

BIOLOGY 208
OUR HUNGRY WORLD: FROM MALTHUS TO MCDONALDS

BULLETIN INFORMATION

BIOL 208: Our Hungry World: From Malthus to McDonalds

Course Description:

Scientific and social issues concerning the interrelationship of culture and agricultural biotic diversity and technology, climate change, resources management, food security, and human health.

SAMPLE COURSE OVERVIEW

Students enrolled in the course will investigate, evaluate, and debate scientific and social issues of the interrelationship of culture and agriculture, especially with regard to biotic diversity and technology, climate change, resources management, food security, and human health. We envision that the course would be divided into four blocks, each consisting of lectures/discussions and student presentations/discussions on selected case studies. Each of the four blocks will focus equally on both scientific and ethical/social issues relevant to the topic.

ITEMIZED LEARNING OUTCOMES

Upon successful completion of Biology 208, students will be able to:

1. Demonstrate understanding and use of the basic principles, concepts and terms of genetics, plant and animal breeding, plant and animal domestication, genetic modification, organismal response to environmental stress/change, and food choices and their relationship to human health.
2. Demonstrate and apply understanding of the scientific method through evaluation of the scientific literature.
3. Investigate and evaluate the relationships between science, technology, agriculture, and society as these relate to food production and security, resources management, eating habits, and human health, in a global context.
4. Identify the sources and functions of values related to agriculture, sustainability, public health, and globalization.
5. Demonstrate an understanding of major ethical and social issues related to food security and access.
6. Demonstrate the ability to reflect and think critically about how values shape personal and community ethics and decision-making as they relate to agriculture.

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS

1. Students will be assigned readings from the primary literature as well as case study materials supplied by the course instructors via Blackboard. A text book is not required.
2. Example Readings:
 - a. VESR Lecture 1: Selections from David Resnik, *Environmental Health Ethics* (New York: Cambridge University Press).
 - b. VESR Lecture 2: D. Magnus and A. Caplan, "Food for Thought: The Primacy of the Moral in the GMO Debate," in M. Ruse and D. Castle, *Genetically Modified Foods: Debating Biotechnology* (Amherst, NY: Prometheus, 2002).
 - c. VESR Lecture 3: Chapter 2, "Seeds of Gold," in P. Pringle, *Food, Inc.* (New York: Simon and Schuster, 2002).
 - d. VESR Lecture 4: D. Jamieson, "Sustainability and Beyond," *Ecological Economics* 24 (1998): 183-192
 - e. VESR Lecture 5: S. Gardiner, "Ethics and Global Climate Change," in L. Pojman, *Environmental Ethics* (Thomson Wadworth), p. 439-448.
 - f. VESR Lecture 6: D. Beauchamp, "Community: The Neglected Tradition of Public Health," *Hastings Center Report* 15 (1985): 28-36.
 - g. VESR Lecture 7: T. Pogge, *World Poverty and Human Rights*, p. 2-18; and the section "Agricultural Trade—Dumping on the Poor," from ch. 4 of Oxfam, *Rigged Rules and Double Standards*.
 - h. SL Lecture: Genetically-modified crops and animals: Tang et al., β -Carotene in Golden Rice is as good as β -carotene in oil at providing vitamin A to children. *Am J Clin Nutr* September 2012 vol. 96 no. 3 658-664
 - i. SL Lecture: Limits on plant productivity: primary productivity, and abiotic and biotic stresses: Chew et al., A stress-free walk from Arabidopsis to crops. 2011. *Current Opinion in Plant Biotechnology* 22: 281-286
 - j. SL Lecture: Plant domestication and improvement: Glaszmann et al., Accessing genetic diversity for crop improvement *Current Opinion in Plant Biology* 2010 13: 167-173
 - k. SL Lecture: Human nutrition: Johns and Eyzaguirre, 2007 Biofortification, biodiversity and diet: A search for complementary applications against poverty and malnutrition. *Food Policy* 32: 1-24

SAMPLE ASSIGNMENTS AND/OR EXAMS

1. **Nine in-class quizzes**
2. **Student Presentations and Summary Paper:** Students will work in groups of two to prepare debating positions regarding a critical and/or controversial issue using the ethical framework presented in the first VESR lecture and subsequent VESR lectures. Each student will individually prepare a summary paper of four pages (12-point font, double-spaced, and one-inch margins) using a minimum of five references from the primary literature that will be due one week after the corresponding class presentation. Presentations and papers must address both the scientific and ethical issues associated with the topic. Grades will be based on both scientific understanding and development of ethical reflections.

SAMPLE COURSE OUTLINE WITH TIMELINE OF TOPICS, READINGS/ASSIGNMENTS, EXAMS/PROJECTS

Part 1: Plant and Animal Resources

- Class 1: Introduction and setting the context for the course
- Class 2: SL Lecture: Basic genetics-what is a gene, genotype, and phenotype?
- Class 3: SL Lecture: Plant & animal domestication and improvement
- Class 4: SL Lecture: The molecular biology of the gene
- Class 5: SL Lecture: Genetically-modified crops and animals
- Class 6: VESR Lecture: Framework for ethical decision-making
- Class 7: VESR Lecture: Ethical and social issues associated with *genetic engineering*
- Class 8: Student presentations
- Class 9: VESR Lecture: Ethical and social issues related to *intellectual property and ownership*, especially gene patenting
- Class 10: Student presentations

Part 2: Environmental Issues

- Class 11: SL Lecture: Water (ownership and access) and soils (energy inputs and mechanization) opportunities and challenges
- Class 12: SL Lecture: Limits on plant productivity: primary productivity, and abiotic and biotic stresses
- Class 13: SL Lecture: Sustainability
- Class 14: VESR Lecture: Ethical and social issues related to *sustainability*, especially the meaning of the concept and various justifications for pursuing it
- Class 15: Student presentations
- Class 16: SL Lecture: Climate change and environmental degradation
- Class 17: VESR Lecture: Ethical and social issues related to *climate change*, including responsibilities to future generations
- Class 18: Student presentations

Part 3: Human Health

- Class 19: SL Lecture: Human nutrition
- Class 20: SL Lecture: Hunger and obesity
- Class 21: SL Lecture: Factory-like agriculture and food safety
- Class 22: VESR Lecture: Ethical and social issues related to *public health*, focusing especially on tensions between the values of individual liberty versus the public good
- Class 23: Student presentations

Part 4: Economics and Business

- Class 24: SL Lecture: Corporate control and free market
- Class 25: SL Lecture: Farm bill and its complexities and impacts
- Class 26: VESR Lecture: Ethical and social issues related to agricultural *subsidies*, focusing especially on ethical issues related to globalization and poverty

Class 27: Student presentations
Class 28: SL/VESR combined lecture: Summary and the future