

= SPRING 2024 PRELIMINARY SYLLABUS =

STSC1151/HIST0877 Modern Biology and Its Social Implications

John S. Ceccatti

Lecturer, History of Science
University of Pennsylvania

Office Hours

by appointment
ceccatti@sas.upenn.edu

General Information

This course covers the history of biology in the 19th, 20th, and 21st 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 materials

The following book should be purchased from the Penn Bookstore or any online bookseller.

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

We will also use this text, which is available electronically via Franklin:

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

The following 2 books are optional; they are convenient to have if you have a strong interest in the topic but the readings will also be available via PDF.

- Philip Appleman (ed.), *Darwin: Texts and Commentary*, Norton, 3rd ed., 2000. (Make sure you have the 3rd edition.)
- James D. Watson, Gunther S. Stent (ed.), *The Double Helix: Texts and Commentary*, Norton, 1980.

Note: the syllabus is subject to change. For the most up-to-date syllabus, assignments, and additional course reading materials refer to the course Canvas website:

<https://canvas.upenn.edu>.

Course work

Successful completion of the course requires regular attendance and active participation in class meetings, close and critical reading of the assigned texts, and on-time submission of the following assignments:

Weekly essays (10 out of 11)

Every week with readings assigned, write a reflection on some aspect of the week's reading. This should not be a comprehensive overview of all topics; rather it is an opportunity for you to describe or comment on an interesting aspect of the reading and will serve to inform your comments during class discussion. Post your reflection to that week's discussion on Canvas by 6pm on Tuesday; post a comment on another student's reflection by 6pm Thursday.

Leading class discussions (1)

For one of our Thursday discussions, each student will be responsible for leading class discussion along with several colleagues. This will involve posing a question (for which you have a reasonable answer) to the class that is based on that week's readings and providing some answers or discussion points in the form of a short paragraph or bullet points. You should be able to guide subsequent in-class discussion of that question. Submit your question and answer(s) via Canvas by midnight on Wednesday. NB: All students are still responsible for active and meaningful contributions to class discussions every week.

Unit tests (2)

Each unit (evolution and heredity, genetics and molecular biology) will culminate in an open-note, take-home test based on terms and concepts drawn from the assigned readings and class discussions. I will provide a study guide of the terms prior to the test. The dates for the unit tests are: TBD

Research paper (1 long or 2 short)

There are two options for the research paper. You may either write (a) one 10- to 15-page "original" research paper or (b) two 5- to 7-page "directed" research papers.

(a) For the **original research paper**, you will conduct your own research of primary and secondary sources and develop a thesis on a topic germane to the history of biology in the 19th and 20th centuries. A proposal consisting of a brief description of the project and a list of potential primary and secondary sources is due by TBD and the final paper of about 10-15 pages is due by TBD.

(b) The **guided research papers** are based on questions and sources provided by the instructor for each of the course units. The paper should provide a convincing thesis to answer the question posed supported by evidence from the assigned texts. The paper should be about 5-7 pages in length and are due on TBD.

Projects (2)

Each unit will culminate in an in-class project, which will entail a short write-up. More details for each of these projects will be provided.

Grading criteria

Your grade for the course will be based on successful completion of the assignments according to the following rubric:

- 1/3 - Class preparation and participation
 - Weekly essays
 - Class discussions (leading and participation)
 - Projects
- 1/3 - Unit tests
- 1/3 - Research paper(s)

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 is not complete; little effort is evident.

Course Policies**Academic integrity**

All work, written and oral, must be your own or suitably referenced. Information on how to paraphrase and cite the work of others can be found in the guides to research, writing, and style listed below, as well as on the Penn Online Research Tutorial (PORT) website: <https://www.library.upenn.edu/page/research-and-scholarship>.

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: www.upenn.edu/academicintegrity/ai_codeofacademicintegrity.html.

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 (weekly essays should be single-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. Weekly essays will not be accepted after Tuesday of each week.

Attendance

Regular attendance at synchronous meetings is required for successful completion of the course. Failure to attend more than 2 classes (with or without an excuse) may adversely affect your grade. The Course Absence Report (CAR) system will not be used for this course. Please email the instructor directly with any questions or concerns.

Other sources in the history of biology

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

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.

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.

Strunk, William and E.B. White. *The Elements of Style* ([Project Gutenberg ebook version](#)).

Syllabus: Weekly reading schedule

NOTE: Please consult the course Canvas site for up-to-date reading assignments, since these are subject to change as the semester progresses.

Part 1: 19th Century Biology: Evolution and Cell Biology

Date	Topic
Week 1	Introduction to the history of biology <ul style="list-style-type: none"> • Overview of the course • Introductions • Background of biological knowledge before the 19th century
Week 2	Evolution, design, and the order of nature <p><u>Primary source readings</u> (Appleman, pp. 39-52)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Malthus (1798) <i>An Essay on the Principle of Population</i> <input type="checkbox"/> Paley (1802) <i>Natural Theology</i> <input type="checkbox"/> Lamarck (1809) <i>Zoological Philosophy</i> <input type="checkbox"/> Lyell (1830-33) <i>Principles of Geology</i> <p><u>Secondary source readings</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Sapp, ch. 1, pp. 3-15 <input type="checkbox"/> Endersby, ch. 1, pp. 1-28
Week 3	Exploration and imperialism <p><u>Primary source readings</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Darwin (1845) <i>The Voyage of the Beagle</i> (Appleman, pp. 67-81) <p><u>Secondary source readings</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Delbourgo (2019) <i>Collecting the World</i> (excerpt) <input type="checkbox"/> Browne (1996) <i>Voyaging</i> (excerpt) <p>Project: Creation Stories (see Canvas site for details)</p>
Week 4	Evolution and natural selection <p><u>Primary source readings</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Darwin (1859) <i>The Origin of Species</i> (Appleman, pp. 95-174) <p><u>Secondary source readings</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Sapp, ch. 2, pp. 16-30 <input type="checkbox"/> Endersby, ch. 2, pp. 29-60

