

## STEM CELL SCIENCE, ETHICS, AND POLICY

PUBP/PST 4803-AL  
Spring 2010, Tuesday, Thursday 3:35-4:55 pm  
Classroom: Guggenheim 246

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DM Smith 216

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Office hours: Wed, 1:30 to 3:00 or by appt

### Cross-listing:

This class is cross-listed as PUBP 4803 – AL, which carries the social science attribute and PST 4803-AL, which carries the humanities attribute. Please be sure you are enrolled in the correct version of the course. This cannot be changed after the end of the first week of classes. The course does NOT fulfill the institute ethics attribute.

### Description:

Stem cells and related technologies offer the potential to advance our understanding of human diseases and lead us to a new era of regenerative medicine. Yet scientific research using stem cells raises profound ethical questions and deciding whether to support and how to regulate stem cell science has posed challenges for policymakers in the United States and around the world. This class will explore the history, current state of the art and likely future of stem cell science. To do so, we will examine different types of stem cell science (e.g. adult stem cells, embryonic stem cells) and research in related fields, such as cloning. For each topic, we will ask assess the current state of scientific knowledge and examine relevant ethical issues and policy considerations. At the end of the course, students will have a solid grounding in the stem cell debate, complemented by an ability to assess ethical issues and participate in and contribute to policy debates on the development of emerging technologies in the life sciences.

When you finish this course, you should be able:

- Understand key elements of stem cell science and related technologies
- Articulate and assess ethical arguments about stem cells and other emerging biotechnologies
- Understand the historical development of stem cell policies
- Assess policy arguments and assess the impact of stem cell policies

### Summary of Course Requirements:

	Requirement	Percent of Grade	Date
1	Participation	25%	Throughout the semester
2	Tests (2)	25%	Test #1: Thursday, February 18 (in-class) Test #2: Tuesday, April 20 (in-class)
3	Policy Memos (2)	25%	Memo #1: Monday, February 8 at 5pm (t-square) Memo #2: Monday, April 5 at 5pm (t-square)
4	Final Paper	25%	Paper Proposal: Tuesday, April 13 (in-class) Paper: Thursday, May 6 at 2:20 pm (t-square)

## **Detailed Descriptions of Course Requirements:**

### 1 – Attendance and Participation

A key component of this class will be the discussion of a wide variety of readings, including book chapters, peer-reviewed scientific articles, ethical reports and policy analyses. Each student is expected to complete the reading before class, come to class prepared to discuss it, and participate regularly in class discussion. To facilitate discussion, we will have a standing assignment for each class period (excluding test days). Specifically, you should prepare in advance of each class a written response to the readings. This response should include a brief discussion of what you judge to be the most important, interesting or confusing components of the reading. In addition, it should also include at least two open-ended questions about the reading that you believe would lead to interesting and useful class discussions. These responses should be typed and no more than one page in length. They will be collected at the end of class. In addition to these response papers your participation in class discussion will be tracked and assessed. Attendance is a prerequisite for participation. I realize that some absences are unavoidable, but frequent unexcused absences will reduce your participation grade and, in particularly bad cases, may lead to deductions from your overall final grade. Repeated tardiness will lead to reductions in your participation grade.

### 2 – Tests

There will be two tests in this class. They will be in-class, short answer and short essay format. They will require thoughtful integration of material from lectures, discussion, readings, and other materials presented in class, along with your own original reflection and analysis. You will be graded on accuracy, breadth, clarity, and originality.

### 3 – Policy Memos

The first two writing assignments in this class will be policy memos. These are short assignments designed to give you practice in concise analytic writing. For each assignment you will be assigned a topic relevant to stem cell policy and asked to develop a memo arguing for a particular policy choice. More details about these assignments will be provided in class and posted to t-square.

### 4 –Final Paper

The final assignment in the course will be a substantial research paper (~3,000 words) focusing on some element of stem cell ethics or policy. You will have a choice of topics as well as the opportunity to develop your own topic. Potential topics include comparisons of the development of stem cell policy in different countries (or states), an exploration of the impact of a particular policy decision (or set of decisions) on stem cell research, or an ethical analysis of an area of stem cell science we are not covering in class. More details about the paper will be provided in class and posted to t-square. You will be required to submit a proposal outlining your topic, preliminary thoughts, and initial set of sources about a month before the final paper is due.

## **Course Policies:**

Atmosphere: To maintain a professional and collegial atmosphere, I ask that you arrive on time to class and keep disruptions during class to a minimum. For instance, I expect that cell phones and other similar devices will be turned off during class. In exchange for your timely arrival, I will strive to end class in a timely manner. You are welcome to use laptops in class to take notes or for educational classroom activities. Please refrain,

however, from using your laptop for purposes not related to class. If laptop use becomes a distraction, it may become necessary to prohibit their use in class.

