

Meetings: 2:00 – 3:50 PM Thursdays, Physical & Life Sciences Building (PLSB) 403  
Instructor: Dr. Michael Wormington  
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Office Hours: 2:00 – 4:00 PM Tuesdays, PLSB 200 & by appointment

Required Text: "Bioethics & the New Embryology", S. Gilbert, A. Tyler, & E. Zackin

Additional reading material will be either distributed in class or can be downloaded as pdf files from the Resources Section of the Course Collab website. Reading assignments will be posted with the assigned reading material in the indicated topic folder in the Resource Section

Cloning humans, the creation of genetically identical individuals from differentiated adult cells, and once the exclusive domain of science fiction, has moved to the front pages of reputable newspapers and prestigious scientific journals. In 1997, the first scientifically substantiated report of a cloned mammal, Dolly the ewe, fomented considerable debate and discussion, and evoked vigorous responses from politicians, pundits, professors, theologians, and entrepreneurs alike. In the past fifteen years, Dolly has been joined by a plethora of cloned mammals. A comparable method of gene transfer used to propagate these cloned animals has been successfully used to treat female infertility in humans and the generation and exploitation of human stem cells and "therapeutic cloning" continues to raise ethical and science policy issues. The completion of the first human genome reference sequence in 2003 provided us for the first time with the genetic "blueprint" for our species. This course will address the fundamental importance of cloning organisms to developmental and reproductive biology and the enormity of the impact of the human genome sequence on human biology. Students will gain an appreciation for the intellectual and methodological challenges posed by these questions and the experimental approaches employed to answer them. It is particularly timely, that the 2012 Nobel Prize in Physiology or Medicine was awarded to John Gurdon, who pioneered the technology of nuclear transplantation to reprogram differentiated cells, and Shinya Yamanaka, who discovered the ability to directly reprogram somatic cells into induced pluripotent stem cells by altering the expression of as few as 4 genes. As such, we will devote a good deal of discussion towards these pioneering achievements. The applications of these technologies and their moral, ethical, and legal ramifications will be considered and discussed in a variety of contexts. Topics and assigned readings will be derived from the scientific literature, books, magazines, newspapers and resources available online.

### Grades

Unlike many of the courses you will take at UVA, this course does not have exams. Instead, my goal is for you to independently explore the topics we discuss and to actively participate in class discussions. Your grade will be determined by the following criteria:

**Attendance** **20%**

You have to be here to participate. Attendance will be taken.

**Participation in Discussion:** **50%**

You have to participate once you're here. I know you have an opinion on virtually any given topic so here's your chance to express it freely. There will be a reading assignment for every class. You will be expected to contribute to classroom discussions based on the assigned reading. Asking thoughtful questions contributes to discussions! You will email me a self-assessment of your participation each week using the following scale:

1 = attentive, but little or no contribution to discussions; correlates to a letter grade of C

2 = occasional productive contributions to discussions; correlates to a letter grade of B

3 = significant and active participation; correlates to a letter grade of A. *An assessment of "3" **must** include several sentences specifically describing your participation.*

**Reports: 30% (3 X 10% ea.)**

You will be required to write three, 4 page (double-spaced) reports presenting a balanced synopsis of the various scientific and ethical perspectives concerning 3 of the main topics discussed in class. Details on the format & points to address in the reports will be provided during the semester.

Report I:	The science & ethics of cloning	<b>Due TBA</b>
Report II:	The science & ethics of stem cell research	<b>Due TBA</b>
Report III:	The science & ethics of utilizing the human genome	<b>Due TBA</b>

**USEM 1580–002 Clones & Genomes: The New Biology  
Spring, 2015 – TOPICS FOR DISCUSSION**

1. Historical origins & the biological basis for cloning. Experimental embryology in the 19<sup>th</sup> & 20<sup>th</sup> centuries. What is developmental biology?
2. The biology of somatic cell nuclear transfer (SCNT).
3. The science & ethics of human reproductive cloning.
4. Embryonic stem cell research, therapeutic cloning & induced pluripotent stem cells – Promises, Perils, Policies & Politics
5. When does life begin?
6. 62 Years of DNA: Double helix to human genome.
7. Genes & politics: Eugenics & better living through genetic enhancement.
8. The science & ethics of somatic cell & germline gene therapy
9. The human genome: Whose DNA is it?