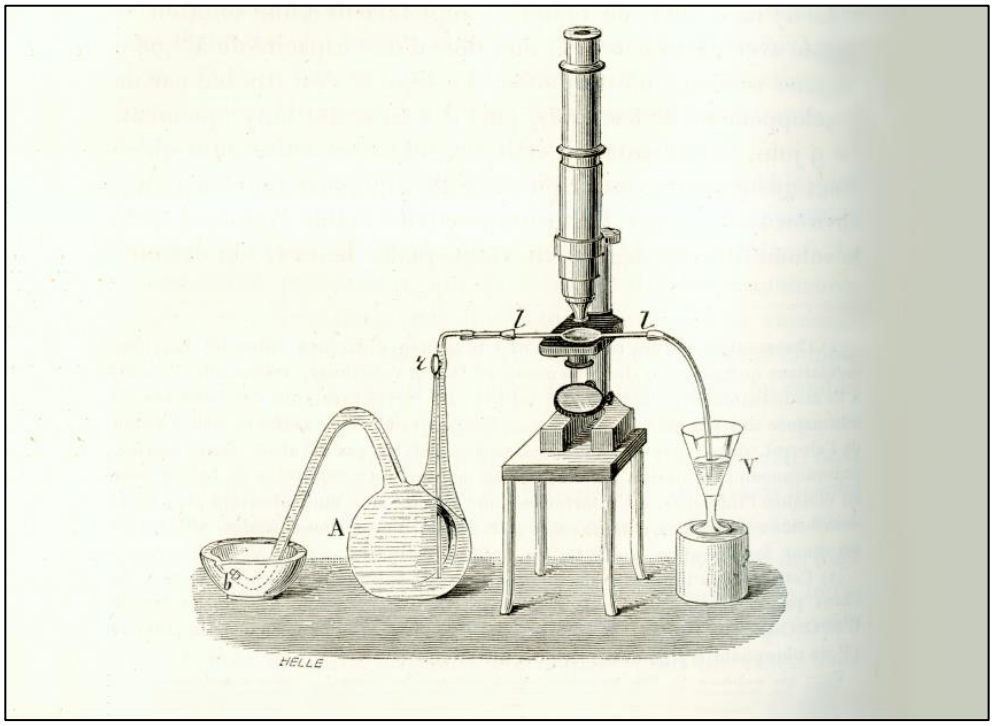
HISTORY 30902: HISTORY OF BIOTECHNOLOGY

Tuesday/Thursday 1:30-2:45p ET
Wilmeth Active Learning Center (WALC) 2127

INSTRUCTOR INFORMATION

Dr. Kathryn Maxson Jones (kmaxson@purdue.edu)
Office Hours: Tuesday/Thursday 3:00-4:00p ET*, BRNG 6169
**Or by appointment.*



***Études sur la Bière* (*Studies on Beer*) by Louis Pasteur, 1876**
Courtesy National Museum of American History

COURSE DESCRIPTION

This class examines historical intersections between engineering and biology in the Western world. The course starts off by considering several possible meanings of "biotechnology." Next, it examines how and why different "biotechnologies" have arisen, changed over time, and affected society in specific historical contexts from the 19th century to the present. We will study vaccines and beer-making in the 19th century, cell culture, birth control pills, and DNA sequencing in the 20th century, and 21st-century genome editing and synthetic biology, for example. Overall, this course argues that biotechnologies have always forced human beings to consider whether living and non-living entities are made up of the same fundamental "stuff," and the implications of manipulating living things. Thus, biotechnologies exemplify how science and engineering have impacted society, and vice versa, both historically and today.

