

8. Syllabus

Darwin's Drama: Evolutionary Biology and Its Impact on Society

Part One: Evolutionary Biology ...

	Title	Description	Activities	Assessments
Lesson One	Jean-Baptiste Lamarck and Theories of Evolution before <i>Origin of Species</i>	The lesson introduces theories of evolution that preceded Charles Darwin, with a particular emphasis on Jean-Baptiste Lamarck's theory of the inheritance of acquired characteristics.	Readings	Pretest: Mathematical Background
Lesson Two	Charles Darwin and the Theory of "Descent with Modification"	Beginning with the voyage of the <i>Beagle</i> , students in this lesson meet Charles Darwin and learn about the theory of natural selection presented in the <i>Origin of Species</i> .	Readings	
Lesson Three	Understanding Heredity: Mendel's Laws and Classical Genetics	A weakness of <i>Origin of Species</i> is that it lacked a solid theory of heredity; this lesson introduces students to Mendel's Laws, which were rediscovered around 1900, after Darwin's death.	Readings, Examples	Problem Set: Mendelian Genetics
Lesson Four	The Modern Synthesis: An Introduction to Theoretical Population Genetics	During the 1920s, Darwinian natural selection was reinterpreted using Mendelian inheritance. This lesson describes how this was done, using the Hardy-Weinberg equation to allow students to solve some simple problems.	Readings, Examples, Computer Simulation	Problem Set: Hardy-Weinberg Equation
Lesson Five	Natural Selection vs. Genetic Drift	This lesson extends ideas developed in Lesson Four, giving students an opportunity to use the skills they've gained to approach a new scientific problem.	Readings, Examples, Computer Simulation	Problem Set: Modeling Selection
Lesson Six	Adaptation, Sexual Selection, and Kin Selection	In this lesson, students learn how natural selection can be used to explain adaptations of organisms, and also explore how modern biologists have explained the existence of non-adaptive traits, such as bright plumage in birds and extreme altruism in ants, bees, and termites.	Readings, Image Observation	Problem Set: Kin Selection
Lesson Seven	Speciation	Ironically, one topic the <i>Origin of Species</i> never addressed was the origin of species. This lesson looks at how new species might actually evolve.	Readings, Computer Simulation	Problem Set: Convergent and Divergent Evolution
Lesson Eight	Macroevolution	This lesson takes the long view, exploring whether the tempo of evolution has differed over time, what causes mass extinctions and adaptive radiations, and how we might map species change over time.	Readings, Computer Simulation	
Lesson Nine	A Brief History of Life on the Planet Earth	Moving away from the theoretical and into the deeply empirical, this lesson presents a history of life on the planet earth, introducing all the major kingdoms of life along with how and when they developed.	Readings, Website Exploration	Project I: The Evolution of a Species
Lesson Ten	Human Origins	This lesson concludes the previous one, focusing specifically on Order Primata and Family Hominidae, including fossil ancestors.	Readings, Image Observation	Project I: The Evolution of a Species

