

CHAPMAN UNIVERSITY
University Honors Program
One University Drive
Orange, CA 92866

Ethical Implications of Biotechnology – Spring 2016
HON 384

Lecture: Tuesday and Thursday 1:00 – 2:15 PM | Argyros Forum 205

Instructors: Milton Greenberg, Ph.D. and Tim Lee

Office Hours: Hashinger Science Center 53 | Monday 10:00 – 12:00 AM, Tuesday 3:00 – 5:00 PM

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Prerequisites: Formal acceptance in the University Honors Program

Course Description

This course looks at the science and ethical controversies behind biotechnologies such as genetic engineering, designer babies, stem cell research/3-D printing, mechanistic augmentations/bionics, Drugs, and immortality. The scientific steps of these biological methodologies will be taught, and extensively examined using different moral philosophies such as Natural Law (Aquinas), Nietzsche, Utilitarianism (Mills), Deontology (Kant), and Buddhism.

Restrictions: Students formally admitted into the University Honors Program or permission of course instructor and Director of Honors

Learning Outcomes

1. GE Learning Outcomes
 - a. GE 7VI Learning Outcome: *Articulates how values and ethics inform human understanding, structures, and behavior.*
 - b. GE 7NI Learning Outcome: *Uses scientific principles and reasoning as a way of knowing the natural world and distinguishes science from non-science*
 - c. GE 7SI Learning Outcome: *Identifies, frames, and analyzes the processes by which human beings develop social and/or historical perspectives.*
2. Program and Course Learning Outcomes: Upon completion of this course students will be able to:
 - a. Critically understand general philosophical and religious approaches to ethical theory, ancient and modern, through the study of primary texts;
 - b. Understand the scientific theories and methodologies behind current biotechnologies and other biological constructs.
 - c. Appreciate the complexity of the ethical life and the need for theoretical nuance as they critically apply philosophical and religious approaches, which they have learned, to the sciences and more specifically, the medical and biological fields of study.
 - d. Think critically, and with an open mind, about contemporary moral issues;
 - e. Develop effective communication skills, specifically in the areas of oral and written exposition, by judiciously analyzing and synthesizing a broad range of knowledge through engagement in active learning with fellow students, faculty, texts, and the world as well as through written information.

Course Content

This course looks at the science and ethical controversies behind biotechnologies such as genetic engineering, designer babies, stem cell research/3-D printing, mechanistic augmentations/bionics, Drugs, and immortality. The scientific steps of these biological methodologies will be taught, and extensively examined using different moral philosophies such as Natural Law (Aquinas), Nietzsche, Utilitarianism (Mills), Deontology (Kant), and Buddhism.

Required Texts

1. White, James E. *Contemporary Moral Problems*. United States: Thomson/Wadsworth, 2006.
2. Gregory, Wanda Torres, and Donna Giancola. *World Ethics*. Australia: Wadsworth/Thomson Learning, 2003.
3. Freeman, Scott. *Biological Science*. San Francisco: Pearson Benjamin Cummings, 2011.
4. Maisto, Stephen A., Mark Galizio, and Gerard J. Connors. *Drug Use and Abuse*. Belmont, CA: Thomson Wadsworth, 2008.
5. *Gattaca*. Dir. Andrew Niccol. Perf. Ethan Hawke and Uma Thurman. Continental Film, 1997.
6. *Google Baby*. Dir. Zippi Brand Frank. 2009.
7. Thomas, Clare E., Anja Ehrhardt, and Mark A. Kay. "Progress and Problems with the Use of Viral Vectors for Gene Therapy." *Nat Rev Genet Nature Reviews Genetics* 4.5 (2003): 346-58.
8. Murphy, Sean V., and Anthony Atala. "3D Bioprinting of Tissues and Organs." *Nat Biotechnol Nature Biotechnology* 32.8 (2014): 773-85.
9. Serruya, Mijail Demian, and Michael J. Kahana. "Techniques and Devices to Restore Cognition." *Behavioural Brain Research* 192.2 (2008): 149-65.

Note: All texts will be available on blackboard or are free and links will be provided.

Instructional Strategies

1. The class will be structured as a seminar. Sometimes mini-lectures will be used to introduce the historical context and theoretical framework of our readings so as to enhance seminar conversations – intended to achieve Program and Course Learning Outcomes (a) and (b).
2. Students are expected to arrive at their own conclusions about issues discussed, to be able to give reasons for their conclusions, and to sympathetically understand why others may disagree – intended to achieve Program and Course Learning Outcome (c).
3. Students are expected to develop further the art of conversation. Conversation requires active listening – that is, openness to what others have to say, asking questions, risking opinions, and the willingness to engage in the back-and-forth of open-ended dialogue. Such conversations are essential for global citizenship in a pluralistic world – intended to achieve Program and Course Learning Outcome (d).
4. The above three strategies are together intended to meet GE Learning Outcomes for 7VI, 7NI, and 7SI.

