ANT 3080 Science and Ethics in Daily Life (Sections 3B30 and 3B31)

Prof. Connie J. Mulligan

Class meets in 223 Little Hall
Class time: Tuesday, period 9 (4:05-4:55 pm) and Thursday, periods 9-10 (4:05-6:00 pm)
Drop-in hours: Tuesday, 1:30-3:30pm, 409 Genetics Institute (or by appointment)

Contact information:
Prof. Connie J. Mulligan
409 Genetics Institute, Cancer and Genetics Research Complex
2033 Mowry Road
(352) 273-8092
cmulligan@ufl.edu
https://conniejmulligan.wordpress.com/

Course description: This course introduces students to the bioethical aspect of topics that are encountered in everyday life through the popular media, such as genetic testing and genome modification, and animal experimentation and cognition. The course will provide students with an understanding of the scientific basis of the bioethical issues in order to develop informed opinions.

Course summary: Science and Ethics in Daily Life introduces students to ethical issues of scientific topics that are encountered in everyday life through the popular media. This course will provide students with an understanding of the scientific basis of the bioethical issues in order to develop informed opinions. 1) For instance, what are the issues with genetic testing and modification of the human genome? Do we understand the human genome sufficiently to modify particular genes and traits? Should this technology be available to whoever can afford it? Scientific advances, such as CRISPR/Cas9, now provide the means to modify the genome with a high level of precision so these questions will become more and more relevant. 2) Another issue is animal experimentation. Do the many medical advances based on animal experimentation justify such use of animals? What do we understand about animal cognition and how does such information influence our opinion on animal experimentation? 3) What about artificial intelligence? How far is too far with this technology? Do we have to re-think our ideas of what it means to be human? 4) Another issue concerns the right to die or the withdrawal of life-saving devices. Do our rights include one to die or do we have a responsibility to survive at all costs? What can we learn from people who have made such decisions? Does our position on this issue also reflect a judgment on the quality of life of disabled persons?

Prerequisites: Students must have sophomore standing in order to take this course. A science background is not required, but students must have an interest in understanding the scientific basis of bioethical issues. The necessary science will be taught in the course and the course will be scientifically rigorous as befitting a 3000 level course. Students must also have an interest in thinking about how they construct arguments and discussing different ways to present information in a clear and compelling manner. The course is intended for students from all departments and colleges. In the past, students from anthropology, business, chemistry, engineering, English, history, molecular genetics and microbiology, and zoology have taken this class. A diverse audience makes for a more interesting and educational class since everyone has different backgrounds, different perspectives, and different interests to contribute to class discussions. Active participation is one of the strengths of the class in this regard.

Course objectives: All students are expected to gain knowledge on the scientific underpinning of ethical issues that are encountered in daily life. Some of these issues are controversial and, in fact, have been chosen for their timeliness in terms of being currently debated in our society. Students may have to reflect on their personal views and their rationale for holding particular opinions. Thus, the class may be personally intense and demanding in a unique way relative to most college courses.

Critical thinking skills will be required throughout the course, both in evaluating the strength/weakness of different arguments and also in thinking how to present such information. In class presentations, you will focus on presenting arguments for particular views and evaluating the rationale and logic behind such arguments. You will have to research information relevant to different perspectives on a topic. For scientific material, students should become familiar with searching PubMed (http://www.ncbi.nlm.nih.gov/pubmed) or Google Scholar (https://scholar.google.com/) for peer-reviewed journal articles that investigate different perspectives on an issue. It is important to point out that critical thinking is not just a way of thinking, but you first need material to inform your thinking and on which to think critically.

A student who completes this course will be able to:

- Identify key scientific concepts that underlie bioethical topics
- Articulate and compare the scientific, medical, legal, economic, and cultural aspects of bioethical topics
- Apply critical thinking skills to develop logical arguments for one side of a bioethical debate
- Create visual presentations to present arguments for different sides of bioethical topics

Reading and course format: Reading material includes one textbook (Bioethics at the Movies, Sandra Shapshay, 2009, Johns Hopkins University Press). The textbook is available at campus bookstores and through online sources such as amazon.com and half.com. Additional reading materials, such as journal or online articles, blogs, etc will be required each week and links are available on the E-learning course website. If students know of additional articles or topics that they would like to discuss, please contact me.