Communication: Email is the best way to contact me and I will try to respond promptly. I check email less frequently on the weekend and may not be able to respond to inquiries until Monday. You are, of course, encouraged to ask questions before or after class or stop by my office hours. If my office hours are not convenient for your schedule, please email me to arrange an alternate time.

T-Square: T-Square will be used to organize electronic materials and submit papers. You should find copies of lecture outlines, review material, links to electronic versions of readings (when available), etc.

Late Assignments: Because assignments will be discussed in class shortly after they are due, late assignments will generally not be accepted.

Students with Disabilities: Georgia Tech offers accommodations to students with disabilities. If you need a classroom accommodation, please provide me with the appropriate ADAPTS paperwork in office hours as early in the semester as possible.

Honor Code: You are expected to abide by the Georgia Tech Honor Code guidelines at all times (for details, see <http://www.honor.gatech.edu/>). In the context of this course, tests should be completed on your own without any unauthorized aids. We will discuss the policy memos and final paper in class, but you should write them on your own. In general, all writing is expected to represent your own work, completed specifically for this course. This means that you cannot copy text from other papers, websites, encyclopedias, etc without quoting any copied material and fully and accurately citing your sources. In addition, if you refer to, use, or build upon ideas from other work, even if you don't quote that work exactly, you should fully acknowledge your sources. For any questions involving these or any other Academic Honor Code issues, please consult me or see <http://www.honor.gatech.edu/>.

### **Required Texts**

1. *Renewing the Stuff of Life: Stem Cells, Ethics and Public Policy* by Cynthia Cohen, Oxford University Press (1st Edition, June 25, 2007) [B]
2. Various articles. Available in library or on t-square.

Codes: [B] = Cohen book, [T] = Available on T-square, [L] = Available from library

### **Detailed Schedule & Preliminary Reading List (Subject to Change)**

Jan. 12 | Introduction & Syllabus Review

- No reading

Jan. 14 | Biology Basics / What are stem cells?

- Levine, AD (2007). *Cloning: A Beginner's Guide*. Oxford, UK: Oneworld Publications, Chap. 2 ("A Cloning Parts List: Cells, Genes and Embryos") [T]
- Cohen, Chapter 1 [B]
- *Stem Cells: Scientific Progress and Future Research Directions*. Department of Health and Human Services. June 2001, Chapter 1 ("The Stem Cell") [T]

Jan. 19 | Precursors to stem cell research

- Parson, A (2004). *The Proteus Effect*. Washington, DC: Joseph Henry Press. Chapter 1-2 [T]
- Solter, D (2006). "From teratocarcinomas to embryonic stem cells and beyond: a history of embryonic stem cell research." *Nature Reviews Genetics* 7: 319-27. [L]

Jan. 21 | In vitro fertilization

- Centers for Disease Control and Prevention, American Society for Reproductive Medicine, Society for Assisted Reproductive Technology. (2008) *2006 Assisted Reproductive Technology Success Rates: National Summary and Fertility Clinic Reports*, Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Overview (p13-16), ART Trends (p61-76) [T] [Skim]
- Kass, LR (1971). "Babies by means of in vitro fertilization: unethical experiments on the unborn?" *New England Journal of Medicine*: 285(21):1174-9. [T]
- Walters, L (1979). "Human in vitro fertilization: A review of the ethical literature." *Hastings Center Report* 9(4):23-43. [T]
- Krawiec, K (2009). "Why we should ignore the 'Octomom'" *Northwestern University Law Review Colloquy*. 104: 120-31. [T]
- Congregation for the Doctrine of the Faith "Dignitas Personae," p1-14 [T]

Jan. 26 | Debates over embryo research (pre-stem cells)

- Bellamo, M (2006). *The Stem Cell Divide*. New York: Amacom, Chapter 8 ("From Roe to Dickey") [T]
- Report of the Human Embryo Research Panel, Volume 1, Chapter 1 & Executive Summary [T]
- The Dickey-Wicker Amendment [T]

Jan. 28 | Derivation of human embryonic stem cells (hESCs)

- Thomson, JA *et al.* (1998). "Embryonic stem cell lines derived from human blastocysts." *Science* 282(5391):1145-47. [L]
- Marshall, E (1998). "A versatile cell line raises scientific hopes, legal questions." *Science* 282(5391):1014. [L]
- Scott, CT (2005). *Stem Cell Now: From the Experiment that Shook the World to the New Politics of Life*. Pi Press. Chapter 1 ("The Experiment that Shook the World.") [T]

