Natural History: Drawing Connections and Specimens in Biology
Instructor: Julia Notar
Summer Session A: May 12-June 24

Course Description:

"Nothing makes sense in biology except in the light of evolution."
-Theodosius Dobzhansky

This course is for non-majors to learn about Biology through the lens of Natural History, as well as how our historical and current understandings of Natural History influence the world around us. The class pairs lectures on Natural History topics with lectures on how these topics intersect with our daily lives and society, as well as the practice of drawing natural history specimens. Biologists, historical and contemporary, use careful observation to formulate hypotheses and understand the natural world. Drawing practice in this course will introduce students to the skill of biological observation, giving students training in how to look at the natural and social world around them with a careful eye.

Students will learn fundamental concepts in Biology, Evolution, and Ecology to gain an understanding of how life on earth evolved and how organisms relate to each other and their environments. Students will also learn how these fields both (1) play a role in historical and contemporary understandings of topics like race, sex and gender, and the evolution of complex traits, and (2) inform modern technological practices in fields and industries such as biodiversity management, genetic ancestry testing, climate change preparation, and agriculture.

Coursework will require that students write short lecture summaries and keep a sketchbook for drawing assignments. Students will compile their best work from these two assignment types into a final portfolio. No prior instruction or experience with drawing is required to enroll; students will receive short lessons in drawing fundamentals to develop their skills. Grading of drawings will be based on assignment completion and the student's improvement in technique during the course.

In-Class Instruction: Two 3-hour classes per week, for a total of 6 hours per week
Time commitment outside of class: Students should plan to spend at least 3-6 hours *per class* completing drawing assignments and study guides.

Assignments:

Weekly Assignments:
- 5 to 15 assigned drawing exercises, done in a Sketchbook
- 4 Study Guides, each a 1-page guide per lecture

Final Assignments:
- A 10-15 minute Book Presentation on a popular science book
- A Portfolio that combines all revised study guides and 2-3 chosen sketches per topic into a single portfolio, booklet, or other type of document

Sketchbook

Students will use a sketchbook throughout the course for drawing practice, writing down observations, and completing drawing assignments. Sketchbook assignments will include drawings and short (2-5 sentence) written observations, to make connections to the lecture material. For example:

- Topic: Texture/Pattern and Plant-Pollinator Interactions
    - Make six 4"x4" boxes on pages of your sketchbook and draw a texture or pattern in each box. Three boxes should be textures or patterns from the same individual (e.g., from a bee balm plant: petal, stem, and leaf), while the remaining three should be from other organisms (e.g., rhododendron, milkweed, goldenrod)
    - For each box/drawing note: (1) The organism (common name), (2) the structure that you are drawing the texture from (leaf, petal, etc.), (3) the aesthetic quality of the texture/pattern (bumpy, rough, polka-dotted, striped, etc.), (4) the biological relevance of the structure (leaf = photosynthesis, petal = attract pollinators, stem = support and nutrient transportation)

Study Guides

Students will create a 1-page (maximum length) study guide per lecture topic; with 2 lectures per class and 2 classes per week, this will total 4 study guides per week. Study guides may be typed or handwritten, but they must be original work. These guides should include definitions of key vocabulary, descriptions and examples of key concepts, and the larger significance of the topics covered in lecture. These guides may be modeled on the type of study guide one might create to accompany them into an open-note test.

Book Presentation

Students will select a popular science book on a topic that interests them to read over the duration of the course. Books may be selected from the Reading List attached at the end of this syllabus or the student may select another book, subject to instructor approval. At the final class, students will give a 10-15 minute presentation on the book that gives a brief summary of the work, connects the topic(s) to the course material, and expresses the individual student's main takeaways and critiques of the book.

Portfolio

Students will complete and submit a portfolio that is a single document with all their study guides and selected drawings from the class. The purpose of the portfolio is for students to leave the course with a "booklet" with concise summaries of the topics covered as well as the drawings they are most proud of. For each set of study guides, students should select 2-3 drawings from course assignments to illustrate the topics covered and write a short (2-5 sentence) statement as to how each drawing relates to the lecture topic. Students will present chosen Portfolio highlights at the last class.

Grading:

Sketchbooks and Study Guides will be turned in for Progress Checks twice during the course before the final portfolio is due, at the end of Weeks 2 and 4. These progress

checks are aimed at making sure that students are keeping up with the progress they should be making on drawing assignments and study guides but are also an opportunity for the instructor to give comments and feedback. Grading on progress checks will only be based on completeness.

Book Presentations will be graded on covering the required elements (summary, relevance, and takeaways/critique) of the presentation.

Portfolios will be graded on completeness, both of the study guides and drawings. Study guides must cover the required topics, present correct information, and be no more than 1 page. Each drawing should present the student's best work and include the appropriate summary statement relating the drawing to the topic.