Class participation and group projects, such as PowerPoint presentations, videos, blogs, skits, are a major part of the class. Group projects are an opportunity to be creative and explore your thoughts and opinions on an issue; students will present group projects every week. For some topics, team-based learning (TBL) modules have been designed that enable students to work in teams to discuss reading material, take Readiness Assurance Tests, and apply knowledge from the readings to Applications (these are components of a TBL approach).

The course meets two times per week on Tuesday and Thursday. The course format will be introduction to a new topic with lecture, video material and discussion on Thursday and student teams will give presentations of an argument, and evidence for that argument, relevant to the topic on the following Tuesday. Presentations are graded on engaging the scientific evidence relevant to the topic, evidence of critical thinking, and clarity.

Grading: UF grading policies are at https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Final grades will be determined by the following five categories (see detailed descriptions below):

Participation	50 points
Five **team-based learning modules** (20 pts/set of quizzes)	100 points

Team projects:

- Four **team projects/Presentations** (20 pts/project)	80 points
- Two **team projects/Debates** (20 pts/project)	40 points
- **Oral presentation** of one Team project/Presentation	25 points
- **Peer grades** for team projects	25 points
One **individual presentation**	30 points
One **paper**	50 points
Total points	**400 points**

- **Participation** is important to facilitate class discussions of the topics covered in class – in the past, many students have said they learned the most from these class discussions. Participation comments provide a demonstration that the assigned material was read and evidence that the students have thought about the material, and also provide different perspectives on the ethical issues being discussed. Participation is required of all students and will be based on each student's contribution of comments, questions, etc to the class. Students are not graded on the brilliance of their statements, but on their willingness to talk in class. Participation will be graded on comments made in class, not comments made to me personally after class, because the purpose of participation is to prompt class discussions. I will ensure that no student dominates the discussions and that there are opportunities for all students to participate.
  - Approximately 85% of the participation grade will be based on the following:
    - Comments made or questions asked in class during:
      - lectures
      - discussions about weekly videos
      - presentations of team-based learning decisions
      - classmates' oral presentations
    - Presenting and defending team decisions in the team-based learning modules
  - Approximately 15% of the participation grade will be based on attendance.
- **Team-based learning modules** – Students will work in team for five team-based learning modules (Race, Genetic screening III, Robots/AI, Organ donation, Good life/death). A key feature of team-based learning is readiness assurance tests (RATs) to ensure that all students are prepared and have completed all of the assigned readings prior to class. Readiness assurance tests are administered as individual and team tests. There will be a set of readiness assurance tests (individual and team) for each of the team-based learning modules.
- **Team projects** (the lowest grade on team projects will be dropped)
  - **Team presentations** – Teams will work on four team projects (Genetic screening I, Cloning, Stem cells, Animal cognition/language). The majority of team projects will be a 5-10 min PowerPoint presentation. Students are encouraged to explore alternative group projects (e.g. podcast, short video, website, short play, etc) and at least one team project must be something other than a PowerPoint presentation. Each project will present a certain side, and take a distinct stand, on an aspect of the bioethical issue being discussed that week. Each project must have a clear scientific underpinning. Students will work on the projects outside of class– you can work in person or virtually, but each project should be a team effort. If any team experiences problems, i.e. a member of the team is not contributing to the projects, please notify me as soon as possible so we can improve the situation.
  - **Team debates** – Teams will participate in two debates during the semester (Genetic screening II/Eugenics and Evolution/Intelligent design). Teams should prepare for the debate outside of class as a team, in person or virtually.

    - One member of each team will present their team's PowerPoint as an **oral presentation** to the class each week. The members of each team will decide who presents each week. If it's appropriate to the presentation, more than one team member can present in one week.
    - Within each team, team members will assign **peer grades** to their team mates to reflect their contributions during the team-based learning modules and the team projects.
- **Individual presentation** – Students will prepare and present one 5-10 min individual presentation for one of two modules (Right to die and Human origins - ½ of the students will present on Right to die and ½ of the students will present on Human origins). Students can choose which type of presentation to create, e.g. PowerPoint, podcase, exhibit, short video, play, etc.
- For your **paper**, you will choose a bioethical issue to discuss. Students should use the paper as an opportunity to investigate a new perspective or new opinion as opposed to something the student has already thought about exhaustively. There must be a clear scientific aspect to the issue you choose and you must explain the science and how it relates to your chosen bioethical issue, in addition to developing the bioethical issue. The paper will be due April 25. The expected length of the paper is ~2500-3000 words or ~4-5 single-spaced pages (not including references).

