



Biology, Technology & Ethics

Phil 285-0001, Fall 2025

Professor William Seeley, Online

Office Hours: Zoom hours TBA & by appointment

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Course Description:

Biomedical ethics is a branch of applied ethics dedicated to the evaluation of ethical issues surrounding medical practice. For instance, how do we distinguish disease and illness from health? Is 'normal function' a biological or a cultural concept? What is the distinction between a treatment and an enhancement? How do answers to these questions affect health care judgments? Does the possibility of neuropharmacological enhancement change these answers in the case of psychological health? What impact might the potential use of these treatment protocols as cognitive enhancements have on our concept of personhood? How should one go about determining the status and quality of life of a comatose patient? Does anyone have the right, or the ethical resources, to assess the life options of chronically ill patients? How should genetic screening be used to enhance the health of an individual? Should this tool be used to enhance the general health of the community? Are there ways gene editing might be used to enhance the well-being of our communities? What are the associated risks? What are the risks related to developments in synthetic biology? Should we allow DIY biotech of any sort to thrive in the garage? We will discuss these and other related issues this semester. Along the way we will focus our attention on the role biomedical technologies play shaping our health care values. Many of our topics of discussion will be loosely directed towards emerging issues in *neuroethics*, a field focused on ethical questions about the growing use of neuropharmacological and neuroscientific technologies in medical contexts.

Course Goals:

The goals of this course are threefold. First we will examine a number of particular ethical issues in health care practice in order to gain a general understanding of the methods and material of biomedical ethics. Second we will evaluate these issues in the broader context of philosophical theories of ethics., e.g. utilitarian, deontological, and virtue-based approaches to philosophical ethics. Third, good reasoning is critical to objective discussion of any topic. In this context, we will learn a little bit about standard reasoning strategies and philosophical method.

Requirements:

- Two 4 page papers on assigned topics (30% - 15% each).
- One online take-home midterm (25%).
- One online take-home final (25%).
- Weekly online multiple choice quizzes (20%).
- Two Zoom Check-in Meetings (organized around your schedules)

Texts:

- *Ethical Issues in Modern Medicine*, 8th Edition, eds. Bonnie Steinbock, John D. Arras, and Alex John London (New York: McGraw Hill, 2009). (*EIMM*)

General Course Outline:

Welcome to Philosophy 285: Biology, Technology, and Ethics!!! This is an online class. All of our work will happen online and be directed via Brightspace. If you are unfamiliar with Brightspace I encourage you to use YouTube and the Brightspace Help function to learn to navigate the platform. It is a very powerful teaching tool. But it may require a little time to become acclimated to its nooks and crannies! I believe USM has posted tutorials for you. I am a big fan of using any every opportunity for sleuthing information to learn to be self-sufficient, but I am more than happy to help you find them if you would like.

Online courses provide flexible learning environments. They allow students to manage their own learning schedules. But they also require students to be self-motivated. It is up to you to work through the material in a timely fashion. I want to take a moment here at the start of the course to sketch out an outline of the course structure to help facilitate this task.

1. The syllabus is a dynamic working document. I will update it each week as needed to direct you to online resources designed to supplement the material in your readings and exercises. These additions are driven by our interactions via *discussion threads*, *quizzes*, *Zoom Check-Ins*, and *emails*. Make sure to check the syllabus and course content modules every week to guarantee that you are up to date on your course work.
2. Online Lectures, Weekly Lecture Text, Links to other Online Course Material, Weekly Quizzes, Paper Assignments, and Online Exams are all collected in the modules organized on the *Content* page of our Brightspace website. You will find a link to the Content Section on the toolbar menu on the top of the webpage. The course is organized into 7 Learning Modules matching the seven syllabus topics listed below. Each learning module contains folders organized into weekly course materials.
3. I will post an Announcement Monday mornings introducing the week's materials and assignments.
4. The online syllabus material for each week (lectures, assignments, and online resources) will be posted Monday mornings @ 7am unless otherwise indicated in the weekly Announcement. The materials will include a recorded online PowerPoint lecture, a short accompanying text lecture, a list of readings with links to where to find them when appropriate, and links to supplemental online resources.
5. Weekly online quizzes will post on Wednesdays @ 7am and will be due the following Sunday @ 11:55pm. There will be no reading quizzes weeks other graded assignments are due. Other graded assignments include two 4 page papers, an online midterm, and an online final.
6. The readings for each week are listed in each weekly module and in the table at the back of the syllabus titled *Schedule of Readings*. They have been organized into groups by lecture. A full bibliography of the readings with links is also listed by module/topic in the body of the syllabus.
7. We will cover 7 topics: introduction to bioethics; normativism, disease, and normal function; neuroethics; reproductive freedom, reproductive cloning, and genetic testing; gene editing & CRISPR; synthetic biology; and DIY biology & citizen science. You will find a bibliography of references for the readings listed in the body of the syllabus with the topics.
8. Syllabus readings will draw on our textbook and online resources. Where the readings can be found online you will find links and reference information with the bibliographic listings for the readings and in the schedule of readings at the end of the syllabus.
9. We will arrange three sets of opportunities for group Zoom check-ins around your schedules. These meetings are an opportunity for you to ask any questions you might have and for me to check in on your progress. I will arrange several meeting times for these check-ins to make sure we accommodate everyone's busy schedules.