COURSE OUTCOMES

By the end of the course, students will be able to:

1. Identify and describe examples of biotechnologies and explain why they are (or could be considered) biotechnologies.
2. Describe and explain how and why major biotechnologies have arisen, changed through time, and impacted society within specific historical contexts, for example by way of interactions with science, medicine, engineering, politics, wars, social movements, industry, economics, gender, race, religion, sexual orientation, age, culture, disability, and class.
3. Investigate the history and social impacts of a biotechnology of their choosing that has not been discussed in depth in this class.
4. Identify and describe this technology; explain why it can be considered a biotechnology; and describe and explain how and why this biotechnology arose, changed over time, and has impacted society within specific historical contexts (using historical methods).
5. Understand major questions and methods in the history of science and technology and science and technology studies (STS).

REQUIRED READINGS

Available at the University Bookstore and Amazon**:**

- Hallam Stevens: *Biotechnology and Society: An Introduction* (University of Chicago Press, 2016).

Various additional articles, chapters, and primary sources not from the textbook also will be made available on BrightSpace.

STUDENT RESPONSIBILITIES

1. Attending class sessions.
2. Reading assigned material on time.
3. Actively participating in class discussions, called “Ask the Prof” (ATP) sessions (see below for how to get your ATP participation points).
4. Completing 3 in-person exams (2 multiple-choice Midterms and 1 essay Final).
5. Completing a Final recorded presentation about the history of one biotechnology not discussed in depth in this class and its relevance for society today.
6. Maintaining respect for others despite differing views on controversial subjects.

GRADES

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

Assignment	Points
Participation / “Ask the Prof” (ATP) sessions	150
Midterm exam #1 (multiple choice)	200
Midterm exam #2 (multiple choice)	200
Final exam (essay)	250
Final recorded presentation	200
Total	**1000**

Grading Scale

A: 930-1000
A-: 900-920
B+: 880-890
B: 830-870
B-: 800-820
C+: 780-790
C: 730-770
C-: 700-720
D+: 680-690
D: 600-670
F: <600

Examinations

Midterm exams #1 and #2 (200 points each): The Midterm exams for this course will be based entirely on materials from the readings and the lectures. The Midterms each will consist of 50 multiple-choice questions, to be completed in class on the days designated on this Syllabus. Midterm #1 will cover the material from Weeks 1-6. Midterm #2 will cover Weeks 8-13.

Final exam (250 points): The Final exam will be essay-based. It will be taken in-class on the Final exam day designated by the Registrar for this course. The exam will consist of an essay question with several parts. The full essay question appears below. You have all semester to prepare for this exam, for which you may draw only from the materials from course lectures, readings, and (if you wish) what you learned from completing your Final recorded presentation.

Final Exam Question

You are visited by an alien from another planet. The alien is very curious about how science and technology impact the organisms here on Earth. As a Purdue student, you are an expert on these issues, so the alien asks you for help.

In an essay of at least 10 paragraphs, and employing examples from the 19th century to the present, please:

1. *Identify and describe TWO examples of biotechnologies (or groups of biotechnologies falling under a single type, such as "vaccines" or "personalized medicine") and explain why they can be considered biotechnologies.*

2. *Describe and explain how and why THREE FURTHER biotechnologies (or groups of them):*
    a. *Arose and (where you consider relevant) changed through time, and …*
    b. *… by way of arising as new technologies and/or changing through time, have impacted society outside the laboratory.*

For both 2a) and 2b), to earn full credit you must consider elements of specific historical context, for instance by discussing interactions of your chosen biotechnologies with science, medicine, engineering, politics, wars, social movements, industry, economics, gender, race, religion, sexual orientation, age, culture, disability, and class.

You must refer to at least 5 SEPARATE biotechnologies (or groups of them) in this essay. You may not repeat biotechnologies in parts 1) and 2).