Final grades will be based on the following point percentages:
100 - 93% = A
92.99 - 90% = A-
89.99 - 87% = B+
86.99 - 83% = B
82.99 - 80% = B-
79.99 - 77% = C+
76.99 - 73% = C
72.99 - 70% = C-
69.99 - 67% = D+
66.99 - 63% = D
62.99 - 60% = D-
Less than 60% = E

Strategies for success:

- "Learning is not a spectator sport. Fundamentally, the responsibility to learn is yours and yours alone. For learning to happen in any course, you must take an active role in the process. For our class, you are expected to come to class 'prepared' and 'ready to learn', which requires you to read and to study the assigned reading before you come to class." Excerpted from Romack 2010, Enhancing Students' Readiness to Learn, Faculty Focus Special Report: 11 Strategies for Getting Students to Read What's Assigned.
- Furthermore, to get the most out of class, you must arrive on time (5 minutes late is not on time) and you must not use computers for non-class-related activities or use cell phones during class. While you may think that you can multi-task and follow the lecture or discussion while playing on your phone, you will definitely learn less and get less out of the course than if you give class your undivided attention. Finally, punctuality is a show of respect for your instructor and classmates and is important not just in class but in your job and eventual career.
- It is important to complete all the readings on time and it is best to read the readings throughout the week. In this way, you have time to think about and process the information during the week and in between different readings. Ideally, you would read some every night of the week. The amount of reading material is very modest, particularly for an anthropology course.

- For the team projects, you will have to get started as early as possible each week in order to create quality presentations. There will be 5-10 min at the end of the Thursday class for team to meet and discuss their topic and presentation for the following Tuesday. By the end of the semester, you will (hopefully) have learned how to efficiently choose and research a topic and create an informative and engaging presentation. If you are the one giving the presentation, it is a good idea to practice your entire presentation without any stops the night before your scheduled presentation – this ensures your talk is the correct length of time and develops good practice for all public speaking.

Useful websites:
http://www.ncbi.nlm.nih.gov/pubmed - National Library of Medicine database of over 11 million journal articles dating back to the 1960s
https://www.genome.gov/genetics-glossary – NIH-maintained glossary of genetic terms
http://bioethics.georgetown.edu/pcbe/reports/beyondtherapy/beyond_therapy_final_webcorrected.pdf - Beyond Therapy: Biotechnology and the Pursuit of Happiness, report from the President's Council on Bioethics, 2003 (353 pages)
http://www.genome.gov/LegislativeDatabase - Database of federal and state laws focused on genetic issues, such as genetic testing and counseling, insurance and employee discrimination, etc.

Attendance and punctuality: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx Because the class format is mainly discussion, it is very difficult to make up missed classes by borrowing notes, etc. Therefore, students are strongly encouraged to attend all classes and to arrive on time. Punctuality is important because I summarize important logistical items at the beginning of class and because punctuality demonstrates professionalism and responsibility. Computers should be used sparingly in class. In a seminar format, it is more important to participate in class discussions than record everything on your computer. Additionally, it can be very off-putting to speak to a sea of laptop backs.

Copyright information: Publication of any course materials without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Accommodations: UF is committed to achieving full accessibility for people with disabilities, and I am committed to making this classroom accessible to you. If there are ways in which the overall structure of the course and general classroom interactions could be adapted to facilitate improved participation, please do not hesitate to raise your ideas with me: Your comments and suggestions about the format of readings, lectures, and class discussions are always welcome.