Course Requirements

1. *Class Attendance*: Class attendance is required. You are expected to attend all class meetings and to have Information prepared when they are due. More than three absences will result in zero points for 'Class Participation'. For each absence beyond three there will be a 5% deduction from your possible semester grade.
2. *Class Participation*: Participation does not mean mere presence in the classroom. Instead, it means active listening – that is, the willingness to engage in the back-and-forth of open-ended and reasoned conversations by being open to what others have to say, risking our opinions, asking questions, and surfacing disagreements. Such "active listening" is essential to being a community of scholars.

3. *Reading Information:* You are asked to study carefully all required readings by the day on which they appear on the projected course schedule. It is important to note that you are asked not merely to read all assigned materials but to study them. Such study may require several readings of the material.
4. *Class Time:* Class meetings will be, for the most part, seminar conversations.
5. *Homework:* You are to complete said homework assignments and turn them into class on time. Turning them in by the next class will result in a 10% deduction on the assignment. No assignments will be accepted after that.
6. *Exams:* There will be two in-class exams during the semester.
7. *Final Presentation and Debate:* You will be broken up into two teams to come up with a well-reasoned argument supporting or opposing the notion of striving for immortality while incorporating some of the ethical models presented throughout the course. Do not forget to include factors like social structures, natural resources, ethics of immortality, etc. There should be a coherent synthesis of the theoretical foundations studied and should including a defense of possible criticisms. You will initially give a presentation stating your position and evidence and reasonable arguments to support your thesis. After both presentations, a debate will be held between the two groups.

Chapman University Academic Integrity Policy

Chapman University is a community of scholars which emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work, and academic dishonesty of any kind will not be tolerated anywhere in the university.

Chapman University Students with Disabilities Policy

In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class are encouraged to contact the Office of Disability Services. If you will need to utilize your approved accommodations in this class, please follow the proper notification procedure for informing your professor(s). This notification process must occur more than a week before any accommodation can be utilized. Please contact Disability Services at (714) 516-4520 or (www.chapman.edu/students/student-health-services/disability-services) if you have questions regarding this procedure, or for information and to make an appointment to discuss and/or request potential accommodations based on documentation of your disability. Once formal approval of your need for an accommodation has been granted, you are encouraged to talk with your professor(s) about your accommodation options. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course.

Chapman University Diversity Policy

Chapman University is committed to fostering learning and working environments that encourage and embrace diversity, multiple perspectives, and the free exchange of ideas as important measures to advance educational and social benefits. Our commitment and affirmation are rooted in our traditions of peace and social justice and our mission of producing ethical and responsible global citizens. The term diversity implies a respect for all and an understanding of individual differences in age, class, disability, ethnicity, gender, language, national origin, race, religion, sexual orientation, and socioeconomic status.

Methods of Evaluation

1. Evaluation and grading will be based on the following:

<u>Requirements</u>	<u>Percentage of Grade</u>
First Exam:	15%
Second Exam:	15%
Class Participation:	30%
Homework	20%
Final Presentation/Debate:	20%

2. Grades will be assigned as follows:

A = 100-90; B = 89-80; C = 79-70; D = 69-60; F = below 59

Projected Schedule of Topics and Information

Date Topic and Assignment

February 2	Introductions <ul style="list-style-type: none">▪ Class members introduce themselves▪ Review syllabus: objectives/expectations of the course▪ General introduction to the course▪ What is Ethics?▪ Watch Peter Singer on Bioethics (https://www.youtube.com/watch?v=wp53IGPJv9s)
February 4	Basic Biology (DNA and Disease) and What is Bioethics <p>Read: Gregory & Giancola, <i>World Ethics</i></p> <ul style="list-style-type: none">▪ Pages xiii-xx: Introduction <p>Read: Freeman, <i>Biological Science</i></p> <ul style="list-style-type: none">▪ Pages 59-65: Nucleic Acids▪ Pages 263-272: DNA synthesis▪ Pages 285-286: Genes
February 9	Basic Biology (Cells) and What is Bioethics <p>Read: James E. White, <i>Contemporary Moral Problems</i></p> <ul style="list-style-type: none">▪ Pages 1-12: Introduction <p>Read: Freeman, <i>Biological Science</i></p> <ul style="list-style-type: none">▪ Pages 105-116: Inside Cells (Eukaryotes)▪ Pages 195-201: Mitosis and Cell Cycle▪ Pages 212-222: Meiosis▪ Pages 225-226: Cell Reproduction Mistakes
February 11	Basic Biology (Overview) and What is Bioethics <p>Read: Stephen Pinker, <i>The Moral Imperative for Bioethics</i></p> <ul style="list-style-type: none">▪ https://www.bostonglobe.com/opinion/2015/07/31/the-moral-imperative-for-bioethics/JmEkoyzlTAu9oQV76JrK9N/story.html▪ Suggested Reading: David Hume (Optional)
February 16	Genetic Engineering and Natural Law <p>Read: Gregory & Giancola, <i>World Ethics</i></p> <ul style="list-style-type: none">▪ Pages 57-67: Thomas Aquinas <p>Read: Freeman, <i>Biological Science</i></p> <ul style="list-style-type: none">▪ Pages 338-343: Case 1 – The Effort to Cure Pituitary Dwarfism: Basic Recombinant DNA Technologies