Late policy: If students need extensions for deadlines, these should be brought to and approved by the instructor a minimum of 24 hours before the deadline. Work submitted late without a requested extension will be docked one percentage point per day it is late. Work that is submitted late due to an emergency or crisis will not have points deducted.

Grading Breakdown:

- Final Portfolio: 60%
- Book Presentation: 10%
- Sketchbook & Study Guide Progress Check 1: 15%
- Sketchbook & Study Guide Progress Check 2: 15%

Lecture and Assignment Schedule:

Classes will consist of 2 hours of lecture (two 1-hour lectures), and 1 hour of drawing instruction and practice. Drawing sessions may take place in the classroom or around campus. *Note:* Some drawing assignments may be rescheduled as necessary depending on the weather and access to outdoor spaces.

Week	Class	Lecture 1 (Theory)	Lecture 2 (Applied)	Drawing Instruction	Drawing Assignment
Introduction & Biology Basics					
1	1	The Building Blocks of Life: Basic Cell Biology & Physiology	Murder, Magic, & Medicine: The Pharmacology of Edible Plants	Developing Visual Habits for Drawing	Practicing Visual Habits for Drawing
	2	Levels of Organization, from Molecules to Rainforests	The Biology of Popular Animals in Myth and Media: Dragons and The Kraken to Dinosaurs and Giant Squid	Lines	Gesture & Contour Line Drawing: Animals in Motion

Evolution					
2	1	The Scientific Method & Darwin's Journey	Race and Humans: The History of Scientific Racism	Negative Space	Form & Function: Shape Diversity of Leaves and Plant Structures
2	2	Our Understanding of Evolution post-Darwin: DNA, Heredity, Genes, Genetics, & Epigenetics	Genetic Ancestry Testing	Perspective	Patterns & Textures: Flower Petals & Pollinator Attraction
3	1	Natural Selection, Mutation, Migration, & Genetic Drift	Sex and Gender in Humans and Non-Humans	Shape & Volume	Life History Stages: Egg to Caterpillar to Moth
	2	Speciation: Convergence, Divergence, Adaptive Radiation, Parallel Evolution, & Co-evolution	How Many Colors can a Mantis Shrimp See? Using Vision to Understand the Evolution of Complex Traits	Value	Specialization & Adaptive Radiation: Carnivorous Plants & Insects
4	1	Tree of Life, Taxonomy, Phylogenetics, & the Diversity of Life on Earth	Getting in Touch with Your Inner Fish: Development and Evolution in Human Anatomy	Light & Shadow	Homologies: Vertebrate Skeletons
Ecology					
4	2	Introduction to Ecology: Abiotic & Biotic Factors, Ecosystems, Biomes, Habitats	Indigenous Land Ownership, Biodiversity, & Valuing Ecosystem Services	Composition	Composition of Ecological Communities
5	1	Trophic Levels & Food Webs	"Save the Bees!" Plant-Pollinator Interactions and the Consequences for Agriculture	None	Identifying Trophic Levels in Nature & Diagramming Food Webs
	2	Ecological Interactions: Competition, Cooperation, Mutualism, Commensalism, Parasitism	Parasites & How We Make Tap Water Safe to Drink	None	Identifying Ecological Interactions in Nature

6	1	Community Ecology, Populations	Climate Change: Global Ecosystems on the Edge	None	Work on Portfolios
	2	Book Presentations	Portfolio Presentations	None	Portfolio Presentations

Reading List:

Students should select a book from the following list, or they may propose a different popular science book (subject to instructor approval).

- *Arming Mother Nature: The Birth of Catastrophic Environmentalism*, Jacob Darwin Hamblin
- *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*, Robin Kimmerer
- *Evolution's Rainbow: Diversity, Gender, and Sexuality in Nature and People*, Joan Roughgarden
- *Gathering Moss: A Natural and Cultural History of Mosses*, Robin Kimmerer
- *Getting in Touch with Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body*, Neil Shubin
- *Ghost Stories for Darwin: The Science of Variation and the Politics of Diversity*, Banu Subramaniam
- *Murder, Magic, and Medicine*, John Mann
- *Native American DNA: Tribal Belonging and the False Promise of Genetic Science*, Kim Tallbear
- *Parasite Rex: Inside the Bizarre World of Nature's Most Dangerous Creatures*, Carl Zimmer
- *People's Science: Bodies and Rights on the Stem Cell Frontier,* Ruha Benjamin
- *Science on Trial: The Case for Evolution*, Douglas Futuyma
- *She Has Her Mother's Laugh: The Powers, Perversions, and Potential of Heredity*, Carl Zimmer
- *Subjected to Science: Human Experimentation in America before the Second World War*, Susan E. Lederer
- *Superior: The Return of Race Science*, Angela Saini
- *The Immortal Life of Henrietta Lacks*, Rebecca Skloot
- *The Mismeasure of Man*, Stephen J. Gould
- *The Social Life of DNA: Race, Reparations, and Reconciliation After the Genome*, Alondra Nelson