If you require accommodation due to a disability, please make an appointment or visit during my office hours so that we may discuss your needs. Students requesting classroom accommodation must first register with the Dean of Students Office, 392-1261, 202 Peabody Hall. The Dean of Students

Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

Evaluations: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

Academic honesty: As a result of completing the registration form at the University of Florida, every student has signed the following statement: "I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions – prohibited behavior includes the use of AI applications to write assignments. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

The latest student honor code and student conduct code can be found at https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/

An excellent website that discusses plagiarism, correct citing of references and correct use of quotes is http://mediasite.video.ufl.edu/mediasite/Viewer/?peid=adaa44500eaf460a84f238e6b9a558f9. All students should read this material at least once. Remember that the university considers self-plagiarism to be plagiarism.

Critical thinking and freedom of speech: Students are encouraged to employ critical thinking and to rely on data and verifiable sources to interrogate all assigned readings and subject matter in this course as a way of determining whether they agree with their classmates and/or their instructor. No lesson is intended to espouse, promote, advance, inculcate, or compel a particular feeling, perception, viewpoint or belief.

UF Counseling Services: On-campus services are available for students having personal problems or lacking clear career and academic goals. They include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual assault counseling
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling
5. Additionally, student web-based resources on sexual harassment are available at http://www.ufsa.ufl.edu/students/sh/sexualharassment.shtml

U Matter We Care

Your well-being is important to the University of Florida. The U Matter We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a

friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Course schedule:

January 10 – Introduction

- Course format
- What do we mean by ethics?
- Memory exercise
- How to read a scientific journal article
- Sample PubMed search
- Sample oral presentation
- Create study groups for group presentations
- Assessment of class opinions and experiences concerning science & ethical issues

January 12 - Team-based learning AND Science in our daily lives

- What is team-based learning?
- How can team-based learning be used to help make difficult decisions about ethical issues?
- What do people think about science and scientific data?
- How should scientific data be used?

Video – TED talk, John Wilbanks: Let's pool our medical data, http://www.ted.com/talks/john_wilbanks_let_s_pool_our_medical_data

Required reading (*** indicates pdfs that are posted on the course webpage)

- ***Team-based learning handout #1
- ***Team-based learning handout #2
- ***The essential elements of team-based learning, Michaelsen and Sweet, 2008, New Directions for Teaching and Learning, 116, DOI: 10.1002/tl.330.
- ***America's crisis of faith in science, Pittinsky, 2015, Science, http://www.sciencemag.org/content/348/6234/511.1.full?utm_campaign=email-sci-toc&utm_src=email
- ***Biology's brave new world, Greenbaum, 2020, Science, https://science.sciencemag.org/content/369/6508/1170?utm_campaign=toc_sci-mag_2020-09-03&et_rid=34819171&et_cid=3470116
- When does life begin?, Dias, NYT, 2022, https://www.nytimes.com/interactive/2022/12/31/us/human-life-begin.html?campaign_id=9&emc=edit_nn_20230102&instance_id=81638&nl=the-morning&regi_id=87569322&segment_id=121364&te=1&user_id=2e3ca399bdce54b3d3c6cfbdc8361680

January 17 – Race (Team-based learning module)

- Is there a biological basis to race?
- How have we evolved?
- Global distribution of genetic and phenotypic variation
- How different are we?
- Estimates of genetic ancestry
- Genetic ancestry testing
- Racial disparities in health

Required reading (*** indicates pdfs that are posted on the course webpage):

- Wikipedia entry on 'Race and Genetics', http://en.wikipedia.org/wiki/Race_and_genetics
- Race: The Power of an Illusion, interview with Alan Goodman, http://www.pbs.org/race/000_About/002_04-background-01-07.htm
- ***What is ancestry? Mathieson & Scally, 2020, PLOS Genetics, https://journals.plos.org/plosgenetics/article?id=10.1371/journal.pgen.1008624
- ***Examining how race, ethnicity, and ancestry data are used in biomedical research, Bonham et al., 2018, Journal of American Medical Association, 320:1533-1534, https://jamanetwork.com/journals/jama/fullarticle/2703957
- ***How race becomes biology: Embodiment of social inequality, Gravlee, 2009, Am J Phys Anthropol, 139:47-57.
- The effect of bias in genomic studies, BioTechniques, Sept 24, 2018, https://www.biotechniques.com/omics/the-effect-of-bias-in-genomic-studies/
- I don't need a DNA test to tell me how black I am, NYT, April 16, 2019, https://www.nytimes.com/2019/04/16/opinion/dna-test-23andme-race.html?emc=edit_th_190417&nl=todaysheadlines&nlid=552340260417
- ***Sample Genetic ancestry report, intended for an African American audience

January 19 Race – Team-based learning application

January 24 – Race

Video – African American Lives

January 26 - Genetic screening I/Genetic testing

- Genetic testing for disease risk
- Prenatal screening
- Testing for personality, mate choice, etc
- How should genetic information be used?