Phew! That is a lot of material. The main points you need to keep in mind are:

- The online lecture & lecture text for each week will post Mondays.
- Online reading quizzes will post Wednesdays.
- Online quizzes are due the following Sunday at 11:55 pm, after which they will become unavailable to you.
- You are responsible each week for
 - watching online lectures
 - reading accompanying lecture texts
 - the syllabus readings
 - any assigned quiz, paper, or online exam

Some Miscellaneous Notes and Guidelines:

Moral behavior is the grounds for, and the framework of, a healthy society. In this regard it is each of our responsibility as an individual within the community of our coursework to act responsibly. This includes following the rules and guidelines set out by the College for academic behavior.

Plagiarism is a serious matter. It goes without saying that each of you is expected to do his or her own work and to cite EVERY text that is used to prepare a paper for this class. In general philosophy papers are NOT research papers. Your exams and papers should not draw on any outside research or materials beyond the readings and resources listed on Brightspace and the syllabus.

The online quizzes are tailored learning experiences. Their primary function is to help you understand how to approach the material, engage the readings, and gauge your progress through the materials. They are tools to help shape your attention to the materials. They also help me understand how everyone is doing.

A paper is also a carefully tailored learning experience. It gives you the opportunity to take a deeper dive into the material utilizing a lens with a more careful analytic focus than you might bring to your weekly readings. The assigned paper topics are designed to give you a chance to stretch your legs a bit with the material and give me a chance to assess your understanding of the material. We will talk about philosophy papers in greater detail later. Generally these papers should offer a description of the syllabus/lecture discussion surrounding the issue at hand and a defense of your take on that issue. But this does not mean that they are a free forum for opinions. Your take on the issue should be framed through an evaluation of the positions on offer in the syllabus/lecture discussion. Make sure that your papers set out the issues germane to the question and that your responses address the relative virtues and shortcomings of theoretical positions discussed in class.

This is an online class. It goes without saying that your work MUST BE YOUR work. Please make sure to complete all of the assignments on your own by yourself.

Please be respectful of your peers in our online discussion sections. Our goal is to, together, generate an inclusive learning environment where we can share ideas and explore issues germane to biomedical ethics. It is our collective responsibility to welcome everyone into this learning environment through careful listening and reflective discussion.

Finally, please have fun! Philosophy is an active pursuit. It is a field of study where we apply carefully developed critical reasoning skills in the evaluation of live, real life issues. Along the way we ought to discover new and surprising things about our own beliefs and the world around us!

Materials & Assignments:

Weekly Online Lectures, Lecture Text, and Other Materials – Materials due each week will post to Brightspace Mondays and Wednesdays unless otherwise indicated in our weekly announcements. These will include a series of short online lectures and associated lecture texts as well as weekly online quizzes. The readings that accompany these online materials are listed on the syllabus. I will also occasionally direct students to internet resources related to our current topic. Students are responsible to keep up with the syllabus readings, online lectures, lecture texts, and other resources by consulting BOTH Brightspace and the pdf of the course syllabus each week.

Weekly Online Quizzes (20%) – Lectures, PowerPoints, and other online course materials for each week will be posted Mondays and Wednesdays. These materials will include a 20 question multiple choice quiz on the week's material that will post Wednesdays. Weekly online quizzes are due the following Sunday at 11:55pm, before the materials for the ensuing week are posted. The quizzes are designed to engage students with the material and reinforce important points from the week's readings. The purpose of the weekly quiz deadlines is to focus your engagement with the materials, help you gauge your progress, and help you stay on top of things, keep up with the material, as the semester unfolds.

As a general rule there will be no quiz assigned on a week that a paper or online exam is due.

There will be no quiz the first two weeks of class.

4 Page Paper (15%) - Write a 4 page paper (1200 word) on one of two topics to be announced on the distribution date of the paper assignment. Your paper should be double-spaced in 12 point font with 1" margins. The purpose of this paper is to demonstrate that you can analyze and evaluate a standard argument and otherwise synthesize materials from the literature on the syllabus.

