

Biotechnology Policy
Princeton University WWS 586a and Mol 586a
Professor Lee M. Silver

Course Details for Spring Semester 2005

Class Time: Monday evenings 7:30-10:30 pm

Place: Forbes College (on Alexander Street near WaWa)

Room: Small dining room off of main dining room

Topics and Weeks

1. & 2. Overview of Biotechnology & Life Patents
3. Plants: "GMOs" and politics
4. GMOs part II
5. GMO wrap-up, Transgenic Animals
6. Xenotransplantation
7. Gene Therapy and Commercialization of Human Reproduction<
9. Embryo Stem Cells and Cloning
10. Repro-Cloning and Genetic Testing and Profiling
11. Embryo selection
12. Germline genetic engineering: therapy and enhancement

First Class (Feb. 2)

- Framing the questions for policy analysis
- What is biotech (from the industry trade site)
- Extended Timeline of Biotechnology
- History of Biotechnology
- Who regulates biotech?
- What is biotech (from the industry trade site)
- Industry Overview (money, people, products)

Second Class (Feb. 9)

- Overview of Life Patents -- Legality and Ethics
- Process vs. Product in moral arguments
- Greek philosophy and biotechnology
- The Natural Law view: a values-based perspective

WEEK 3 Readings

- **Genetically Modified Crops: Overview of Science, Technology, and Attitudes**
 - [The Green Revolution](#) (7p)

- Critical mostly historical paper for discussion, but I don't expect those without a molecular biology background to wade through this. Shin-Yi, and Djordie should take the lead in providing an overview to the rest of the class.
 - [Current GMOs on the U.S. market](#)
 - This list should be scanned just to give you a sense of what is out there already. All with a mol. bio. background can help others understand the different traits.
 - [The promise of GMOs \(17 p\)](#)
 - This is a political analysis written for the "Consultative Group on International Agricultural Research" or CGIAR. I would like Mary and Eileen to provide understanding and critiques.
 - [GMO/butterfly.pdf](#)[Jeremy Rifkin: Who Plays God](#)
 - This page and the following are advertisements placed in the New York Times by a coalition of groups that oppose genetic engineering in categorical terms. I would like Leslie to critique these ads.
 - [Genetic Pollution](#)
 - [GMOs will increase poverty and hunger](#)
 - [Christian Aid report](#)
 - This article and the response that follows are actually placed later in your packet. I would like Lauren and Jordan to consider this article together with the following three (the Monsanto response, a short pro-GM piece and a short anti-GM piece) for explanation and discussion.
 - [Monsanto response to Christian Aid](#)
 - [A pro-GM paper](#)
 - [Anti-GM \(very short\)](#)
 - [Multiple assessments of anti-GMO attitudes](#)
 - This paper provides a variety of different viewpoints from commentators in different countries. I would like Joaquin to review this for us.
 - [Greenpeace founder switches sides](#)
 - Ignore this one (unless someone wants to talk about it)

GMO case studies and international response

- Industry, politics, and scientists
 - - [Is Monsanto the cause of "over-regulation"?](#)
 - [The reaction to the Monsanto article](#)
 -
- Other Biotechnology Applications
 - - [Functional foods](#)
 - [Increasing vitamin production \(science\)](#)
 - [Transgenic trees \(science\)](#)
 - [Plants as pharmaceutical factories \(4p\)](#)
 - [Objections To Pharmaceutical Crops](#)
 - [Objections from within the biotech industry \(and a technical solution\)](#)
 - {Discussion: technical solutions and why no one talks about them}
- Risk Assessment
 - - [The Precautionary Principle \(3p\)](#)
 - [The precautionary principle and Risk-Risk analysis \(1p\)](#)
 - [The risk of eating naturally organic food \(8p\)](#) for all to look at
 - - [Science-based risk assessment \(8p\)](#)
 - [Ecological Risk Assessment \(4p\)](#)
 - [Health Risk Assessment \(5p\)](#)

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- Regulations and Public Attitudes
 - - [U.S. agricultural industry recommendations](#) (14p)
 - [Worldwide regulation](#) (5p)
 - - [Gene introgression and consequences](#) (1p)
 - [Survey: How Americans feel about GM foods and labeling](#) (4p)
 - [Public relations campaign against GM foods and for organic food](#) (1p)

GMO Wrap-up

- Case Study I: The Mexican Maize Incident and gene flow
 - **Shin-Yi**
 - [The initial scientific finding](#) (for molecular biologists to read only)
 - [The media response](#) (for all to read)
 - [Editorial retraction](#) (look at headlines of letters, and read editors note)
 - [Nature Biotechnology editorial](#) (the response of biotech scientists for all to read)
 - **Jordan**
 - [General Analysis of Gene Flow between plants](#) (5p)
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- Case Study II: The Monarch Butterfly Incident and Unintentional Harm to Wildlife
 - **Djordie**
 - [Media Report: BT corn kills butterflies](#) (2p)
 - [The response of the USDA](#) (3p)
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- Case Study III: The Starlink Incident and Food Allergies
 - **Joaquin**
 - [Non-approved GMO found in food](#) (Investigation results of FOE)
 - [No empirical evidence of allergic reaction](#)
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- Case Study IV: Indian cotton
 - **Lauren**
 - [India: Are GM crops like software?](#)
 - [India approves GM cotton](#)
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- Further Case Studies: Europe versus the US versus Africa vs. China
 - **Mary**
 - [Critique of European GM politics](#)
 - [Economic critique](#) (5p)
 - [European Disarray](#) (2002)
 - [EU versus the US](#)
 - [EU versus the US versus Africa](#)
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Transgenic Animals

- **Some Examples of Animal Transgenic Technology**
 - **Tracy**
 - [Cows producing human blood](#) (2p)
 - [Cows engineered not to be "mad"](#) (0.5p)
 - [Designer Milk](#) (2p)
 - [Porky Pig](#) (does one base change make a transgenic?)

- [Environmentally friendly pigs](#) (for scientists to read)
 - [Overview of Future Technological Potential](#) (2p)
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- Case Study I: Transgenic Aquaculture
 - **Aaron** (first 18pages) **and Eileen** (remaining pages)
 - [The Pew Foundation Report](#) (37 page abstract)

Xenotransplantation & Gene Therapy

- **Traditional vs. Transgenic; Pet transgenics**
 - **Allison**
 - [Conventional fish farming versus transgenic fish](#)
 - [Genetically modified pet fish](#)
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- **Cultural Considerations**
 - **Lauren**
 - [Animal Integrity versus Animal Welfare](#) (brief)
 - [Social, Cultural, Religious & Ethical Factors](#) (Nat. Res. Council, US)
 - If you want to see the whole chapter on policy issues in animal biotech, [click here](#)
- **Xenotransplantation**
 - **Prof. Silver**
 - [Overview and scientific explanation of PERVs and other infectious agents](#)
 - **Jordan**
 - [Position paper and overview by the International Xenotransplantation Society](#) (9p)
 - [PERVs and the Precautionary Principle in policymaking](#) (2p)
 - **Shin-Yi**
 - [When is therapy ready for prime-time?](#)
 - [Commerical xenotransplantation company](#)
 - **Djordie (*next week)**
 - [Who is considering xenotransplantation policy in the U.S.?](#) (2p)
 - [The major opposition to xenotransplantation](#)
 - [The real basis for their opposition](#)