Required reading (*** indicates pdfs that are posted on the course webpage):

- When 'Where are you from?' Takes You Someplace Unexpected, NPR Aug 10, 2017, https://www.npr.org/sections/codeswitch/2017/08/10/541921634/when-where-are-you-from-takes-you-someplace-unexpected?utm_source=npr_newsletter&utm_medium=email&utm_content=201

70813&utm_campaign=&utm_term?utm_source=npr_newsletter&utm_medium=email&utm_content=20170813&utm_campaign=&utm_term

- ***Screening embryos for complex genetic traits called premature, Science, Oct 25, 2019, https://science.sciencemag.org/content/366/6464/405?utm_campaign=toc_sci-mag_2019-10-24&et_rid=34819171&et_cid=3044162
- ***Pregnancy: Prepare for unexpected prenatal test results, Bianchi, 2015, Nature, http://www.nature.com/news/pregnancy-prepare-for-unexpected-prenatal-test-results-1.17655
- ***Chloe's Law: A powerful legislative movement challenging a core ethical norm of genetic testing, Caplan, 2015, PLOS Biology, https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1002219
- ***Divulging DNA secrets of dead stirs debate, Couzin-Frankel, Science, 2014, 343:356-357, http://www.sciencemag.org/content/343/6169/356.full
- ***Should police have access to genetic genealogy databases? Capturing the Golden State Killer and other criminals using a controversial new forensic technique, Guerrini et al. 2018, PLOS ONE, https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2006906
- Sues San Francisco Over Arrest Based on DNA From Her Rape Kit, NYT, Sept 2022, https://www.nytimes.com/2022/09/13/us/rape-kit-dna-san-francisco.html?action=click&algo=bandit-all-surfaces-variants-shadow-lda-unique-time-cutoff-30&alpha=0.05&block=trending_recirc&fellback=false&imp_id=924343773&impression_id=af035da3-335a-11ed-9492-6321050b788a&index=3&pgtype=Article&pool=pool%2F91fcf81c-4fb0-49ff-bd57-a24647c85ea1&region=footer&req_id=555382133&shadow_vec_sim=0.0548620346571596 9&surface=eos-most-popular-story&variant=0_bandit-eng30s-shadow-lda-unique

- Work on first team presentations

January 31 - Genetic screening I/Genetic testing team presentations

February 2 – Genetic screening II/Eugenics

- Eugenics
- Genome modification
- Designer babies
- Pre-implantation genetic testing

Required reading (*** indicates pdfs that are posted on the course webpage):

- Bioethics at the Movies (BAM)
  - Chpt 5 ("No Gene for Fate?": Luck, Harm, and Justice in *Gattaca*)
  - Chpt 6 (Lifting the Genetic Veil of Ignorance: Is there anything really unjust about *Gattacan* society?)
- ***GATTACA is still pertinent 25 years later, Greenbaum and Gerstein, 2022, Nature Genetics, file:///C:/Users/cmulligan/Downloads/s41588-022-01242-5.pdf

- The controversial embryo tests that promise a better baby, Kozlov, 2022, Nature, https://www.nature.com/articles/d41586-022-02961-9?WT.ec_id=NATURE-20220922&utm_source=nature_etoc&utm_medium=email&utm_campaign=20220922&sap-outbound-id=86301EF48A3CACDF344CF38B11366F3700612ABC
- ***A cautionary tale of eugenics, Rutherford, Science, 2021, 373:1419, A cautionary history of eugenics (science.org)
- ***Establishing the International Genetic Discrimination Observatory, Joly et al. 2020, Nature Genetics, file:///C:/Users/cmulligan/Downloads/s41588-020-0606-5-1.pdf