Due: 10/5 @11:55pm on Brightspace

4 Page Paper (15%) - Write a 4 page paper (1200 word) on one of two topics to be announced on the distribution date of the paper assignment.. Your paper should be double-spaced in 12 point font with 1" margins. The purpose of this paper is to demonstrate that you can analyze and evaluate a standard argument and otherwise synthesize material from the literature on the syllabus

Due: 12/15 @11:55pm on Brightspace

Take Home Mid-term – cumulative (25%)

Due: 10/31 @11:55pm on Brightspace

but open until Sunday night 11/2

Final Exam – cumulative (25%)

Due: 12/19 @11:55pm on Brightspace

Schedule of Topics:

Topic 1: What is Philosophy? What is Bioethics? Philosophy is described as a *science of arguments*. Topic 1 introduces the discipline of philosophy with a focus philosophical method. The philosophers toolkit includes a range of *critical reasoning strategies* that are used to engage in *conceptual analysis* and develop *arguments*. This is just a fancy way of saying that philosophers like to break down a topic by examining the meanings of associated ideas and evaluating the principled reasons people give for what they believe. Biomedical ethics is the *ethics of health care practice*. Ethics is the philosophical study of *morality*, or the rules a community appeals to to organize their social behaviors. Health care practice is a field dedicated to the maintenance of health, the prevention of illness, and the treatment of illness. Topic 1 introduces students to the basics of philosophical method, three standard theories of ethics, and their relationship to issues bioethics. We will use the rest of the semester to develop a more detailed and structured understanding of bioethics.

Week 1: Bioethics & the Methods of Philosophy

Walter Glannon, Chapter 1: History and Theories, *Biomedical Ethics* (pp. 1-22). New York: Oxford University Press, 2005. (**Brightspace**)

H. G. Wells, "The Country of the Blind," *The Country of the Blind and Other Stories* (London: T. Nelson & Sons), 537-567. See link below in the schedule of readings table. (**Available as an eBook through the USM Library online library catalog or at <http://www.online-literature.com/wellshg/3/>**).

Topic 2: Normativism, Disease, and Normal Function – Topic 2 addresses the question “What is ‘health’?” If health care practices are aimed at the preservation and restoration of health, and ethical question about health care concern the nature of these practices, it would behoove us to understand what it means to be healthy, what it means to designate a condition a disease, and when deviations from normal health merit treatment. There is some debate in the literature about whether culture influences our concept of health. Researchers who argue that it does are called *normativist*. They argue that health is a cultural value and that the notion of health can consequently differ from culture to culture. We begin Topic 2 with a science fiction story by H. G. Wells that reflects this view. We follow Well’s story of the country of the blind with a paper that offers an objective definition of health with the resources to accommodate differing cultural values. We close the topic with a discussion of cochlear implant surgery and a distinction between mode and level of biological function.

Week 2: Conceptual Analysis, The Definitions of Health, Disease, and Illness.

Christopher Boorse, "On the Distinction between Disease and Illness" *Philosophy & Public Affairs*, 5(1), 1975: 49-67. Please read an excerpt of the paper, pages 50-62, Sections I & II. **(online resource, available on JSTOR through the USM Library online catalog. Type the article title into the search field on the library website to bring up the library holdings record and access options. JSTOR can also be accessed via the A-Z databases link below the general search field -- the USM OneSearch field -- from the Library homepage.)**

Our primary focus will be on the material in Section II. Disease and Illness (pages 56-62). Boorse discusses the interrelated constellation of concepts ‘health’, ‘disease’, and ‘illness’ in this section. We will not discuss the application of these concepts to health care judgements about mental health. You will notice that the choice and language of some of Boorse’s examples in this paper is insensitive and could have benefitted from the perspective of our contemporary discussions of diversity and inclusion. These issues have been noted in the literature and many problems have been identified with Boorse’s broader theory -- for instance the theoretical analysis of normal physiological function can be influenced by social values via the selection of targeted reference classes that might bias what constitutes statistically normal individuals. Of course Boorse rejects any statistical criteria for normal function in this text. Nonetheless his language and some of the results he has taken his theory to entail have been rightly challenged. However, this should not minimize the value of his critical analysis of the constellation of concepts health, disease, & illness for our understanding of the relationship between biology, technology, and value. With that all in mind we should be aware that there are issues with Boorse’s account and take it as an example of the care we need to take when framing an inclusive discussion. We will read critiques of Boorse below in the context of the Boorse-Daniels model and the distinction between normal mode of function and normal level of function.

H. G. Wells, "The Country of the Blind," *The Country of the Blind and Other Stories* (London: T. Nelson & Sons), 537-567. **(online resource, available as an eBook through the USM Library online library catalog or at <http://www.online-literature.com/wellshg/3/>. Please reflect on how the technologies developed by folk in the Country of the Blind over the course of generations to help them manage their blindness have shaped their concepts of normal function, disease, & illness. Does this thought experiment support strong or weak normativism in judgements about health, disease, and illness?**

Week 3: Cochlear Implant Surgery and the Deaf Community

Robert Crouch, "Letting the Deaf Be Deaf: Reconsidering the use of Cochlear Implants in Prelingually Deaf Children," *The Hastings Center Report*, 27(4), 1997: 14-21. **(online resource, available on JSTOR through the USM Library).**

Johns Hopkins Medicine, "Cochlear Implant Surgery" **(online resource)**
<https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/cochlear-implant-surgery>

