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EESB16: Feeding Humans – The Cost to the Planet Course Outline

Instructor: Nicole Ricker

Office: module TBA mid January

Office Hours: Wednesday 2-4 pm but by appointment (through email) until an office becomes available

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This course outlines the development of modern industrialized agriculture, including the tools of genetic engineering and its application to the species we rely on for food. Environmental impacts of these developments will be highlighted, including of over-harvesting, genetic erosion, soil erosion, pesticide and fertilizer use, sustainable agricultural practices, and the issues surrounding the use of genetically modified organisms. The course has been enjoyed by students of biology, environmental science and social sciences.

Prerequisites: BGYA01 & BGYA02

Course Text: None. Readings provided via intranet.
TA's: Jackie Goordial and Soulbee Jin

Date	Lecture
Jan 6 th	Introduction
Jan 13 th	Traditional agriculture
Jan 20 th	Industrialized crop production
Jan 27 th	Fertilizers
Feb 3 rd	Pesticides
Feb 10 th	Midterm test/Meat production and CAFO's
Feb 17 th	READING WEEK
Feb 24 th	Fisheries and aquaculture
Mar 3 rd	Basics of genetic engineering
Mar 10 th	GM crops and their special issues
Mar 17 th	Modification of mammals and birds
Mar 24 th	GM fish; Other applications of GM technology
Mar 31 st	Packaging and distribution

Evaluation

Midterm Exam	30%
Participation	5%
Poster presentation	30%
Final Exam	35%

Exam Format:

Midterm: Multiple choice, true/false, fill in the blank answers

Final: Multiple choice, definitions, short answer

Tutorials:

Student will give poster presentations in groups of up to 4 students during one of two poster sessions scheduled in early March in a public part of the campus. Tutorials will be used to assign poster groups, poster outline presentations to tutorial groups and for reading material discussion. Your participation mark will be evaluated based on attendance and interaction in the tutorial sessions.

Poster Topics:

1. The ecology/industrial ecology of the food we eat. Choose any food item and attempt to answer the following questions:

- origin of the plant or animal
- natural history – places of origin and domestication history
- varieties grown/harvested; genetic diversity
- transportation costs
- pesticide requirements – toxicity, ecotoxicity of same
- fertilizer requirements
- species affected directly or indirectly including (habitat displacement)
- who benefits financially from this industry

2. The ecology/industrial ecology of major fish consumed from the wild:

- habitat
- place in food chain
- population estimates
- harvest methods and collateral damage to system
- transportation costs
- pesticide/heavy metal loads
- who benefits financially from this industry

Suggestions: halibut, cod, shark, tuna, mahi mahi, pacific salmon, arctic char, trout, herring, anchovies, lobsters, shrimp, crab, whale

3. The life of farmed vertebrate species. Sources, varieties, management, use of antibiotics, cost and type of feed, use and discharge of waste and water, dangers of escape, diseases.

Suggestions: tilapia, catfish, Atlantic salmon, rainbow trout, shrimp, cows, pigs, chickens, turkeys, sheep, ducks, ostrich

4. Who are the large corporations that control beef, chicken and pork production in North America and how do they operate? What are their profits?

5. Who are the large corporations that control genetically modified crop seeds and sources in North America and how do they operate? What are their profits? Who benefits?
6. What are the common production systems in Asia and what is the trend with respect to GMO's and CAFO's?
7. Investigate the incidence of pesticide resistance in plant crops or insect pests.
8. Choose your favorite food. Detail the cost of having it available in Toronto year round. Discuss possible methods of sustainable production of this item.
9. What is really meant by organic certification? Who regulates it in Canada? What criteria are used to grant certification and how frequently do inspections occur?
10. How do you eat sustainably/locally in the GTA?
11. Choose an engineered organism, plant or animal, and present information on
 - its development
 - ownership, limits on use
 - uses, limitations, risks
 - costs and benefits

Suggestions: Round up Ready Cotton, Soybeans, Corn, Canola, Phytase Pigs, Omega-3 Pigs

Resource Books, Optional Reading

- Armesto, Felipe Fernandez. 2002. *Near a Thousand Tables: A History of Food*. The Free Press. Simon and Schuster Inc. ISBN 0-7432-2644-5
- Cook, Christopher D. 2005. *Diet for a Dead Planet: How the Food Industry is Killing Us*.
- Dalby, Andrew. 2000. *Dangerous Tastes: The Story of Spices*. University of California Press. ISBN 0-520-22789-1
- Goodall, Jane. 2005. *Harvest for Hope: A Guide for mindful Eating*. Time Warner Book Group. ISBN 0-446-53362-9
- Prance, Sir Ghillean and Mark Nesbitt. 2005. *The Cultural History of Plants*. Routledge, UK. ISBN 0-415-92746-3.
- Schlosser, Eric. 2005. *Fast Food Nation: The Dark Side of the All-American Meal*.
- Thieman, William J. and Palladino, Michael A. 2009. *Introduction to Biotechnology*. 2nd Edition. Pearson/Benjamin Cummins. ISBN 0-321-49145-9