Video – *GATTACA*

February 7 - Genetic screening II/Eugenics debate

February 9 – Genetic screening III/Genome editing and gene therapy (Team-based learning module)

- Genome editing, CRISPR/Cas9
- Gene therapy
- Gene therapy case study at UF

Required reading (*** indicates pdfs that are posted on the course webpage):

- What is CRISPR/Cas9? Your Genome, https://www.yourgenome.org/facts/what-is-crispr-cas9
- Genome-editing revolution: My whirlwind year with CRISPR, Doudna, 2015, Nature, http://www.nature.com/news/genome-editing-revolution-my-whirlwind-year-with-crispr-1.19063?WT.ec_id=NATURE-20151224&spMailingID=50325468&spUserID=MjA1NzYzMjUzNAS2&spJobID=823531954&spReportId=ODIzNTMxOTU0S0
- In a 1st, doctors in US use CRISPR tool to treat patient with genetic disorder, NPR, July 2019, https://www.npr.org/sections/health-shots/2019/07/29/744826505/sickle-cell-patient-reveals-why-she-is-volunteering-for-landmark-gene-editing-st
- Chinese scientist claims to use CRISPR/Cas9 to make first genetically edited babies, NYT, Nov 26, 2018, https://www.nytimes.com/2018/11/26/health/gene-editing-babies-china.html
- ***Government report blasts creator of CRISPR twins, 2019, Science, 363:328, http://science.sciencemag.org/content/363/6425/328.full
- As creator of 'CRISPR babies' nears release from prison, where does embryo editing stand? Cohen, 2022, Science, https://www.science.org/content/article/creator-crispr-babies-nears-release-prison-where-does-embryo-editing-stand
- CRISPR's 'ancestry problem' misses cancer targets in those of African descent, Kaiser, 2022, Science, https://www.science.org/content/article/crispr-s-ancestry-problem-misses-cancer-targets-those-african-descent
- ***UF's Explore article on UF's Barry Byrne's research on Pompe disease and how it was made into a movie, 2010, https://research.ufl.edu/publications/explore/past/fall2010/story_2/documents/Extraordinary_Measures.pdf

Video – *Extraordinary Measures*

February 14 - Genetic screening III/Genome editing and gene therapy - Team-based learning application

February 16 - Cloning

- What is cloning?
- Can we clone humans?
- Are two genetically identical humans really the same individual?

Required reading (*** indicates pdfs that are posted on the course webpage):

- Bioethics at the Movies (BAM)
  - Chpt 7 (*Multiplicity*: A study of cloning and personal identity)
  - Chpt 8 (Is ignorance bliss: *Star Trek: Nemesis*, Cloning and the right to an open future)
- Neanderthals are people too, NYT, April 24, 2014 - http://www.nytimes.com/2014/04/25/opinion/neanderthals-are-people-too.html?emc=edit_th_20140425&nl=todaysheadlines&nlid=60704772
- ***Cloning humans? Biological, ethical, and social considerations, Ayala, 2015, PNAS - http://www.pnas.org/content/112/29/8879.full?sid=c34596b7-09fa-45b4-8b3f-d3e6a0de3fa2

Video – *Multiplicity*

February 21 - Cloning team presentations

February 23 – Robots/AI (Team-based learning module)

- What rights do robots/clones/unborn babies have?
- Self-replication – Organisms and DNA
- Blurring the line between humans and robots
- Machine learning and the future

Required reading:

- Bioethics at the Movies (BAM)
  - Chpt 3 (*Homo sapiens*, robots, and persons in *I, Robot* and *Bicentennial Man*)
- To make robots more human-like, we need to teach them how to be mind readers, Azarian, Oct 25, 2016, Quartz.com, https://qz.com/817476/to-make-robots-more-human-like-we-need-to-teach-them-how-to-be-mind-readers/
- Neurons in a dish learn to play Pong – what's next? Ledford, 2022 Nature, https://www.nature.com/articles/d41586-022-03229-y?WT.ec_id=NATURE-20221020&utm_source=nature_etoc&utm_medium=email&utm_campaign=20221020&sap-outbound-id=63ACCBA6799E05E57C343F4EEE44102E3E76A2DE
- Can lab-grown brains become conscious? Reardon, 2020, Nature, https://www.nature.com/articles/d41586-020-02986-y?WT.ec_id=NATURE-20201029&utm_source=nature_etoc&utm_medium=email&utm_campaign=20201029&sap-outbound-id=B03EAAF0B9708731EF3DE20F16B6A243640C42E5