Movie: *Sound and Fury: The Communication Wars of the Deaf*, dir. Josh Aronson (2001). See link to library holdings below in the table of readings. **(the movie is available to stream online or through the USM Library online library catalog as a university system-wide video resource. Type the full title of the movie into the search bar on the USM Library homepage. Open the listing/record for the movie. Click on the link for "UM System-wide Access." The movie should load on a new page that provides you with access via the University of Maine and allows you to watch it.)**

Movie: *Deaf President Now!* dirs.. Nyle DiMarco & Davis Guggenheim (2025). **(TBD)**

Sara Novic, "A Clearer Message on Cochlear Implants," *The New York Times*, Nov 21, 2018. **(online resource available via the USM Library)**
https://www.nytimes.com/2018/11/21/opinion/deaf-cochlear-implants-sign-language.html?unlocked_article_code=1.Hk4.GmLB.-FiSyRNH5LVv&smid=url-share

Heather Artinian, *Harvard Law Today*, Student Spotlight. **(online resource)**
<https://today.law.harvard.edu/heather-artinian-18-people-tell-no-just-becomes-motivator/>

Heather Artinian, TED Talk. **(online resource)**
<https://www.youtube.com/watch?v=jhm5OaXJVMQ>

Optional Supplementary Resources:

Lydia Denworth, "Science Gave My Son the Gift of Sound," *Time Magazine*, April 5, 2014, **(online resource)**
<https://time.com/76154/deaf-culture-cochlear-implants/>

Jane E. Brody, "Unlocking the World of Sound for Deaf Children," *The New York Times*, October 8, 2018. **(online resource available via the USM Library)**
<https://www.nytimes.com/2018/10/08/well/live/unlocking-the-world-of-sound-for-deaf-children.html>

Irene Taylor Brodsky, "Between Sound & Silence," *The New York Times*, August 7, 2018. **(online resource, please watch the short video clip from Brodsky's documentary, *The Listening Project*, embedded in the Opinion piece)**
<https://www.nytimes.com/2018/08/07/opinion/deafness-cochlear-implants.html?action=click&module=RelatedLinks&pgtype=Article>

Week 4: Mode vs. Level of Function in Treatment Strategies and Health Care Decisions

The topic of this week's materials is a distinction between what Anita Silvers refers to as *mode of function* and *level of function*. The normal mode of function is the ordinary mechanical, computational, physiological, or etc. way members of a class of systems or organisms implement a function. In the context of health care discussions this is what Chris Boorse would have called the *normal function* of an organism. If we use Norman Daniels' writings as a lens through which to interpret Chris Boorse's discussion of the constellation of concepts surrounding our understanding of disease and illness, the goal of health care interventions is to restore the normal level of function associated with the normal mode of function in healthy individuals in order to facilitate access to the normal range of opportunities. Silvers points out a difficulty with this approach. It runs the risk of biasing health care judgments towards cultural preferences for familiar modes of function at the expense of normal levels of function. Worse it may blind us to alternative approaches that would facilitate a normal level function. Worse still it may blind us to normative differences between communities of individuals within our own cultures. Our goal is to determine whether Silver's observations are at odds with the framework Boorse has proposed.

Norman Daniels, "Equal Opportunity and Health Care," in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 182-185. **(EIMM)**

Anita Silvers, "A Fatal Attraction to Normalizing: Treating Disabilities as Deviations from 'Species Typical' Functioning," in Ed. Erik Parens, *Enhancing Human Traits: Ethical and Social Implications* (Washington D.C.: Georgetown University Press, 2000), 95-123. **(Brightspace)**

Elselijn Kingma, "What Is It to Be Healthy?" *Analysis*, 67(2), 2007: 128-133. **(online resource, available on JSTOR through the USM Library online catalog)**

Optional Supplemental Resources:

The Listening Project (Vermillion Films, 2018), dirs. Irene Taylor Brodsky and Jane Madell **(online resource)** This film explores the impact that hearing technologies like cochlear implants can have on young adults with hearing loss through personal interviews that give them voice while they share their stories.

<https://www.acialliance.org/page/TheListeningProject>

<https://www.hearingfirst.org/celebrate-isi/listening-project> (watch the documentary)

Sound and Fury: 6 Years Later (Aaronsen Film Associates), dir Josh Aronson (2007). **(online resource)** This short documentary is a follow up with Heather Artinian's family that provides a lens on her life as a middle school student after receiving cochlear implant surgery.

https://www.youtube.com/watch?v=5fERq26j2AI&ab_channel=A%26S

Topic 3: Neuroethics. Neuroethics explores the ethics of the use of novel neuroscientific technologies as tools for the treatment of illness in clinical contexts and for human subjects research. Critical questions addressed in the field focus on the distinction between issues narrowly associated with the unique nature of these technologies and classical bioethical questions that apply to the role played by novel research health care contexts and research more generally. Critically, neuroscience studies the brain, an organ that we believe to be critical to the operations of our minds, and as a result the nature of ourselves as unique persons. In addition to familiar questions about safety, distributive justice, and autonomy/coercion the use of these technologies in treatments and potential as neurocognitive enhancements raises conceptual questions about the nature of personhood itself. In this section we will use Neuroethics to explore the definition of health further by introducing a distinction in practice between treatments and enhancements, we will open a discussion about the ethics of human subjects research, and we will open a discussion about the nature of personhood and the impact this concept has on ethical issues in medicine.