Feb. 2 | Guest Lecture – Human Embryonic Stem Cell Science

Todd McDevitt  
Assistant Professor  
Department of Biomedical Engineering

Feb. 4 | Embryo Disposition

- Cohen, Chapter 2 [B]
- Lyerly, AD and Faden RR (2007). "Willingness to donate frozen embryos for stem cell research." *Science* 317:46-7. [L]
- Beauchaine, J (2009) "The next frontier of the stem cell debate: 'Snowflake'"

babies, embryo 'adoption,' and being pre-born again." *The Village Voice*. June 17. [T]

- Lyerly, AD *et al.* (2006). "Factors that affect infertility patients' decisions about the disposition of frozen embryos." *Fertility and Sterility* 85(6): 1623-30. [L]

**[Policy Memo #1 due at 5pm on Monday, Feb 8]**

Feb. 9 | Ethics of hESC Research

- Cohen, Chapter 3 [B]
- George, RP and Gómez-Lobo, A (2005). "The Moral Status of the Human Embryo." *Perspectives in Biology and Medicine* 48(2): 201-10 [T]
- Green, RM (2002). "Part III – Determining Moral Status." *The American Journal of Bioethics* 2(1):20-30 [T]

Feb. 11 | Ethics of hESC Research (cont'd)

- No new reading

Feb. 16 | Ethics of hESC Research (cont'd)

- Cohen, Chapter 4 [B]
- National Bioethics Advisory Commission (1999) *Ethical Issues in Human Stem Cell Research*, Volume 1, Chapter 4 [T]
- President's Council on Bioethics (2004). *Monitoring Stem Cell Research*, Chapter 3, p 53-63,74-84 [T]
- Walters, K (2004). "Human embryonic stem cell research: An intercultural perspective." *Kennedy Institute of Ethics Journal* 14(1): 3-38 [especially pages 20-38] [L]

Feb. 18 | **Test #1**

Feb 23 | Somatic Cell Nuclear Transfer

- Levine, AD (2007). *Cloning: A Beginner's Guide*. Oxford, UK: Oneworld Publications, Chapter 5 ("Embryonic Stem Cells and the Promise of Therapeutic Cloning") [T]
- Hochedlinger, K and Jaenisch, R (2003). "Nuclear Transplantation, Embryonic Stem Cells, and the Potential for Cell Therapy." *The New England Journal of Medicine* 349: 275-86. [L]
- President's Council on Bioethics (2002). *Human Cloning and Human Dignity: An Ethical Inquiry*, Chapter 6 [T]

Feb. 25 | Egg Donation

- Steinbrook, R (2006). "Egg Donation and Human Embryonic Stem-Cell-Research." *New England Journal of Medicine*. 355(4): 324-6. [L]
- George, K (2007). "What about the women? Ethical and policy aspects of egg supply for cloning research." *Reproductive BioMedicine Online* 15(2): 127-33. [L]
- Resnik, DB (2001). "Regulating the market for human eggs." *Bioethics* 15(1): 1-25. [L]
- Klitzman, R and Sauer, MV (2009). "Payment of egg donors in stem cell research in the USA." *Reproductive BioMedicine Online* 18(5): 603-8. [L]

Mar. 2 | TBA

Mar. 4 | Alternatives to hESCs

- President's Council on Bioethics (2005). *Alternative Sources of Human Pluripotent Stem Cells: A White Paper*. p1-61 [T]

Note: Mar 5 is the last day to drop classes with a grade of 'W'

Mar. 9 | Alternatives to hESCs (Cont'd)

- President's Council on Bioethics (2005). *Alternative Sources of Human Pluripotent Stem Cells: A White Paper*. p1-61 [T]

Mar. 11 | Induced Pluripotent Stem Cells

- De Souza, N (2010) "Primer: Induced pluripotency." *Nature Methods* 7(1) 20-1. [T]
- Krauthammer, C (2007). "Stem Cell Vindication" *Washington Post*, November 30. [T]
- Hyun I *et al.* (2007). "New advances in IPS cell research do not obviate the need for human embryonic stem cells." *Cell Stem Cell* 1(4): 367-8. [T]
- Brown, MT (2009). "Moral complicity in induced pluripotent stem cell research." *Kennedy Institute of Ethics Journal* 19(1) 1-22. [L]
- Zarzeczny, A *et al.* (2009). "IPS cells: Mapping the policy issues." *Cell* 139(6): 1032-7 [L]
- Yu, J *et al.* (2007) "Induced pluripotent stem cell lines derived from human somatic cells." *Science* 318: 1917-20. [L] [Optional]