- UF partners with CIA on improving cybersecurity, July 12, 2022, https://news.ufl.edu/2022/07/project-to-improve-cybersecurity/

Video –*Bicentennial Man*

February 28 - Robots/AI – Team-based learning application

March 2 – Stem cells

- Different types and uses of stem cells
- Status of stem cell research
- Current and potential applications of stem cells

Required reading (*** indicates pdfs that are posted on the course webpage):

- Stem Cell Quick Reference, https://learn.genetics.utah.edu/content/stemcells/quickref/
- UM professor on stem cell research today, http://www.youtube.com/watch?v=HZWVj5mqJ1I&feature=channel (watch the video)
- ***A review of regenerative therapy for spinal cord injury using human iPS cells, Kawai et al., 2023, NASSJ, https://www.sciencedirect.com/science/article/pii/S2666548422000877?via%3Dihub

Video – PBS documentary on stem cell research

March 7 - Stem cell team presentations

March 9 - Organ donation/Exploitation (Team-based learning module)

- Organ donation/wait lists/commodification of organs
- Exploitation of individuals in developing countries/poor people
- Informed consent/Issue of greater good

Required reading (*** indicates pdfs that are posted on the course webpage):

- Bioethics at the Movies (BAM)
  - Chpt 11 (Commodification, exploitation, and the market for transplant organs/*Dirty Pretty Things*)
  - Chpt 18 ("If you could cure cancer by killing one person, wouldn't you have to do that?"/*Extreme Measures*)
- Wikipedia entry on the Tuskegee Syphilis Study, https://en.wikipedia.org/wiki/Tuskegee_Syphilis_Study
- ***A shocking discovery, Semeniuk, *Nature*, Oct 4, 2010, 467:645, http://www.nature.com/news/2010/101004/full/467645a.html
- ***Developing pig-to-human organ transplants, Sykes, 2022, Science, https://www.science.org/doi/full/10.1126/science.abo7935?et_rid=34819171&utm_campaign=SCIeToc&af=R&et_cid=4444880&utm_medium=email&utm_content=alert&utm_source=sfmc

Video – *Never Let Me Go*

March 14, 16 Spring break

March 21 - Organ donation/exploitation - Team-based learning application

March 23 - Right to die

- Withdrawal of life-sustaining treatment
- Right to die
- Relevance to people with disabilities

Required reading (*** indicates pdfs that are posted on the course webpage):

- Bioethics at the Movies (BAM)
  - Chpt 14 (False images: Reframing the end-of-life portrayal of disability in *Million Dollar Baby*)
  - Chpt 15 ("I can't be like this, Frankie, not after what I've done": *Million Dollar Baby* and the value of human lives)
- Immigrant's health crisis leaves her family on sideline, NYT, March 3, 2011, https://www.nytimes.com/2011/03/04/us/04immigrant.html
- http://www.amazon.com/Breath-Lifetime-Rhythm-Iron-Memoir/dp/1608191192 - Breath: A Lifetime in the Rhythm of an Iron Lung: A Memoir – read reviews also

Video – *Million Dollar Baby*

March 28 - Right to die individual presentations

March 30 - Quest for good life/death (Team-based learning module)

- Technological innovations for improved happiness
- Memory deletion as a means to happiness
- Can a good death compensate for an impoverished life?
- Assisted suicide

Required reading (*** indicates pdfs that are posted on the course webpage):

- Bioethics at the Movies (BAM)
  - Chpt 9 ("Blessed are the forgetful": The ethics of memory deletion in *Eternal Sunshine of the Spotless Mind*)
  - Chpt 17 (The thanatoria of *Soylent Green*: On reconciling the good life with the good death)
- Manipulating memories, BioTechniques, May 2019, https://www.biotechniques.com/preclinical/manipulating-memories/
- ***Revisiting propranolol and PTSD: Memory erasure or extinction enhancement, Giustino et al. 2016, Neurobiology of Learning and Memory, https://ac.els-cdn.com/S1074742716000216/1-s2.0-S1074742716000216-main.pdf?_tid=0a80a2a2-d982-4326-8f97-0eefca79d62d&acdnat=1544565636_d9bbb0c8ba30dd0dbd534b404f0be786 (pdf on course webpage)