Week 5: What Is Neuroethics?

Adina Roskies, "Neuroethics Fifteen Years On," *Philosopher's Magazine*, March 3, 2019. (**online resource**)
<https://www.philosophersmag.com/essays/196-neuroethics-fifteen-years-on>

Martha J. Farah, "Neuroethics: A Guide for the Perplexed," in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 843-848. (**EIMM**)

Jonathan Moens, "California Passes Law Protecting Consumer Brain Data," *The New York Times*, September 29, 2024. (**online resource**)
https://www.nytimes.com/2024/09/29/science/california-neurorights-tech-law.html?unlocked_article_code=1.Ok4.TtPC.jKJKVox4xi7n&smid=url-share

Week 6: A Distinction between Treatment and Enhancement: the case of neurocognitive intervention

Martha J. Farah et al, "Neurocognitive Enhancement: What Can We do and What Should We Do?", *Nature Reviews Neuroscience*, 5(5), 2004:421-425. **(online resource)**
https://repository.upenn.edu/neuroethics_pubs/9/

Paul R. Wolpe, "Treatment, Enhancement, and the Ethics of Neurotherapeutics," *Brain and Cognition*, 50(3): 387-395. **(Available via online journal access to *Brain and Cognition* through OneSearch, USM Library. Online Journals and eBooks can be accessed via the electronic journal and eBook link below the general search field on the library homepage).**

Anjan Chatterjee, "The Promise and Predicament of Cosmetic Neurology" *Journal of Medical Ethics* 32, 2006: 110-113. **(online resource & available as an electronic resource via the USM Library website)**
https://repository.upenn.edu/neuroethics_pubs/3/

Kevin Loria, "There Is One Drug in the World that Can Make You Smarter – Here's Why You Can't Take It Yet." *Business Insider (online)*, June 27 2016.
<https://www.businessinsider.com/modafinil-is-an-effective-cognitive-enhancement-nootropic-2016-6>

Week 7: The Ethics of Memory Blunting & Emotion Regulation Technologies

Happy Souls (excerpt), Chapter 5, Intro, Sections I & II, *Beyond Therapy: Biotechnology and the Pursuit of Happiness*, President's Council on Bioethics, Washington D.C., 2003: 234. **(online resource)**
<https://biotech.law.lsu.edu/research/pbc/reports/beyondtherapy/chapter5.html>

Michael Henry, Jennifer R. Fishman, Stuart J. Younger, "Propranolol and the Prevention of Post-Traumatic Stress Disorder: Is It Wrong to Erase the "Sting" of Bad Memories?" *The American Journal of Bioethics*, 7(9), 2007: 12-20. **(available via the USM Library webpage through the "Journals and Ebooks" link below the main search field on the home page).**

Elisabeth Camp, [Personal identity](#), Kahn Academy (video – 9 mins) **(online video resource)**

Personal Identity: Crash Course Philosophy #19. **(online video resource)**
<https://youtu.be/trqDnLNRuSc>

Against Personal Identity: Crash Course Philosophy #20. **(online video resource)**
https://youtu.be/17WiQ_tNld4

Week 8: Memory Blunting, Emotion Regulation, & Our Sense of Self

Lauren Gravitz, "The Importance of Forgetting," *Nature* 571, 2019: S12-s14.

<https://media.nature.com/original/magazine-assets/d41586-019-02211-5/d41586-019-02211-5.pdf>

Catherine A. Hartley and Elizabeth Phelps, "Changing Fear: The Neurocircuitry of Emotion Regulation," *Neuropsychopharmacology Reviews*, 35(1), 2009: 136-146. (**online resource**)

<https://acnp.org/wp-content/uploads/2017/10/ChangingFearTheNeurocircuitry.pdf>

Topic 4. Genetic Testing, Reproductive Freedom, & Reproductive Cloning

Week 9: Reproductive Cloning

John Robertson, "The Presumptive Primacy of Procreative Liberty," in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 631-641.

"The Case Against Cloning to Produce Children," *The President's Council on Bioethics*, in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 669-682.

Bonnie Steinbock, "Reproductive Cloning: Another Look," in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 683-693.

Week 10. Personhood, Genetic Screening, & IVF

In Vitro Fertilization (IVF), *The Mayo Clinic*.

<https://www.mayoclinic.org/tests-procedures/in-vitro-fertilization/about/pac-20384716>

Kjell Asplund, "Use of In Vitro Fertilization – Ethical Issues," *Upsala Journal of Medical Sciences*, 125(2), 2020: 192-199.

https://pmc.ncbi.nlm.nih.gov/articles/PMC7721055/pdf/IUPS_125_1684405.pdf

Jeffrey M. Jones, "Americans Back IVF; Divide on Morality of Destroying Embryos," *Gallup News, Social & Policy Issues*, June 13, 2024.

