

## STSC135/HIST035: Modern Biology and Its Social Implications Summer 2021

\*\*PRELIMINARY SYLLABUS - SUBJECT TO CHANGE\*\*

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### General Information

This course covers the history of biology in the 19<sup>th</sup>, 20<sup>th</sup>, and 21<sup>st</sup> centuries, giving equal consideration to three dominant themes: evolutionary biology, classical genetics, and molecular biology. The course is intended for students with some background in the history of science as well as in biology, although no specific knowledge of either subject is required.

We will have three main goals: first, to delineate the content of the leading biological theories and experimental practices of the past two centuries; second, to situate these theories and practices in their historical context, noting the complex interplay between them and the dominant social, political, and economic trends; and, third, to critically evaluate various methodological approaches to the history of science.



Cactus finches, by Elizabeth Gould, from Charles Darwin *The Zoology of the Voyage of the H.M.S. Beagle, 1839-43*

### **Course schedule**

Class meets MWF 9:00 - 11:30 am during Summer Session II from July 2 - August 6, 2021. We will not meet synchronously for this entire time period; part of the time will be devoted to synchronous discussions, small group work, and 1-1 meetings with the instructor; and part will be available for asynchronous work including recorded lectures. Specific synchronous meeting times and asynchronous work will be posted on Canvas.

### **Course materials**

The required and recommended texts are listed below. Additional course materials will be made available on the course Canvas website: <https://canvas.upenn.edu>

#### Required texts

Jim Endersby, *A Guinea Pig's History of Biology*, Harvard, 2009. (

Philip Appleman (ed.), *Darwin: Texts and Commentary*, Norton, 3<sup>rd</sup> ed., 2000.

James D. Watson, Gunther S. Stent (ed.), *The Double Helix: Texts and Commentary*, Norton, 1980.

#### Additional background text

Jan Sapp, *Genesis: The Evolution of Biology*, Oxford, 2003.

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### **Course work**

Successful completion of the course requires regular and active participation in class meetings, close and critical reading of the assigned texts, and on-time submission of assignments. If you cannot attend a synchronous session or complete another assignment on time, it is your responsibility to contact the instructor ahead of time to make alternative arrangements.

### **Readings and Quizzes**

- The course content comes primarily from the assigned readings. The recorded lectures are meant as supplemental sources of information. "Key concepts" will be provided to highlight the main ideas to understand for that reading. These concepts will be the basis for our discussions and an "open-note" test during the final week of the course.

### **Discussions and Class Participation**

- All students will be responsible for contributing to each class discussion. (Discussions will generally be synchronous, but asynchronous participation will also be accepted. Please let me know if you cannot participate in the synchronous discussion and we can arrange the asynchronous participation.)
- Each student will also be responsible for providing a discussion question for one of the discussion sessions.

### **Projects**

- There will be two (2) projects, each of which will result in a short (2-3 page) written report.
  - Darwin Correspondence Project: Religion, Race, and Gender (week 2)
  - Eugenics: International Perspectives (week 3)

### **"Directed" Research Paper**

- There will be one (1) paper due at the end of the course.
- These are called "directed" since there is a list of topics that provide sources and a thesis question.
- The final paper should be 5 to 7 pages (double spaced) in length and contain a clear thesis statement specifying the argument being made and sufficient evidence from the sources.
- If you would like to pursue a topic that is not on the list and conduct your own research to determine the sources and research question, please let me know to discuss.

### **Test**

- There will be one (1) test based on the "key concepts" provided for the readings.
- The test questions will be provided on XXX and due on XXX.

The final grade for the course will be calculated based on the following percentages:

- 15% Discussions and general class participation
- 15% Reading quizzes (drop the lower score)
- 20% "Open-note" test
- 20% Projects (2): participation and write-up
- 30% "Directed" research paper

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### **Grading criteria**

Letter grades will reflect the following departmental criteria:

- A = Outstanding, nearly flawless work; assignments completed thoroughly; technically excellent; evidence of creativity and/or inspiration; deep contextual grasp of issues; and ability to synthesize individual elements into broader historical analysis.
- B = Good work; all aspects of assignment(s) completed thoroughly and competently; technically competent; does not consistently show inspiration or deeper grasp of connections, interpretations, and/or synthesis among elements.
- C = Work less than satisfactory; assignment(s) not completed thoroughly or according to instructions; basic grasp of issues not always evident; more than occasional technical flaws.
- D = Basic work not complete; little effort is evident.

