduction. Also considered is the relevance of human biology to contemporary issues in human health and biology.

M/W/F
12:00pm - 1:15pm

*Lieberman, Lauder, Biewener, Matott*

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HEB 1200 **Neanderthals and Other Extinct Humans** — Evolution

Over the past 100,000 years why did modern humans survive while other human lineages went extinct? This seminar will center on comparing modern humans to Neanderthals and other extinct humans using the genetic, fossil, and archaeological records. With a focus on science outreach and communication, students will create videos and activities for the public, to be shared in schools and museums.

W/F
1:30pm - 2:45pm

*Alex*

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HEB 1245 **Technology, Behavior, and Human Evolution** — Evolution

When does human history begin? We now know that some of the first Homo sapiens appeared over 315,000 years ago. Looking back to even earlier human species, around 2-3 million years ago, we would perhaps be surprised to encounter familiar behaviors: people walking upright, cooperating and socializing, hunting, and using technology. Everything that exists as written history represents less than 2% of what has happened since we emerged as a species, and less than 0.3% of what has happened since archaic humans first emerged. If we want to understand who we are, and why we do the things we do, we need to take a closer look at our relatives in the Paleolithic.

Technology, Behavior, and Human Evolution is an introductory course which offers primatological, fossil, environmental, genetic, and archaeological perspectives on human evolution. Starting with the earliest hominins, each week we will examine central themes and developments in human evolution over the last 6 million years. Students will consider how the emergence and spread of new technologies, biological capacities, changing social dynamics, symbolic behaviors, and cultural complexity shaped human evolutionary trajectories. The behavioral repertoire of modern humans at the end of the last ice age will form the final part of the lecture course.

M/W
3:00pm - 4:15pm

*Desmond*

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HEB 1330 **Primate Social Behavior** — Behavior

This course provides an overview of primate social behavior and cognition and will cover topics such as friendships, kinship, sex and mate choice, dominance, communication, cognition, emotion, parental care, and altruism. Over the course of the semester, we will attempt to address fundamental questions about the Primate order from three perspectives:

1) An evolutionary perspective. How do primate species differ from one another? What are the selection pressures that account for such differences? How to explain seemingly maladaptive behaviors such as infanticide within an evolutionary framework?

2) A primate perspective. An evolutionary perspective. How do primate species differ from one another? What are the selection pressures that account for such differences? How to explain seemingly maladaptive behaviors such as infanticide within an evolutionary framework?

3) A human perspective. What are the continuities and discontinuities between human and non-human primates? What is it that sets humans apart from other primate species?

T/Th
1:30pm - 2:45pm

*Surbeck, Benenson*

## TUTORIAL & SEMINARS

**HEB 91r** **Reading & Research** Research Seminar

Special study of selected topics in human evolutionary biology, given on an individual basis and directly supervised by a member of the Human Evolutionary Biology Faculty.

*ad hoc*

*Yegian*

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HEB 1353 **Dogs: Behavior, Evolution, and Domestication** Research Seminar

What makes dogs behave the way they do, and what can this teach us about our own species? In this course, we will explore the evolution of canine behavior through the lens of ethology. We will discuss current research on the evolutionary history of dogs, and consider whether this might parallel some aspects of human evolution. We will also examine communication, cooperation, attachment, and other aspects of behavior in dogs, humans, and other species. Students will learn to understand behavior as an adaptive, evolved trait and consider artificial selection as a window on mechanisms of behavior evolution. In the weekly 3-hour lab, students will also receive hands-on training in the collection and analysis of dog behavior data through a semester-long group research project.

T/Th
10:30am - 11:45am

*Hecht*

(limited to 12)

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HEB 1480 **Building the Human Body** Research Seminar

Humans and our primate relatives are incredibly variable. This variation results from natural selection operating on the developmental mechanisms that control anatomy and physiology. While these mechanisms remain mostly undiscovered, we are beginning to understand these complex processes due to major advances in technology that have pushed the fields of genetics, genomics and developmental biology rapidly forward. This research-centered course explores these relationships in the context of the human paleontological record. We focus on the evolution and development of the musculoskeletal system, which includes the cranium, axial skeleton and limbs, and present studies that cast light on the developmental genetic mechanisms that underlie major transitions in human evolution.

T/Th
10:30am - 11:45am

*Capellini*

(limited to 20)

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HEB 99a **Senior Thesis** [req. for thesis]

Research and writing of the Senior Thesis.

T
3:00pm - 4:15pm

*Lawrence*

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FRSEMP 50P **Food, Up Close and Personal** [freshman only]

Several times a day, you decide what to eat and drink. What happens to the food in your body; how is it turned into you and how has evolution shaped some of your choices? We alternate among popular nutrition literature, peer reviewed papers and discussion of data to unravel some of the complicated issues surrounding human nutrition. We will examine the published results from "The Biggest Loser" television program and explore the effects of alcohol on the body and brain. We will, of course, cook. The class will meet for three hours each week and attendance is mandatory. As a group, the class will plan a cooking and eating experience, and each student will present on at least one of the topics in the class.