A potential paragraph outline for this Final exam essay is the following:
-Paragraph 1/ Introduction.
Part (1)
-Paragraph 2/ Biotechnology 1: Identification/description of the technology and explanation of why it can be considered a biotechnology.
-Paragraph 3/ Biotechnology 2: Identification/description of the technology and explanation of why it can be considered a biotechnology.
Part (2)
-Paragraph 4/ Biotechnology 3: How and why it arose and (where you consider relevant) changed through time, with consideration of elements of specific historical context.
-Paragraph 5/ Biotechnology 3: How and why it has impacted society outside the laboratory, with consideration of elements of specific historical context.
-Paragraph 6/ Biotechnology 4: How and why it arose and (where you consider relevant) changed through time, with consideration of elements of specific historical context.
-Paragraph 7/ Biotechnology 4: How and why it has impacted society outside the laboratory, with consideration of elements of specific historical context.
-Paragraph 8/ Biotechnology 5: How and why it arose and (where you consider relevant) changed through time, with consideration of elements of specific historical context.
-Paragraph 9/ Biotechnology 5: How and why it has impacted society outside the laboratory, with consideration of elements of specific historical context.
-Paragraph 10/ Conclusion.

Keep in mind, however, that this outline is just a suggestion. There are other ways to structure successful Final exam essays in this class.

The Instructor or TA will grade your Final exam essay according to the following rubric:

Final essay element	Points
Introduction	**25**
Part 1: For (2) biotechnologies:	**50**
-Identify and describe the technology (10 points; 5 points per element) -Explain why it can be considered a biotechnology (15 points)	25 (x2)
Part 2: For (3) further biotechnologies:	**150**
Part (2a) -Describe and explain how and why the technology arose and (where you consider relevant) changed through time (10 points) -Answer considers elements of specific historical context (15 points)	25 (x3)
Part (2b) -Describe and explain how it has impacted society outside the laboratory (10 points)	25(x3)

-Answer considers elements of specific historical context (15 points)	
Conclusion	**25**
Total	**250**

The Midterm and Final exams can be made up only due to University-excused absences. The University Senate recognizes the following as types of absences that must be excused:

- Absences related to those covered under the Grief Absence Policy for Students (GAPS).
- Absences related to those covered under the Military Absence Policy for Students (MAPS).
- Absences related to those covered under Jury Duty Policy for Students.
- Absences related to those covered under the Parenting Leave Policy for Students.
- Absences related to those covered under the Medical Excused Absence Policy for Students (MEAPS).

Arrangements for make-up Midterm exams should be made before (if possible) or immediately following the scheduled exam. Arrangements for make-up Final exams must be made as far ahead of the exam as possible.

Final recorded presentation

200 points: For the Final project in this course, students will record a presentation about the history and relevance for society of one biotechnology not discussed in depth in this course. The presentation will be 5-7 minutes long and may take any of several formats:

-A podcast format, either:
- -Voice recorded and with NO SLIDES.
- -Voice AND video recorded with NO SLIDES.

-A lecture format, either:
- -Voice recorded WITH SLIDES.
- -Voice AND video recorded WITH slides.

You may use any program to generate your Final recorded presentation. Acceptable file formats include (but are not limited to) .m4a, .mp4, .mp3, and .pptx. If you are unsure if your desired file type is acceptable, please send the Instructor a test file before the end of semester. In Course Resources on BrightSpace, you can find a list of tips and tricks for recording your presentation with PowerPoint and Zoom.

Your presentation must be uploaded to BrightSpace by **Friday, 4/19/2024, at 11:59p ET.** In addition, all students must have their Final recorded presentation topics approved by the Instructor on BrightSpace by **Friday, 2/23/24 at 11:59p ET.** Students who do not have their Final presentation topics approved will not receive full credit for this assignment.

The presentation will make direct reference to at least 2 primary sources and 3 secondary sources, which also will be fully and correctly referenced (either in a slide at the end of the

presentation or in a document turned in with the recording on BrightSpace by the deadline). You may choose any referencing style. See Course Resources on Brightspace for information on how to cite your sources and the differences between primary and secondary sources.