### **Course Policies**

#### **Academic integrity**

All work, written and oral, must be your own or suitably referenced. All work for this course is subject to the university's Code of Academic Integrity. All cases of plagiarism will be subject to both a lowered grade and appropriate university disciplinary policies. Information can be found at the university's academic integrity website: <https://www.college.upenn.edu/academic-integrity>.

If any aspect of this policy is not clear, it is the student's responsibility to clarify this with the instructor prior to any work being submitted.

#### **Written work**

All written work must be submitted via the course Canvas site using the Turnitin option. Papers must be double-spaced with standard font, size (10-12 pt.) and margins (1"). Please include your full name on the first page (or put your last name and the page number in the header or footer of every page).

#### **Lateness and grading**

All assignments are expected to be turned in on time and in the appropriate format. Extensions will only be granted in the most extraordinary circumstances. This must be arranged with the instructor at the earliest possible time before the due date. In the absence of such arrangements, grades for late assignments will be lowered by a half a grade for each day late.

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### **Other Sources and Writing Guides**

The following sources are a selection of relevant books on the history of biology in general.

Allen, Garland. 1978. *Life Science in the Twentieth Century*. Cambridge: Cambridge University Press.

Bowler Peter J. 1989. *The Mendelian Revolution*. Baltimore: Johns Hopkins University Press.

Bowler, Peter J. 1989. *Evolution: The History of an Idea*. revised edition ed. Berkeley: University of California Press.

Coleman, William. 1978. *Biology in the Nineteenth Century: Problems of Form, Function and Transformation*. Cambridge: Cambridge University Press.

Kevles, Daniel J. 1985. *In the Name of Eugenics: Genetics and the Uses of Human Heredity*. Berkeley: University of California Press.

Larson, Edward J. 2004. *Evolution: The Remarkable History of a Scientific Theory*. New York: Modern Library.

Morange, Michel. 1998. *A History of Molecular Biology*. Cambridge: Harvard University Press.

Olby, Robert. 1985. *Origins of Mendelism*. 2nd ed. Chicago: University of Chicago Press.

Olby, Robert. 1994 (1974). *The Path to the Double Helix: The Discovery of DNA*. Revised ed. New York: Norton.

### **Guides to Research, Writing, and Style**

These are some recommended guides that can be used for this class and other classes, work, etc. You are not required to write and cite according to Chicago style; you should choose an accepted academic style (Chicago, MLA, APA, etc.) that works for you and use that consistently.

*The Chicago Manual of Style*. The 17th edition is most recent, but earlier ones are acceptable. Some materials are also available online:

[www.chicagomanualofstyle.org](http://www.chicagomanualofstyle.org).

Turabian, Kate L. *A Manual for Writers of Term Papers, Theses, and Dissertations*. Any edition is acceptable, although more recent editions deal with online sources. Also available online:

[www.press.uchicago.edu/books/turabian/turabian\\_citationguide.html](http://www.press.uchicago.edu/books/turabian/turabian_citationguide.html).

Strunk, William and E.B. White. *The Elements of Style* (any edition).

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**Syllabus**

<b>Class</b>	<b>Date</b>	<b>Topic</b>
<b>1</b>	<b>July 2</b>	<b>Introduction to the History of Biology</b> <ul style="list-style-type: none"> <li>❑ Introductions</li> <li>❑ Course overview</li> </ul>
<b>Week 1</b>		
<b>2</b>	<b>July 5</b>	<b>The Order of Nature</b> <ul style="list-style-type: none"> <li>❑ Endersby, Ch.1 <i>Equus quagga</i> and Lord Morton's Mare (pp. 1-28)</li> <li>❑ Quiz and Key Concepts</li> </ul>
<b>3</b>	<b>July 7</b>	<b>Transmutation and Evolution</b> <ul style="list-style-type: none"> <li>❑ Appleman (pp. 39-52) <ul style="list-style-type: none"> <li>❑ Malthus (1798) <i>An Essay on the Principle of Population</i></li> <li>❑ Paley (1802) <i>Natural Theology</i></li> <li>❑ Lamarck (1809) <i>Zoological Philosophy</i></li> <li>❑ Lyell (1830-33) <i>Principles of Geology</i></li> </ul> </li> <li>❑ Key Concepts</li> </ul>
<b>4</b>	<b>July 9</b>	<b>Darwin and the Voyage of the Beagle</b> <ul style="list-style-type: none"> <li>❑ Endersby, Ch.2 <i>Passiflora gracilis</i>: Inside Darwin's Greenhouse (pp. 29-60)</li> <li>❑ Quiz and Key Concepts</li> <li>❑ Darwin (1845) <i>The Voyage of the Beagle</i> (excerpt in Appleman)</li> <li>❑ Discussion</li> </ul>
<b>Week 2</b>		
<b>5</b>	<b>July 12</b>	<b>Darwin and Natural Selection</b> <ul style="list-style-type: none"> <li>❑ Darwin (1859) <i>The Origin of Species</i> (excerpt in Appleman)</li> <li>❑ Darwin <i>Origin</i> analysis</li> <li>❑ Darwin Correspondence Project: Religion</li> </ul>