- February 18** **Genetic Engineering and Natural Law**
 Read: James E. White, *Contemporary Moral Problems*
 ▪ Pages 27-30: The Natural Law
 Read: Freeman, *Biological Science*
 ▪ Pages 351-354: Case 5 – Severe Immune Disorders: The Potential of Gene Therapy
- February 23** **Genetic Engineering and Natural Law**
 Read: Freeman, *Biological Science*
 ▪ Pages 354-356: Case 6 – The Development of Golden Rice: Biotechnology in Agriculture
- February 25** **Genetic Engineering and Natural Law**
 Read: Thomas, Ehrhardt, and Kay, *Progress and Problems with the Use of Viral Vectors for Gene Therapy*
- March 1** **Review**
March 3 **Exam 1**
- March 8** **Designer Babies/Eugenics and Nietzsche**
 Read: Gregory & Giancola, *World Ethics*
 ▪ Pages 112-119: Nietzsche
 Read: Freeman, *Biological Science*
 ▪ Pages 377-379: Differentiation
 ▪ Pages 388-392: Fertilization
- March 10** **Designer Babies/Eugenics and Nietzsche**
 Watch: Dr. Maggie Little, *Introduction to Bioethics: Bioethics at the Beginning of Life*
 ▪ <https://www.youtube.com/watch?v=hqZlvhW8mus>
- March 15** **Designer Babies/Eugenics and Nietzsche**
 Watch: *Google Baby*
 ▪ <https://www.youtube.com/watch?v=pQGIAM0iWFM>
- March 17** **Designer Babies/Eugenics and Nietzsche**
 Watch: *Gattaca*
- March 22** **Spring Break**
March 24 **Spring Break**
- March 29** **Stem Cell Research/3-D Printing and Utilitarianism**
 Read: James E. White, *Contemporary Moral Problems*
 ▪ Pages 38-46: Utilitarianism
 Read: Freeman, *Biological Science*
 ▪ Pages 374-377: Development
- March 31** **Stem Cell Research/3-D Printing and Utilitarianism**
 Read: Gregory & Giancola, *World Ethics*
 ▪ Pages 87-92: John Stuart Mill
 Read: Murphy and Atala, *3D Bioprinting of tissues and organs*
- April 5** **Stem Cell Research/3-D Printing and Utilitarianism**

- Watch: Dr. Anthony Atala, *Printing a Human Kidney*
- <https://www.youtube.com/watch?v=9RMx31GnNXY>
- April 7** **Stem Cell Research/3-D Printing and Utilitarianism**
 Read: Papers on “Stress-induced” stem cells are retracted
- <http://www.nature.com/news/papers-on-stress-induced-stem-cells-are-retracted-1.15501>
 - <http://blogs.nature.com/news/2014/06/last-remaining-support-for-controversial-stem-cell-papers-collapses.html>
- April 12** **Review**
April 14 **Exam 2**
- April 19** **Mechanistic Augmentation/Bionics and Deontology**
 Read: Gregory & Giancola, *World Ethics*
- Pages 77-87: Immanuel Kant
- Watch: Dr. Hugh Herr, *New Bionics Let Us Run*
- <https://www.youtube.com/watch?v=CDsNZJTWw0w>
- April 21** **Mechanistic Augmentation/Bionics and Deontology**
 Read: James E. White, *Contemporary Moral Problems*
- Pages 47-52: The Categorical Imperative
- April 26** **Mechanistic Augmentation/Bionics and Deontology**
 Read: DARPA Project Starts Building Human Memory Prosthetic
- <http://spectrum.ieee.org/biomedical/bionics/darpa-project-starts-building-human-memory-prosthetics>
- April 28** **Mechanistic Augmentation/Bionics and Deontology**
 Read: Serruya and Kahana, *Techniques and Devices to Restore Cognition*
- May 3** **Drugs and Buhhdism**
 Read: Maisto, Galizio, and Connors, *Drug Use and Abuse*
- Pages 102-112: Drug Development
- Read: Gregory & Giancola, *World Ethics*
- Pages 181-186: The Buddha
- Read: Gregory & Giancola, *World Ethics*
- Pages 204-209: The Dhammapada
- May 5** **Drugs and Buhhdism**
 Watch: Dr. Susan Solomon, *The Promise of Research with Stem Cells*
- https://www.youtube.com/watch?v=CY_Oj59WIL0
- May 10** **Drugs and Buhhdism**
 Read: Drug Prices and Dangers of Drugs
- <http://www.smh.com.au/world/us-election/multibillion-dollar-lobbying-caused-daraprim-price-hike-analysis-20150923-gjsxm1.html>
 - http://www.nytimes.com/2015/09/17/health/antidepressant-paxil-is-unsafe-for-teenagers-new-analysis-says.html?_r=0
- May 12** **Drugs and Buhhdism**
- May 16-20** **Final Presentation/Debate**