Your Instructor and/or Teaching Assistant will grade your Final recorded presentation according to the following rubric:

Final recorded presentation element	Points
Introduction	**50**
Identification and description of a biotechnology not discussed in depth in this class.	25
Explanation of why the technology can be considered a biotechnology.	25
Analysis Part 1: Analysis of origins and change over time in chosen biotechnology:	**50**
Description and explanation of how and why the biotechnology arose (10 points), with consideration of specific historical context (15 points)	25
Description and explanation of how and why the technology has changed, or did change, through time in at least one way (10 points), with consideration of specific historical context (15 points).	25
Analysis Part 2: Analysis of the relevance of the chosen biotechnology for society.	**25**
Description and explanation of how and why the technology has impacted society outside the laboratory, in the past and/or now (10 points), with consideration of specific historical context (15 points).	
Length*	**25**
The presentation is the correct length (5-7 minutes) (25 points). **ALL 25 points will be deducted if the presentation is under 5 minutes. There will be a 5-point deduction for presentations between 7 and 8 minutes. ALL 25 points will be deducted if the presentation is over 8 minutes.*	25
Citations** ***The primary and secondary sources may include course readings, including the textbook, but note that the textbook itself is only one source ☺.*	**50**
2 PRIMARY SOURCES, directly referenced in the presentation, EITHER by citation directly on a slide (i.e., under an image, set of bullet points, chart/table, or quote), OR by direct verbal reference in the presentation (5 points each).	10
THE SAME 2 PRIMARY SOURCES, fully, clearly, and correctly referenced, EITHER in a slide at the end of the presentation OR in a document turned in with the recording on BrightSpace by the deadline (5 points each)	10
3 SECONDARY SOURCES, directly referenced in the presentation, EITHER by citation directly on a slide (i.e., under an image, set of bullet points, chart/table, or quote), OR by direct verbal reference in the presentation (5 points each).	15
THE SAME 3 SECONDARY SOURCES, fully, clearly, and correctly referenced, EITHER in a slide at the end of the presentation OR in a document turned in with the recording on BrightSpace by the deadline (5 points each).	15
Total	**200**

Three days (4/11/24, 4/16/24, and 4/24/24) will be designated for you to work in-class on the Final recorded presentation. The Instructor will be available for Q+A on these days. Students also are encouraged to discuss their Final recorded presentations with the Instructor during Office Hours, over e-mail, or by appointment.

Attendance & Participation

Attendance Policy: Beginning in Week 4, this course generally will consist of lectures (Tuesdays) and discussion sections (Thursdays). There are some exceptions, listed in the syllabus on the relevant days (i.e., in-class work for Final Recorded Presentations). Attendance is not required. However, it is strongly encouraged: Material tested on the Midterm exams will weigh heavily towards the lectures, not the readings alone. So, plan accordingly.

Ask the Prof (ATP) (150 points): On most Thursdays (beginning in Week 4), we will have an "Ask the Prof" (ATP) session during the discussion section. The purpose is to discuss your questions pertaining to the Tuesday lectures and any of the assigned readings for each week.

The dates of 17 ATP sessions are marked clearly on the syllabus. Prior to the revisions in the course structure, the first 5 ATPs (up through 1/31/24) were required. From 2/2/24 onward, only those due on Wednesdays (following lectures) are required. This adds up to 12 of the 17 ATPs being required, with the other 5 being optional.

ATP questions are due **by 11:59p ET on the day after each class.** The Instructor will choose from questions submitted on Wednesdays for Thursday section; those submitted on Fridays will be considered for the following week's section. The Instructor always will introduce the ATP questions to be answered and discussed anonymously. *This exercise is meant for learning and camaraderie-building. Thus, no one will be singled out during this exercise.*

To earn your 150 Participation points, you must submit a question on BrightSpace pertaining to the readings and/or lecture materials for the 12 required ATP sessions (10 points each). These will be graded for completion – you will either earn the 10 points or not – yet, your questions must pertain to the course materials, not the course in general (i.e., "what types of questions will appear on the Midterms?" is not an appropriate ATP question).

At the end of term, your lowest 2 ATP scores will be dropped. In addition, you will automatically receive 10 points for each of the 5 optional ATP sessions.