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<b>6</b>	<b>July 14</b>	<p><b>Evolution, Gender, and Race</b></p> <ul style="list-style-type: none"> <li>❑ Darwin (1871) <i>The Descent of Man</i></li> <li>❑ Richards (1983) "Darwin and the Descent of Woman" (Appleman, pp. 434-444)</li> <li>❑ Adams (1989) "Woman Red in Tooth and Claw" (Appleman, pp. 444-449)</li> <li>❑ Desmond and Moore (2009) Darwin's Sacred Cause: Race, Slavery, and the Quest for Human Origins (excerpt on Canvas)</li> <li>❑ Darwin Correspondence Project: Gender and Race</li> </ul>
<b>7</b>	<b>July 16</b>	<p><b>Social Darwinism</b></p> <ul style="list-style-type: none"> <li>❑ Endersby, Ch. 3 <i>Homo sapiens: Francis Galton's Fairground Attraction</i> (pp. 61-94)</li> <li>❑ Quiz and Key Concepts</li> <li>❑ Discussion</li> </ul>
<b>Week 3</b>		
<b>8</b>	<b>July 19</b>	<p><b>Mendel and Heredity</b></p> <ul style="list-style-type: none"> <li>❑ Endersby, Ch. 4 <i>Hieracium auricula: What Mendel Did Next</i> (pp. 95-127)</li> <li>❑ Quiz and Key Concepts</li> <li>❑ Mendel <i>Experiments in Plant Hybridization</i></li> <li>❑ Mendel Experimental Analysis</li> </ul>
<b>9</b>	<b>July 21</b>	<p><b>Experimental Genetics</b></p> <ul style="list-style-type: none"> <li>❑ Endersby, Ch. 6 <i>Drosophila melanogaster Bananas, Bottles, and Bolsheviks</i> (pp. 170-208)</li> <li>❑ Quiz and Key Concepts</li> <li>❑ Eugenics Project: International Perspectives</li> </ul>
<b>10</b>	<b>July 23</b>	<p><b>Eugenics</b></p> <ul style="list-style-type: none"> <li>❑ Paul (1995) "What is Eugenics? Why Does It Matter?" <i>Controlling Human Heredity: 1865 to the Present</i> (Ch. 1)</li> <li>❑ Levine and Bashford (2010) "Introduction: Eugenics and the Modern World" in <i>Oxford Handbook for the History of Eugenics</i></li> <li>❑ Levine (2011) "Bad Blood: Newly Discovered Documents on US Funded Syphilis Experiments"</li> <li>❑ Discussion</li> </ul>

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<b>Week 4</b>		
<b>11</b>	<b>July 26</b>	<b>Genes and DNA</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Endersby, Ch. 8 Bacteriophage: The Virus that Revealed DNA (pp. 251-291)</li> <li><input type="checkbox"/> Quiz and Key Concepts</li> </ul>
<b>12</b>	<b>July 28</b>	<b>The Double Helix</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Watson and Crick (1953) 2 papers (Watson, pp. 237-247)</li> <li><input type="checkbox"/> Watson (1968) The Double Helix (Watson, pp. 1-133)</li> <li><input type="checkbox"/> Crick (1974) "The double helix: A personal view" (Watson, pp. 137-145)</li> <li><input type="checkbox"/> Klug (1968) "Rosalind Franklin and the discovery of the structure of DNA" (Watson, pp. 153-158)</li> </ul>
<b>13</b>	<b>July 30</b>	<b>"Big" Biology: Human Genome Project and Biotechnology</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Endersby, Ch. 12 OncoMouse<sup>®</sup> Engineering Organisms (pp. 411-432)</li> <li><input type="checkbox"/> Discussion and Review</li> </ul>
<b>Week 5</b>		
<b>14</b>	<b>August 2</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Work on Test and Directed Research Papers</li> <li><input type="checkbox"/> Office hours</li> </ul>
<b>15</b>	<b>August 4</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Work on Test and Directed Research Papers</li> <li><input type="checkbox"/> Office hours</li> </ul>
<b>16</b>	<b>August 6</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Test and paper due</li> <li><input type="checkbox"/> End of course discussion (sharing information relating to research papers)</li> </ul>