- Scientists trace memories of things that never happened, NYT, July 25, 2013, http://www.nytimes.com/2013/07/26/science/false-memory-planted-in-a-mouse-brain-study-shows.html?src=me&ref=general

Video – *Eternal Sunshine of the Spotless Mind*

April 4 - Quest for good life/death - Team-based learning application

April 6 - Animal cognition/animal rights

- Animal experimentation/exploitation
- Vegetarianism and other uses of animals
- Animal testing/medical advances
- Animal cognition/what separates us from other animals?

Required reading (*** indicates pdfs that are posted on the course webpage):

- Bioethics at the Movies (BAM)
  - Chpt 4 (The *Babe* vegetarians: Bioethics, animal minds, and moral methodology)
- "Wanted: Intelligent aliens, for a research project", Olivia Judson, NYT, Sept 30, 2008, http://opinionator.blogs.nytimes.com/2008/09/30/wanted-intelligent-aliens-for-a-research-project/
- ***Understanding others: Emotion recognition abilities in humans and other animals, Ferretti and Papaleo, 2018, Genes, Brain, and Behavior, Dec 13:e12544, https://onlinelibrary.wiley.com/doi/abs/10.1111/gbb.12544 (read through Section 3.3.2 Prairie voles)
- A searchable website that documents scientific advances made through animal research - http://www.animalresearch.info/en/medical-advances/diseases-research/

Video – *Babe*

April 11 - Animal cognition/animal rights team presentations

April 13 - Human origins/Admixture with archaic hominids

- Human genetic variation
- Human evolution
- Archaic hominids and admixture with modern humans

Required reading (*** indicates pdfs that are posted on the course webpage):

- Revolution in human evolution, Ann Gibbons, Science, July 2015, 349: 362-366, http://www.sciencemag.org/content/349/6246/362.full?sid=b053f6c4-8ff7-4327-9d3a-a1b138ed406c
- Archaic hominin introgression into modern human genomes, Gokcumen, 2019, Yrb Biol Anthro, https://onlinelibrary.wiley.com/doi/epdf/10.1002/ajpa.23951
- The genomics of human local adaptation, Rees et al. 2020, Trend Genet, https://www.cell.com/action/showPdf?pii=S0168-9525%2820%2930070-6
- A molecular investigation of human self-domestication, Wilkins, 2020, Trend Genet, https://www.cell.com/action/showPdf?pii=S0168-9525%2820%2930004-4

Video – TED lecture - Svante Paabo: DNA clues to our inner Neanderthal

April 18 - **Human origins individual presentations**

April 20 - **Evolution/intelligent design**

- Scientific basis of evolution and creationism/intelligent design
- Should evolution/creationism/intelligent design be required subjects to teach? In what classes?

Required reading (*** indicates pdfs that are posted on the course webpage):

- ***Darwin in the Dock, Talbot, 2005, *The New Yorker*, pp 66-77, http://go.galegroup.com/ps/infomark.do?source=gale&srcprod=AONE&tabID=T003&userGroupName=gain40375&prodId=AONE&action=interpret&docId=A139444013&type=retrieve&contentSet=IAC-Documents&version=1.0
- *** Evolution and Creationism in America's Classroom: A National Portrait, Berkman et al., 2008, *PLoS Biology*, 6:0920-0924 - http://www.plosbiology.org/article/info%3Adoi%2F10.1371%2Fjournal.pbio.0060124
- ***The evolution of antievolution policies after Kitzmiller vs Dover, Matzke, 2016, Science, 351:28-30, http://science.sciencemag.org/content/351/6268/28.full?utm_campaign=email-sci-toc&et_rid=34819171&et_cid=186003-Talbot%20M.%202005.%20Darwin%20in%20the%20Dock

Course evaluations

April 25 - **Evolution/intelligent design debates**

Paper due