<https://news.gallup.com/poll/646025/americans-back-ivf-divide-morality-destroying-embryos.aspx>

Laura Herscher, "How Arguments that Embryos Are People Pose a Threat to IVF," *Scientific American*, March 8, 2024.

<https://www.scientificamerican.com/article/how-arguments-that-embryos-are-people-pose-a-threat-to-ivf/#:~:text=The%20decision%20also%20states%20that,uterus%20and%20never%20been%20born.>

"Instruction on Respect for Human Life in Its Origin and the Dignity of Procreation," *Vatican, Congregation for the Doctrine of the Faith*, in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 641-650.

Supplemental:

John Haas, "Begotten Not Made: A Catholic View of Reproductive Technology," *United States Conference of Catholic Bishops*, 1998.

<https://www.usccb.org/issues-and-action/human-life-and-dignity/reproductive-technology/begotten-not-made-a-catholic-view-of-reproductive-technology>

Kimberly Mutcherson, "A Brain-Dead Woman is Being Kept on Machines to Gestate a Fetus. It was Inevitable" *The New York Times*, May 28, 2025.

https://www.nytimes.com/2025/05/24/opinion/georgia-abortion-brain-dead.html?unlocked_article_code=1.Kk8.p2V7.CldVujF-t6rY&smid=url-share

Judith Jarvis Thompson, "A Defense of Abortion," *Philosophy and Public Affairs*, Vol. 1, No. 1. (Autumn, 1971), pp. 47-66. (**available on Jstor through the USM library**)

Topic 5: Gene Editing & CRISPR

Week 11: The Promise & Ethical Challenge of CRISPR

Readings:

Heidi Ledford, "CRISPR, The Disruptor," *Nature* 522, 2015: 20-24.

<https://www.nature.com/articles/522020a>

Heidi Ledford, "Quest to Use CRISPR Gene Editing to Fight Disease Gains Ground," *Nature* 577, 2020: 156.

<https://www.nature.com/articles/d41586-019-03919-0>

Lieke Geerts, "Three Ways CRISPR Is Making Animal Research More Predictive," *Genetic Engineering & Biotechnology News*, January 12, 2023.

<https://www.genengnews.com/insights/three-ways-crispr-is-making-animal-research-models-more-predictive/>

Erika Check Hayden, "Tomorrow's Children," *Nature* 530, 2016: 402-405.

<https://www.nature.com/articles/530402a.pdf?origin=ppub>

Caplan, Arthur L., Brendan Parent, Michael Shen, and Carolyn Plunkett. "No time to waste—the ethical challenges created by CRISPR." *EMBO reports* 16, no. 11 (2015): 1421-1426. (**online resource**)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4641494/pdf/embr0016-1421.pdf>

Videos:

CRISPR Explained, *Mayo Clinic*. (**online video resource**)

<https://youtu.be/UKbrwPL3wXE>

What You Need to Know about CRISPR, Ellen Jorgensen, *TEDTalk*, 2016. (**online video resource**)

<https://youtu.be/1BXYSGepx7Q>

Week 12: Conversations about Case Studies

Gene Testing, Gene Editing & Designer Babies

Why Gene Editing Is So Controversial, *The World*, ABC News (Australian Broadcast Corporation)
<https://youtu.be/u70je75CvcA>

Lauren Neergaard, "AP-NORC Poll: Edit Babies for Health, Not Smarts," *AP News*, December 29, 2018.
<https://apnews.com/article/ef1161deac194f2ca1fd99457dc2cf15>

Steven Pinker, "The Designer Baby Myth," in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 815-818. Reprinted from *The Guardian*, June 5, 2003. **(available online via the USM library)**
<https://www.theguardian.com/education/2003/jun/05/research.highereducation>

Gene Drives, Mosquitos, & Malaria

CRISPR-Cas9: Gene Drives, *Gene Drives*, Wyss Institute. **(online video resource)**
<https://vimeo.com/100996784> ; <https://wyss.harvard.edu/technology/gene-drives/>

Can Genetically Engineered Mosquitoes Help Fight Disease. *Above the Noise*, Season 1, Episode 11, 02/27/2018. **(online video resource)**
<https://www.pbs.org/video/can-genetically-engineered-mosquitoes-help-fight-disease-skxegb/>

Elian Peltier, "Russia's Latest Target in Africa: U.S. Funded Anti-Malaria Programs," *The New York Times*, October 14, 2024.
https://www.nytimes.com/2024/10/14/world/africa/russia-africa-disinformation-malaria-.html?unlocked_article_code=1.SU4.IFyp.ID-IXlx9U5bc&smid=url-share

Sickle Cell Anemia Case Study:

Can CRISPR Cure Sickle-cell Disease? *Nature Videos*, August 21, 2021. **(online video resource)**
https://www.youtube.com/watch?v=mQ8Ola_C5po&ab_channel=naturevideo