Week 5	Evolution, gender, and race <u>Primary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Darwin (1871) <i>The Descent of Man</i> (Appleman, pp. 175-254) <input type="checkbox"/> Stanton (1898) <i>The Woman's Bible</i> (Appleman, p. 426) <u>Secondary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Sapp, ch. 4, pp. 43-54 <input type="checkbox"/> Endersby, ch. 3, pp. 61-94 <input type="checkbox"/> Richards (1983) "Darwin and the Descent of Woman" (Appleman, pp. 434-444) <input type="checkbox"/> Adams (1989) "Woman Red in Tooth and Claw" (Appleman, pp. 444-449) <input type="checkbox"/> Desmond and Moore (2009) <i>Darwin's Sacred Cause</i> (excerpt)
Week 6	Heredity, cells, and development in the 19th century <u>Primary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Darwin (1868) <i>The Variation of Animals and Plants under Domestication</i> Vol. 2, pp. 374-404 <input type="checkbox"/> Weismann (1893) <i>The Germ Plasm: A Theory of Heredity</i>, Preface (pp. i-xviii) and Introduction (pp. 1-35) <u>Secondary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Sapp, ch. 7-9 (pp. 75-102)
Week 7	Darwin's Life and Letters Project <p>Group project based on Darwin's letters, notebooks, and other unpublished writing, which can be found at www.darwinproject.ac.uk and www.darwin-online.org.uk. Details on Canvas.</p> <p>Project write-up due TBD</p>
Week 8	TBD
Week 9	<u>Test #1: 19th-Century Biology: Evolution and Cell Biology due TBD</u> <u>Paper #1 or Research Proposal due TBD</u>

Part 2: 20th-Century Biology: Genetics and Molecular Biology

Date	Topic
Week 10	Mendel: Genetics Neglected and Rediscovered? <u>Primary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Mendel (1865) <i>Experiments in Plant Hybridization</i> (skim) <u>Secondary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Sapp, chs. 7-8, pp. 75-94 <input type="checkbox"/> Endersby, chs. 4-5, pp. 95-169
Week 11	Experimental Genetics <u>Primary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Morgan et al. (1915) <i>The Mechanism of Mendelian Heredity</i> <input type="checkbox"/> Morgan (1926) <i>The Theory of the Gene</i> <input type="checkbox"/> Beadle and Tatum (1941) "Genetic control of biochemical reactions in <i>Neurospora</i>" <u>Secondary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Kohler, <i>Lords of the Fly</i>, chs. 2-3, pp. 19-90 <input type="checkbox"/> Sapp, chs. 11-14, pp. 117-170 <input type="checkbox"/> Endersby, chs. 6-7, pp. 170-250
Week 12	Heredity and eugenics <u>Primary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Galton (1865) "Eugenics, Its Definition, Scope, and Aims" <input type="checkbox"/> Davenport (1911/1915) <i>Heredity in Relation to Eugenics</i> (Chs. 1-3) <u>Secondary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Paul (1995) <i>Controlling Human Heredity: 1865 to the Present</i> (Ch. 1) <input type="checkbox"/> Kevles (1985) <i>In the Name of Eugenics: Genetics and the Uses of Human Heredity</i> (Chs. 3 and 7) <input type="checkbox"/> Levine and Bashford (2010) "Introduction: Eugenics and the Modern World" in <i>Oxford Handbook for the History of Eugenics</i> <input type="checkbox"/> Philippa Levine (2011) "Bad Blood: Newly Discovered Documents on US Funded Syphilis Experiments"
Week 13	Genes and DNA <u>Primary source readings</u> <ul style="list-style-type: none"> <input type="checkbox"/> Watson and Crick (1953) 2 papers (Watson, pp. 237-247) <input type="checkbox"/> Watson (1968) <i>The Double Helix</i> (Watson, pp. 1-133) <input type="checkbox"/> Crick (1974) "The double helix: A personal view" (Watson, pp. 137-145) <input type="checkbox"/> Klug (1968) "Rosalind Franklin and the discovery of the structure of DNA" (Watson, pp. 153-158) <u>Secondary source readings</u>

	<input type="checkbox"/> Maddox (2002) <i>Rosalind Franklin: The Dark Lady of DNA</i> (excerpt) <input type="checkbox"/> Sapp, chs. 14-16, pp. 157-200 <input type="checkbox"/> Endersby, ch. 8, 251-290
Week 14	"Big" Biology: Human Genome Project and Biotechnology <u>Primary source readings</u> <input type="checkbox"/> Science and policy articles from www.genome.gov <input type="checkbox"/> Biotechnology Innovation Organization – policy positions: www.bio.org/bio-initiatives <u>Secondary source readings</u> <input type="checkbox"/> Cook-Deegan, <i>The Gene Wars</i> (excerpt) <input type="checkbox"/> Hughes (2001) Making Dollars out of DNA: The First Major Patent in Biotechnology and the Commercialization of Molecular Biology, 1974-1980 <input type="checkbox"/> Endersby, ch. 11, pp. 334-372
Week 15	Science Policy and Science Funding readings to be posted
Finals Week	<u>Test #2: 20th-Century Biology</u> <u>Paper #2 or Final Research Paper Due</u>