Late Work Policy

Excuses for late work include those associated with University-excused absences (listed above). Consideration also will also be given to students whose dependent children experience serious illness. Arrangements for making up late work (in this course: the 12 required ATPs and Final recorded presentation) should be made before (if possible) or (if not) immediately following the deadline for the work, by way of direct communication with the Instructor. These arrangements will be made in ways that do not in any way discriminate against the affected students.

For late ATPs, I will grade for half credit (5/10 points) questions that are submitted within 24 hours of the deadline. For late Final Recorded Presentations, I will deduct 5 percentage points (10 class points) for each 24 hours late, up to 7 days (i.e., for a Final Recorded Presentation submitted 6 days late, the highest possible grade is 70%, or 140 points).

Academic Integrity & Dishonesty

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breeches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty" [Part 5, Section III-B-2-a, Student Regulations]. Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest" [University Senate Document 72-18, December 15, 1972].

For additional details: https://www.purdue.edu/odos/academic-integrity/.

“As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.” For more information, see: Purdue’s Honor Pledge.

Use of AI Policy

All use of Chatbots and/or any Generative AI is prohibited in this course. Determinations will be made carefully on a case-by-case basis. However, students who are determined to have used AI-generated writing for any portion of their assignments will be deemed in violation of the academic integrity expectations for this course. Violations can include a failing grade for the course and restrictions from further class attendance.

All suspected incidents of academic dishonesty will also be referred to the Office of Student Rights and Responsibilities for further review of the student's status with the University, which may include being separated from the University.

Disability Resource Center

The Disability Resource Center (DRC) is a resource for students and instructors. Students may present a “Letter of Accommodation” to the professor at any point in the semester. If you have questions or need accommodations to effectively complete your work in this course, please contact the DRC at: 765 494-1247. You may also write the DRC at: drc@purdue.edu.

Syllabus Change Policy

"Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice."

COURSE SCHEDULE AND READINGS

*This schedule is subject to change. Readings listed for a particular day are **DUE ON THAT DAY**.*

Week 1: Defining "Biotechnology"

Tuesday, 1/9/24: Syllabus Day

LECTURE 1: Thursday, 1/11/24: Course Overview / What is 'biotechnology'?

- Stevens, pp. 15-20 (Ch. 1: What is Biotechnology?).
- **Supplemental:** "From DNA to Beer: Harnessing Nature in Medicine and Industry": https://www.nlm.nih.gov/exhibition/fromdnatobeer/education/index.html?data-nav=OnlineActivities (U.S. National Library of Medicine).

Week 2: Engineering Food & Drink

LECTURE 2: Tuesday, 1/16/24: Brewing Beer & 'Zymotechnology'

- Baxter, Alan G. "Louis Pasteur's Beer of Revenge." *Nature Reviews Immunology* 1, no. 3 (2001): 229–32.
- Stevens, pp. 21-32 (Ch. 2: The Long History of Biotechnology).
- *By **Wed. 1/17/24 at 11:59p ET**: Submit question from 1/16/24 for **1/18/24 ATP (#1).***

LECTURE 3: Thursday, 1/18/24: Genetically Modified Foods (GMFs)

- Stevens, pp. 97-115 (Chs. 7-8: Risk, Regulation, and Our Food; The Economics of Eating).
- *By **Fri. 1/19/24 at 11:59p ET**: Submit question from 1/18/24 for **1/23/24 ATP (#2).***

Week 3: Public Health in Peace & War

LECTURE 4: Tuesday, 1/23/24: Vaccines

- Plotkin, Stanley A., and Susan L. Plotkin. "The Development of Vaccines: How the Past Led to the Future." *Nature Reviews Microbiology* 9, no. 12 (2011): 889–93.
- Plotkin, Stanley. "History of Vaccination." *Proceedings of the National Academy of Sciences* 111, no. 34 (2014): 12283–87.
- *By **Wed. 1/24/24 at 11:59p ET**: Submit question from 1/23/24 for **1/25/24 ATP (#3).***