Mar. 16 | US Stem Cell Policy

- Cohen, Chapter 7 (pages 166-183) [B]
- Rabb Letter ("Federal Funding for Research Involving Human Pluripotent Stem Cells") [T]
- NIH guidelines for funding of human pluripotent stem cell research, August 25, 2000 in Cohen book, p226-232. [B]
- Speech by President George W. Bush regarding human stem cell research, August 9, 2001 in Cohen book, p233-37. [B]
- Lefkowitz, JP (2008). "Stem cells and the President – An inside account." *Commentary*, January 2008 [T]
- Kaplan K and Cline E (2006). "Stem Cell Limits Have Scientists Seeing Double." *Los Angeles Times*, August 9, p. A19. [T]

Mar. 18 | US Stem Cell Policy (cont'd)

- Committee on Guidelines for Human Embryonic Stem Cell Research, National Research Council (2005). *Guidelines for Human Embryonic Stem Cell Research*. Washington, DC: National Academies Press, Summary (p1-14) [T]
- Hudson, KL *et al.* (2005). "Values in conflict: Public attitudes on embryonic stem cell research." *Genetics and Public Policy Center*. [T]
- Speech by President Obama regarding human stem cell research, March 9, 2009 [T]
- NIH guidelines for human stem cell research, July 7, 2009 [T]

## SPRING BREAK

### Mar. 30 | State stem cell policies

- Bellamo, M (2006). *The Stem Cell Divide*. New York: Amacom, Chapter 6 (“California Dreaming”) [T]
- Trounson, A *et al.* “Stem cell research in California: The game is on.” *Cell* 132(4): 522-4.
- Wadman, M (2008) “Stuck in New Jersey.” *Nature* 451: 622-626. [L]
- Sulmasy, DP (2009). “Deliberative democracy and stem cell research in New York State: The good, the bad, and the ugly.” *Kennedy Institute of Ethics Journal* 19(1): 63-78. [L]

### Apr. 1 | Impact of stem cell policies

- Caulfield, T *et al.* (2009). “The stem cell research environment: a patchwork of patchworks.” *Stem Cell Reviews & Reports* 5(2): 82-88. [T]
- Levine, AD (2006). “Research policy and the mobility of US stem cell scientists.” *Nature Biotechnology* 24(7): 865-6. [L]
- Levine, AD (2008). “Identifying under- and over-performing countries in research related to human embryonic stem cells.” *Cell Stem Cell* 2(6): 521-4. [T]
- Scott, CT *et al.* (2009). “And then there were two: use of hESC lines.” *Nature Biotechnology* 27(8): 696-7. [L]

### **[Policy Memo #2 due at 5pm on Monday, April 5]**

### Apr. 6 | Hematopoietic & other adult stem cells (including adult SC plasticity)

- Parson, A (2004). *The Proteus Effect*. Washington, DC: Joseph Henry Press. Chapter 3 [T]
- TBA

### Apr. 8 | Cord blood stem cells **[Paper Proposal is due in class]**

- Bellamo, M (2006). *The Stem Cell Divide*. New York: Amacom, Chapter 16 (Banking on Cord Blood)
- Sugarman J *et al.* (1997). “Ethical Issues in umbilical cord blood banking” *Journal of the American Medical Association* 278(11): 938-43 [T]
- TBA

### Apr. 13 | TBA

### Apr. 15 | Human-nonhuman chimeras

- Cohen, Chapter 5 [B]
- TBA

### Apr. 20 | **Test #2**

### Apr. 22 | The business of stem cells / IP issues

- Pollack, A. (2001). “Another Stem Cell Debate; Ethics Aside, a Good Business Model Remains Elusive.” *New York Times*, July 28 [T]
- Regalado, A. (2005). “Big Companies Quietly Pursue Research on Embryonic Stem Cells.” *Wall Street Journal*, April 12, pg A1 [T]

Version 4 (Updated on March 7, 2010)

- Korobkin, R and Munzer, S (2007) *Stem Cell Century*. New Haven: Yale University Press, Chapter 4 (“Stem Cell Patents”) [T]

Apr. 27 | Translational stem cell research

- TBA

Apr. 29 | Unproven stem cell therapies

- Enserink, M. “Selling the Stem Cell Dream” *Science* 313: 160-163 [L]
- Hyun, I *et al.* “New ISSCR guidelines underscore major principles for responsible translational stem cell research.” *Cell Stem Cell* 3: 607-9. [T]
- Lau, D *et al.* (2008). “Stem cell clinics online: The direct-to-consumer portrayal of stem cell medicine” *Cell Stem Cell* 3: 591-4. [T]
- Ryan, KA *et al.* (2010). “Tracking the rise of stem cell tourism.” *Regenerative Medicine* 5(1): 27-33. [T]

**Final Paper due no later than Thursday, May 6 at 2:20 pm**