M
12:00pm - 2:45pm

*Tuross*

## ELECTIVES

### HEB 1304 The Human Face

Our faces are the means by which we perceive the world and the world perceives us. The size and shape of the face has changed dramatically across human evolution. Some of our prehistoric relatives had huge teeth and enormous cheek bones, others had massive brow ridges, and modern humans have unique features such as our chins and our unusually big, globular brains. This course will explore how our social interactions and facial expressions, changes in what we eat and how we eat it, and evolutionary adaptations (sexual selection and cultural/environment influences) have molded the face and led to the variety of facial forms we see within and between populations today. We will examine the origins of human facial variation from our early primate origins, across the hominin fossil record, to the impact of modern soft diets and dentistry. What do we think the last common ancestor of humans and chimpanzees looked like? What were the earliest changes to the face and what can they tell us about the lives of our ancestors? What can our own faces tell us about our ancestry, development, and health?

M
3:00pm - 5:00pm

*Lawrence*

### HEB 1306 Wearable Sensors: Measuring Activity, Health, and Performance

Have you ever used a wearable sensor to measure your step count, heart rate, or blood sugar levels? Wearable sensors like FitBit and the Apple Watch are increasingly popular and important in research, sports, and healthcare, with the potential to transform people's habits, health and performance. This course will examine how these sensors work, and explore their limitations and potential. Following an introduction to basic electronics and signal acquisition, we will explore the biology, physics, and engineering of a wide range of sensors that measure physiologically relevant variables like body accelerations, electrocardiography, heart rate, and body temperature. Then students will get hands-on programming and circuit design experience by building their own activity monitoring devices using an open-source Arduino programming board and an accelerometer. No prior programming or electronics experience is required. The flexibility and low cost of the Arduino hardware interface will allow students to develop their own novel experiments and measurement devices and potentially help guide the future of human performance measurement.

W
9:45am - 11:45am

*Yawar*

### HEB 1328 Evolutionary Medicine

Heart attacks, breast cancer, anxiety and eating disorders occur across the animal kingdom. Taught by a physician, the course explores the species-spanning and evolutionary origins of medical, surgical, and psychiatric illnesses. A 'mini-medical school' format will be used to introduce students to ten forms of human pathology emphasizing the typical mechanistic explanations of disease causation offered by physicians followed by in depth evolutionary analyses. Both physical and mental illnesses will be explored across the animal kingdom with a special focus on how emerging awareness of psychopathology in animals can alter the perception (stigma) and treatment of mental illness in human beings.

T
6:00pm - 8:00pm

*Natterson-Horowitz*

## ELECTIVES, CONT.

### HEB 1378 Professional Writing for Human Evolutionary Biologists

Great research isn't enough. Scientists need to effectively communicate their work to diverse audiences. This course will explore written communication in human evolutionary biology and related disciplines. Students will become better writers and produce publishable writing samples. We will survey major genres in academia and beyond, including research papers, grant proposals, job/school/fellowship applications, and pop-science writing for non-specialists. By analyzing exemplary models from these genres, we will distill elements that make scientific writing successful and sometimes beautiful. In this way, we'll approach science writing as a technical and creative endeavor. We'll also discuss strategies to make writing easier, which consider the writer's emotional, social, and environmental conditions. For the major course assignment, students will choose a specific writing project (e.g. grant proposal, op-ed) and work on it throughout the term in order to produce a document that's ready to publish or submit. Course intended for upper-level undergraduates or graduate students.

W
6:00pm - 8:00pm

*Alex*

(limited to 12)

### HEB 1381 The Arrogant Ape: Rethinking Our Relationship to Others

Darwin's theory of evolution offered a powerful counternarrative to the scala naturæ, thus redefining the place of Homo sapiens in the natural world. But a great irony presents itself when a species so-named for its wisdom is currently causing the sixth mass extinction of life on earth. In this seminar, we will explore this apparent contradiction, assess why it has come to be part of our evolutionary legacy, and discuss theory and research that counteracts its profound negative potential.

T
3:00pm - 5:00pm

*Webb*

(limited to 12)

### HEB 1600 Evolutionary Genetics of Complex Human Traits

We need to move beyond the "one gene – one trait" framework of Mendelian genetics to understand many human traits of compelling evolutionary and biomedical significance. "Complex traits" are those determined by multiple genes, environmental factors, and their interactions. Complex traits include diseases that kill us (e.g., heart disease) and a wide range of physical and behavioral features, such as height, metabolism, language, depression, and countless others. Arguably the best characterized human complex traits are those for which the most NIH dollars and researchers' efforts have been spent; these include schizophrenia, autism spectrum disorder, and other neurodevelopmental and neuropsychiatric disorders. By paying close attention to the genetic bases of these disorders and their contributing environmental components, we will develop a useful framework for analyzing other human complex traits. In this advanced small-group seminar, we will examine their multiple genomic and environmental causes, the influences of epigenetics and of the gut microbiome, what animal models and stem cell "organoids" can tell us, whether natural selection acts to maintain these disorders in humans, and the importance of studying world-wide population diversity for uncovering the full range of genetic factors. Our discussions will span topics from the gene and neurobiological levels to the societal.

W
9:45am - 11:45am

*Ruvolo*

(limited to 8)