LECTURE 5: Thursday, 1/25/24: Vitamins & Antibiotics

- Quinn, Roswell. "Rethinking Antibiotic Research and Development: World War II and the Penicillin Collaborative." *American Journal of Public Health* 103, no. 3 (2013): 426–34.
- Wendt, Diane. "Vitamins Come to Dinner." *Distillations Magazine*, June 7, 2012. https://www.sciencehistory.org/stories/magazine/vitamins-come-to-dinner/.
- *By **Fri. 1/26/24 at 11:59p ET**: Submit question from 1/25/24 for **1/30/24 ATP (#4).***

Week 4: Making Cells Immortal

LECTURE 6: Tuesday, 1/30/24: Cell Culture

- Carrel, Alexis. "The New Cytology." *Science* 73, no. 1890 (1931): 297–303.
- Stevens, pp. 133-143 (Ch. 9: Owning Part of You).
- **Supplemental:** "Significant Research Advances Enabled by HeLa Cells" https://osp.od.nih.gov/hela-cells/significant-research-advances-enabled-by-hela-cells/ (U.S. National Institutes of Health).

- *By **Wed. 1/31/24 at 11:59p ET**: Submit question from 1/30/24 for **2/1/24 ATP (#5).***

DISCUSSION SECTION: Thursday, 2/1/24: Catch-Up ATP; Discussion of readings

- ***NOW OPTIONAL**: by **Fri. 2/2/24 at 11:59p ET**: Submit question from 2/1/24 for **2/6/24 ATP (#6).***

Cancelled lecture (material will not be tested; these biotechnologies are now options for Final Recorded Presentation): Cryopreservation & Organ Transplantation

- Schlich, Thomas. "The Origins of Organ Transplantation." *The Lancet* 378, no. 9800 (2011): 1372–73.
- Schlich, Thomas, and Bart Lutters. "Historical Perspectives on Xenotransplantation." *The Lancet* 399, no. 10331 (2022): 1220–21.
- Stevens, pp. 144-155 (Ch. 10: Freezing, Banking, Crossing).

Week 5: Intervening in Sex & Reproduction

LECTURE 7: Tuesday, 2/6/24: The Pill & IVF

- Stevens, pp. 223-235 (Ch. 15: From the Pill to IVF).
- Watkins, Elizabeth Siegel. "How the Pill Became a Lifestyle Drug: The Pharmaceutical Industry and Birth Control in the United States Since 1960." *American Journal of Public Health* 102, no. 8 (2012): 1462–72.
- *By **Wed. 2/7/24 at 11:59p ET**: Submit question from 2/6/24 for **2/8/24 ATP (#7).***

DISCUSSION SECTION: Thursday, 2/8/24: Intervening in Sex & Reproduction

- Discussion of readings for 2/6/24.
- In addition, please read:
  - Meyerowitz, Joanne. "Transforming Sex: Christine Jorgensen in the Postwar U.S." *OAH Magazine of History* 20, no. 2 (2006): 16–20.
  - Sengoopta, Chandak. "'Dr. Steinach Coming to Make Old Young!': Sex Glands, Vasectomy and the Quest for Rejuvenation in the Roaring Twenties." *Endeavour* 27, no. 3 (2003): 122–26.
- ***NOW OPTIONAL:** By **Fri. 2/9/24 at 11:59p ET**: Submit question from 2/8/24 for **2/13/24 ATP (#8).***