FDA Approves First Test of CRISPR to Correct Genetic Defect Causing Sickle Cell Disease, *UC Berkeley Media Relations*, March 30, 2021. **(online video resource)**
<https://chemistry.berkeley.edu/news/fda-approves-first-test-crispr-correct-genetic-defect-causing-sickle-cell-disease>

Sickle Cell Gene Therapy using CRISPR (press release), *Synthego*.
<https://www.synthego.com/crispr-sickle-cell-disease>

Rob Stein, "FDA Advisers See No Roadblock for Gene Editing Treatment for Sickle Cell Disease," *Morning Edition*, NPR, October 31, 2023. **(online resource)**
<https://www.npr.org/sections/health-shots/2023/10/31/1208041252/a-landmark-gene-editing-treatment-for-sickle-cell-disease-moves-closer-to-reality>

Cormac Sheridan, "The World's First CRISPR Therapy Is Approved: who will receive it?," *Nature* 42, January 2024: 3. **(Brightspace)**

optional supplemental readings on genetic enhancement:

Fritz Allhoff, "Germline Genetic Enhancement and Rawlsian Primary Goods," *Journal of Evolution & Technology*, 18(1), 2008: 10-26. **(online resource)**
<https://jetpress.org/v18/allhoff.pdf>

Julian Savulescu, "Genetic Interventions and the Ethics of Enhancement of Human Beings," in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 818-828. **(EIMM)**

Robert Sparrow, "Yesterday's Child: How Gene Editing for Enhancement Will produce Obsolescence – and Why It Matters," *The American Journal of Bioethics*, 19(7), 2019: 6-15. **(available online via electronic journals at the USM Library)**

Topic 6: Synthetic Biology

Week 13: What Synthetic Biology Is and What It Isn't

First Self-Replicating Synthetic Bacterial Cell. *J. Craig Venter Insititute*.

<https://www.jcvi.org/research/first-self-replicating-synthetic-bacterial-cell>

Mark A. Bedau, "The Intrinsic Scientific Value of Reprogramming Life," in eds. Bonnie Steinbock, John D. Arras, & Alex John London, *Ethical Issues in Modern Medicine: Contemporary Readings in Bioethics* (eight edition). McGraw-Hill, 2013: 838-841. **(electronic journal article available through Jstor on the library website)**

Gutmann, Amy. "The ethics of synthetic biology: guiding principles for emerging technologies." *Hastings Center Report* 41, no. 4 (2011): 17-22. **(electronic library resource available via the USM library webpage)**

Rob Carlson "Staying Sober about Science." *Hastings Center Report* 41, no. 4 (2011): 22-25. **(electronic library resource available via USM OneSearch on the library webpage)**

Dan Fletcher, "Which Biological Systems Should Be Engineered? *Nature* 563, 2018:177-179.

<https://www.nature.com/articles/d41586-018-07291-3>

Topic 7: The Promise & Pitfalls of DIY Biology & Citizen Science

Week 14: DIY Biology, CRISPR, & Conversations about Case Studies

Ledford, Heidi. "Garage Biotech: Life hackers." *Nature News* 467, no. 7316 (2010): 650-652. (**online resource**)
<https://www.nature.com/news/2010/101006/pdf/467650a.pdf>

Wolinsky, Howard. "Kitchen biology." *EMBO Reports* 10, no. 7 (2009): 683-685. (**online resource**)
<https://www.embopress.org/doi/full/10.1038/embor.2009.145>

The International Genetically Engineered Machine (iGEM) Competition. "Synthetic Biology: based on standard parts." igem.org. http://igem.org/Main_Page (accessed April 22, 2016).

Dan Kramer, "Artemisinin: A Synthetic Biology Success Story," *Scitable, Nature Education*, June 23, 2011. https://www.nature.com/scitable/blog/bio2.0/artemisinin_a_synthetic_biology_success/

Linda Nordling, "DIY biotech: how to build yourself a low-cost malaria detector," *The Guardian*, April 25, 2014. <https://www.theguardian.com/global-development-professionals-network/2014/apr/25/diy-detector-malaria-eradication-amplino>

Mark Peplow, "Synthetic Malaria Drug Meets Market Resistance," *Nature* 530, 2016: 389-390.
<https://www.nature.com/articles/530390a>

Manu Prakash, "A 50-cent Microscope that Folds Like Origami," TEDtalks, March 7, 2014.
<https://youtu.be/h8cF5QPPmWU>

Cybulski JS, Clements J, Prakash M (2014) Foldscope: Origami-Based Paper Microscope. *PLoS ONE* 9(6): e98781. <https://doi.org/10.1371/journal.pone.0098781>

Playing God: Should Anyone BE Allowed to Edit Their DNA Using CRISPR Technology?, *CBS News*, September 12, 2008.
<https://youtu.be/yAud1iynheY>

Emily Baumgartner, "As DIY Gene Editing Gains Popularity, 'Someone Is Going to Get Hurt,'" *The New York Times*, May 14, 2018.
https://www.nytimes.com/2018/05/14/science/biohackers-gene-editing-virus.html?unlocked_article_code=1.Hk4.8Mcd.Y-dD6RtYzAkM&smid=url-share