Part Two: ... and Its Impact on Society

	Title	Description	Activities	Assessments
Lesson Eleven	Religion: The Reception of Darwinism	Beginning with the famous debate between Thomas Huxley and Samuel Wilberforce in 1860, this lesson will survey the tangled relationship between Darwinian evolution and several different religious traditions.	Readings, Image, Journal	
Lesson Twelve	Religion: Darwin in American Public Education, from Dayton to Dover	Continuing the theme introduced in the previous lesson, this lesson will focus specifically on the political and legal debates involved in the teaching of Darwinian evolution in American public schools from the Scopes Trial of 1925 to <i>Kitzmiller v. Dover</i> of 2005.	Readings, Image, Journal	Short Essay 1
Lesson Thirteen	Philosophy: The Pragmatist Tradition	After discussing a broad range of ways philosophers responded to Darwin, this lesson will pay detailed attention to the Pragmatists (William James, Chauncey Wright, John Dewey), who used Darwin's theories to think about the relationship between Truth and Utility.	Readings, Image, Journal	
Lesson Fourteen	Philosophy: Human Progress?	While most citizens of the 19 th century saw evolution as a confirmation of their belief in gradual human progress, Darwinian thought could also be used to develop a radical critique of notions of progress. This lesson introduces philosophical approaches to progress and evolution.	Readings, Image, Journal	Short Essay 2
Lesson Fifteen	Literature: <i>The Time Machine</i> , H.G. Wells (1895)	Building on the themes introduced in the previous lesson, this lesson uses the short novel <i>The Time Machine</i> to demonstrate how fiction can engage seriously with scientific and philosophical ideas.	Readings, Image, Journal	
Lesson Sixteen	Literature: <i>The Time Machine</i> (continued)	This lesson continues the previous one, exploring how H.G. Wells used Darwin's ideas to reflect upon 19 th century notions of Progress.	Readings, Image, Journal	Short Essay 3
Lesson Seventeen	Ethics: Scientific Racism and Its Abandonment	In the late 19 th century and the first half of the 20 th century, evolutionary doctrine was used to sustain theories of racial hierarchy. After discussing this history, the lesson will explore how modern biology understands race and human diversity.	Readings, Image, Journal	
Lesson Eighteen	Ethics: Social Darwinism and the Eugenics Movement	For nearly a century, Social Darwinists and eugenicists were even stronger advocates of Darwinian thinking than biologists were. This lesson examines these social projects, challenging students to think about the dangers of applying evolutionary thought uncritically.	Readings, Image, Journal	Short Essay 4
Lesson Nineteen	Contemporary Issues: Human Nature	Drawing on the scientific lessons of Part One and the philosophical and ethical lessons of Part Two, students will critically analyze two recent influential applications of Darwinian thinking, <i>Sociobiology</i> (E.O. Wilson) and <i>The Selfish Gene</i> (Richard Dawkins).	Readings, Image, Journal	Final Essay, Project II: Organisms & Human Society
Lesson Twenty	Contemporary Issues: The Environment	In this lesson, students will be introduced to several major ecological problems involving biodiversity and conservation, and they will use the skills they've developed throughout the course to evaluate potential solutions.	Readings, Image, Journal	Project II: Organisms & Human Society

An Explanation of the Activities and Assessments Noted in the Syllabus:

- 1) Readings: Course readings will come from a number of sources. These include the following:
 - a) Peter J. Bowler, *Evolution: The History of an Idea*, 3rd edition, 2003.
 - b) An introductory biology textbook, yet to be determined.
 - c) A Course Reader that consists of short excerpts from a number of sources.
 - d) H.G. Wells, *The Time Machine*, 1895.

- 2) Problem Sets: To gauge how well they understood the material, students will be assigned a number of problem sets during Part One of the course. The answers to the questions in these sets will be unambiguous, and sample solutions will be provided in case students do not obtain the correct answers.

- 3) Simulations: To better explain some of the concepts presented in Part One of the course, students will be given simple computer simulations that illustrate the situation being described. These will be used particularly to visualize scenarios that are being presented mostly through mathematical abstractions.

- 4) Journals: Throughout Part Two of *Darwin's Drama*, students will keep personal journals. At the end of each lesson, students will be provided with a writing prompt that addresses an issue from the previous lesson in an open-ended way.

- 5) Images: Each lesson during Part Two of the course will include an image of some sort, whether an historical photograph, an editorial cartoon, a reproduction of a work of art, or a scientific diagram. Each image will be provocative and open to multiple readings, and the students will respond to these images in their journals.

- 6) Essays: In Part Two of *Darwin's Drama*, students will write four short essays and one final essay. For each essay, students will be presented with three different open-ended questions, and they will be asked to choose one. The format of each of the four essays will be the same, so it should be possible to track student progress across the four essays. The final essay will ask students to use the various skills they've acquired throughout the course to critically analyze a specific, influential modern example of applied Darwinian thought.

- 7) Projects: During each part of *Darwin's Drama*, students will complete a project. These projects will require independent research by the students, but extensive guidelines and suggestions for how to undertake the research will be provided. For the first project, students will choose an organism and explore several aspects of its evolutionary history. For the second project, students will choose an organism that has close ties to human society and will research some aspect of the human-organism relationship; some examples might include state laws relating to the keeping of pets, the history of an agricultural crop like corn or wheat, or public policy related to saving a particular endangered species. The goal of the second project will be to use the knowledge obtained during Part One to better understand the relationship between humans and other species.