Week 6: The Dawn of Genetic Engineering

LECTURE 8: Tuesday, 2/13/24: Recombinant DNA

- Berg, Paul, David Baltimore, Herbert W. Boyer, Stanley N. Cohen, et al. "Potential Biohazards of Recombinant DNA Molecules." *Science* 185, no. 4148 (1974): 303.
- Stevens, pp. 35-64 (Ch. 3: Inventing Genetic Engineering; Ch. 4: The Recombinant DNA Debates).
- **Supplemental:** "Asilomar '75: The Beginning of the Future": https://www.youtube.com/watch?v=g23oM-VqT_M (U.S. National Institutes of Health).
- **Supplemental:** "Recombinant DNA and the Birth of Biotech": https://americanhistory.si.edu/collections/object-groups/birth-of-biotech (National Museum of American History).
- *By **Wed. 2/14/24 at 11:59p ET**: Submit question from 2/13/24 for **2/15/24 ATP (#9).***

DISCUSSION SECTION: Thursday, 2/15/24: The Dawn of Genetic Engineering

- Discission of readings for 2/13/24.
- In addition, please read:
  - Stevens, pp. 65-94 (Ch. 5: Biotechnology and Business; Ch. 6: Patenting Life).
- *Note: **NO ATP ASSIGNMENT OPEN ON BRIGHTSPACE FOR TOMORROW**. In preparation for Midterm exam #1, please try to submit/ask your most pressing questions before the end of today's discussion section.*

Week 7: MIDTERM EXAM #1 / THURSDAY CLASS CANCELLED

Tuesday, 2/20/24: IN-CLASS MIDTERM EXAM #1 (MULTIPLE CHOICE)
Thursday, 2/22/24: CLASS CANCELLED

- *By **Friday, 2/23/24 at 11:59p ET**: You must have your topic for your Final recorded presentation approved by the Instructor on BrightSpace.*

Week 8: Sequencing Genes, Assessing Risk

LECTURE 9: Tuesday, 2/27/24: Genome Sequencing & Related Biotechnologies

- Sanger, Frederick. "Determination of Nucleotide Sequences in DNA." *Science* 214, no. 4526 (1981): 1205–10.
- Stevens, pp. 159-173; pp. 174-191 (Ch. 11: Eugenics; Ch. 12: The Human Genome Project).
- *By **Wed. 2/28/24 at 11:59p ET**: Submit question from 2/27/24 for **2/29/24 ATP (#10).***

DISCUSSION SECTION: Thursday, 2/29/24: Sequencing Genes, Assessing Risk

- Discussion of readings for 2/27/24.
- In addition, please read:
  - Stevens; pp. 195-206; pp. 269-276 (Ch. 13: Genetic Testing, Disability, and Discrimination; Ch. 18: Designer Babies).
- ***NOW OPTIONAL:** By **Fri. 3/1/24 at 11:59p ET**: Submit question from 2/29/24 for **3/5/24 ATP (#11).***

Week 9: Wonder Drugs

LECTURE 10: Tuesday, 3/5/24: Prozac & Viagra

- Potts, Malcolm. "Two Pills, Two Paths: A Tale of Gender Bias." *Endeavour* 27, no. 3 (2003): 127–30.
- Stevens, pp. 279-291 (Ch. 19: Drugs and Designer Bodies).
- *By **Wed. 3/6/24 at 11:59p ET**: Submit question from 3/5/24 for **3/7/24 ATP (#12).***

DISCUSSION SECTION: 3/7/24: Wonder Drugs

- Discussion of readings for 3/5/24.
- *Note: **NO ATP ASSIGNMENT OPEN ON BRIGHTSPACE FOR TOMORROW**. In advance of Spring Break, please try to submit/ask your most pressing questions before the end of today's discussion section.*

Week 10: SPRING BREAK / NO CLASS MEETINGS

Week 11: Manipulating Biological Time

LECTURE 11: Tuesday, 3/19/24: Cloning & Stem Cells

- Stevens, pp. 236-249; pp. 253-268 (Ch. 16: Cloning; Ch. 17: Stem Cells).
- *By **Wed. 3/20/24 at 11:59p ET**: Submit question from 3/19/24 for **3/21/24 ATP (#13).***