Date	Schedule of Readings	Assignments
Week 1 9/2 – 9/7	Glannon, History & Theories: 1-22. (<i>Brightspace</i>) Wells, Country of the Blind 536-568 (<i>eBook, USM Library</i>)	
Week 2 9/8 – 9/14	Boorse, On the Distinction ... Disease and Illness (excerpt): 49-62. (<i>JSTOR</i>) Wells, Country of the Blind 536-568 (<i>eBook, USM Library</i>)	
Week 3 9/15 – 9/21	Crouch, Letting the Deaf be Deaf : 14-21. (<i>web</i>) Johns Hopkins, Cochlear Implant Surgery (<i>online resource</i>) Movie: Sound and Fury (<i>online via USM Library</i>) Novic, A Clearer Message , NYT, Nov 21, 2018 (<i>web</i>) Heather Artinian, Harvard Student Spotlight. (<i>online resource</i>) Heather Artinian, TED Talk . (<i>online resource</i>)	
Week 4 9/22 – 9/28	Daniels, Equal Opportunity and Health Care: 200-202. (<i>EIMM</i>) Silver, A Fatal Attraction to Normalizing: 95-123. (<i>Brightspace</i>) Kingma, What Is It to Be Healthy: 128-133. (<i>USM Library online</i>)	1 st Paper Topics Assigned
Week 5 9/29 – 10/05	Roskies, Neuroethics 15 Years On (<i>web</i>) Farah, Neuroethics: 843-848. (<i>EIMM</i>)	1 st Paper Due: 10/5
Week 6 10/06 – 10/12	Farah et al, Neurocognitive Enhancement : 421-425. (<i>web</i>) Wolpe, Treatment, Enhancement, and...: 387-395 (<i>USM Library online</i>) Chatterjee, Cosmetic Neurology : 110-113. (<i>web</i>) Loria, One Drug ...Smarter (<i>web</i>)	
Week 7 10/13 – 10/19	President's Council, Happy Souls : intro- Sec. II. (<i>web</i>) Henry et al, Propranolol and Protection: 12-20. (<i>USM Library online</i>) Camp, Mind: Personal Identity (The Narrative Self) . (<i>online video resource</i>) Personal Identity: Crash Course . (<i>online video resource</i>) Against Personal Identity: Crash Course . (<i>online video resource</i>)	
Week 8 10/20 – 10/26	Hartley & Phelps, Changing Fear : 1-11. (<i>web</i>) Gravitz, Forgetting : S12-S14 (<i>web</i>)	Midterm Posted
Week 9 10/27 – 11/02	President's Council, Case Against Cloning: 669-682. (<i>EIMM</i>) Steinbock, Reproductive Cloning: 683-693. (<i>EIMM</i>)	Midterm Due: 10/31 (but open until 11/2)
Week 10 11/03 – 11/09	Buchanan et al, Reproductive Freedom and...: 602-608. (<i>EIMM</i>) Herscher, ...a Threat to IVF . (<i>web</i>)	
Week 11 11/12 – 11/16	Ledford, CRISPR Disruptor . Hayden, Tomorrow's Children . (<i>web</i>) Caplan et al, Ethical CRISPR . (<i>web</i>) Anthes, CRISPR Chickens . (<i>web</i>) Why Gene Editing Is Controversial . (<i>online video resource</i>)	
Week 12 11/17 – 11/23	What You Need to Know (<i>online video resource</i>) Pinker, The Designer Baby Myth: 815-818. (<i>EIMM</i>) Can Genetically Engineered Mosquitoes Help Fight Disease . (<i>online video resource</i>) Can CRISPR Cure Sickle-cell Disease . (<i>online video resource</i>) FDA Approves First Test . (<i>online video resource</i>) FDA Sees No Roadblock . (<i>online resource</i>)	

Biology, Technology, & Ethics: syllabus

11/24 – 11/30	Thanksgiving Break!!!	
Week 13 12/1 – 12/7	Gutmann, Ethics of synthetic biology: 17-22. (<i>electronic library resource</i>) Wade, Researchers Created a 'Synthetic Cell' : 1-3. (<i>web</i>) Bedau, Reprogramming Life: 838-841. (<i>EIMM</i>)	2nd Paper Topics Assigned
Week 14 12/8 – 12/12	Ledford, Life Hackers : 650-652. (<i>web</i>) Wolinsky, Kitchen Biology : 683-685. (<i>web</i>) The International Genetically Engineered Machine (iGEM) Competition Kramer, Artemisinin . (<i>web</i>) Nordling, Low Cost Malaria Detector . (<i>web</i>) Peplow, Market Resistance . (<i>web</i>) Prakash, A 50 Cent Microscope . (<i>online video resource</i>)	Final Posted: 12/08 2nd Paper Due: 12/15
Exam Week 12/15 -12/19	Online Final Exam Due	December 19, 11:55 pm