DISCUSSION SECTION: Thursday, 3/21/24: Manipulating Biological Time

- Discussion of readings for 3/19/14.
- In addition, please read:
  - Maienschein, Jane. "What's in a Name: Embryos, Clones, and Stem Cells." *The American Journal of Bioethics* 2, no. 1 (2002): 12–19.
  - Stevens, pp. 144-155 (Ch. 10: Freezing, Banking, Crossing). *Note: This reading initially was assigned for our Cryopreservation lecture, but it also fits here.*
- ***NOW OPTIONAL:** By **Fri. 3/22/24 at 11:59p ET**: Submit question from 3/21/24 for **3/26/24 ATP (#14).***

Week 12: Analyzing, Editing, & Building Genomes

LECTURE 12: Tuesday, 3/26/24: Personalized Medicine, Genome Editing, & Synthetic Biology

- Stevens, pp. 292-309; pp. 345-357 (Ch. 20: Personal Genomics; Ch. 23: Synthetic Biology and Bioterrorism).
- **Supplemental:** Doudna, Jennifer. TED Talk: "How CRISPR lets us edit our DNA" (2015), available from: https://www.youtube.com/watch?v=TdBAHexVYzc.
- *By **Wed. 3/27/24 at 11:59p ET**: Submit question from 3/26/24 for **3/28/24 ATP (#15).***

DISCUSSION SECTION: Thursday 3/28/24: Analyzing, Editing, & Building Genomes

- Discussion of readings for 3/26/24.
- In addition, please read:
  - Doudna, Jennifer A., and Emmanuelle Charpentier. "The New Frontier of Genome Engineering with CRISPR-Cas9." *Science* 346, no. 6213 (2014): 1077, 1258096-1-9.
  - Frischknecht, Friedrich. "The History of Biological Warfare." *EMBO Reports* 4, no. Suppl 1 (2003): S47–52.
- ***NOW OPTIONAL:** By **Fri. 3/29/24 at 11:59p ET**: Submit question from 3/28/24 for **4/2/24 ATP (#16).***

Week 13: Implications of Biotechnologies

LECTURE 13: Tuesday, 4/2/24: Bioethics

- Benjamin, Ruha. "Interrogating Equity: A Disability Justice Approach to Genetic Engineering." *Issues in Science and Technology* 32, no. 3 (2016): 51–54.
- Stevens, pp. 207-219 (Ch. 14: Bioethics).
- *By **Wed. 4/3/24 at 11:59p ET**: Submit question from 4/2/24 for **4/4/24 ATP (#17).***

DISCUSSION SECTION: Thursday, 4/4/24: Ethical Analysis: Biotechnology & Human Diversity

- Discussion of readings for 4/2/24.
- In addition, please read:
  - Stevens, pp. 313-342 (Ch. 21: Biotechnology and Race; Ch. 22: Bioprospecting and Biocolonialism).

- *Note: **NO ATP ASSIGNMENT OPEN ON BRIGHTSPACE FOR TOMORROW**. In preparation for Midterm exam #2, please try to submit/ask your most pressing questions before the end of today's discussion section.*

Week 14: MIDTERM EXAM #2 / FINAL PRESENTATION PREP

Tuesday, 4/9/24: IN-CLASS MIDTERM EXAM #2 (MULTIPLE CHOICE)
Thursday, 4/11/24: In-class work on Final recorded presentations (& Instructor Q+A).

Week 15: FINAL PRESENTATION PREP

Tuesday, 4/16/24: In-class work on Final recorded presentations (& Instructor Q+A).
Thursday, 4/18/24: In-class work on Final recorded presentations (& Instructor Q+A).

- *Final recorded presentations due on BrightSpace on **Friday, 4/19/24 by 11:59p ET.***

Week 16: COURSE WRAP-UP / QUIET WEEK

LECTURE 22: Tuesday, 4/23/24: Course wrap-up discussion: What are we?
Thursday, 4/25/24: CLASS CANCELLED (STUDY FOR FINAL/MEET WITH ME).