

Department of Biology Course Outline

SC/BIOL 4305 3.00 Controversies in the Modern Life Sciences
Fall 2020

Course Description

This course is designed to give students the skills to analyze controversies within the bio-medical sciences and at the interface of the life sciences and society. Emphasis is placed on study of the methods, theory, socio-political and ethical issues in contemporary life sciences. Students will become practiced in library searches, critical reading and writing, PowerPoint presentations, and in working in groups.

Prerequisites

Course Instructors and Contact Information

Professor Jan Sapp
Email: biol4305@yorku.ca
Office: Farquharson 306.

Schedule

Class time: Tuesdays: 1430-1730

Location: delivered remotely on zoom for live stream lectures. Students will require a computer and internet service. Lectures will also be recorded.

- For outside class time questions, I will provide “office hours” after class. You may also contact me at biol4305@yorku.ca.

Evaluation

Midterm test (Oct 27) 25% on the lectures and text, Jan Sapp, *What is Natural? Coral Reef Crisis*. New York; Oxford University Press, 2003. **The mid term test may be conducted with the aid of an online proctoring service. All students must write the test on October 27.**

Essay proposals 15%: due Oct 6, introducing the topic and its significance and what you will do in the essay, one page, plus a bibliography indicating the literature you intend to study. **To be submitted through turnitin on the e-class site for the course.**

Student presentations (20%). Students will give 10 minute PowerPoint presentations of their individual work. Each student will be assessed **only on their own presentation** and lead class discussion. Students will work in groups on an over arching topic and will be responsible for coordinating their individual projects such that they are partitioned so as to form a coherent series, with little overlap.

Class participation: *All students will offer written evaluations of all talks on the evaluation form provided for downloading from the e-class site. Note up to 10% of final mark will be deducted for lack of class attendance and participation; 10% off for three classes missed.*

Essays: 40% due Dec 11, 8 pages, double-spaced, 12 pt font (2000 words), plus references with scholarly formatting (e.g. as per *What is Natural?*). **NOTE:** *At least 7 journal articles and/or scholarly books must be used and properly referenced in the essay. Your aim to write an historical narrative required, Tell a story, not a textbook or Wikipedia entry: What? Where? When? Who? Why? How?. Avoid passive tense such as "it was found" etc. Who reported something: When? Where? Why? Based on what data?*
Final essays will be submitted through turnitin on the e-class site for the course.

Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

Important Dates

First class: September 15
Final day of Class December 8
Research proposals due: Oct 6
Mid term test: October 27
Reading week: October 10-16
Final term paper due: December 11

Resources

Jan Sapp, *What is Natural? Coral Reef Crisis*. New York; Oxford University Press, 2003
Course Moodle: My PowerPoint slides will be made available to the class through the course Moodle site. These slides are not a substitute for attending class or reading the book. You are responsible for information you may have missed in the lectures.

Learning Outcomes

Students are introduced to social and political issues often underlying biological controversies and begin to understand processes by which controversies may open and close. Students become practiced in literature searches, critical reading and writing, PowerPoint presentations, working independently and in groups.

Course Content

September 15 **Introduction, methods for writing a term paper for this course, topics and forming groups.**

September 22 ***What is Natural?* P. xi-49**

September 29 ***What is Natural?* 49-115**

October 6 ***What is Natural?* 115-163**

October 10-16 **Reading week**

October 20 ***What is Natural?* 163-216**

October 27 **Test**

November 3 Workshop

November 10 Student Presentations

November 17 Student Presentations

November 24 Student Presentations

December 1 Student Presentations

December 8 Student Presentations

Course Policies

Missed mid-term Test: If you miss a test with a legitimate documented reason, permission **may** be granted to take a **makeup test**. ***Makeup tests may be conducted orally over zoom*** Remember a computer internet connection is a requirement of this course. If your internet happens to fail the hour of the test, tethering a cell phone should work.

Assignment and midterm dates are non-negotiable. They have been structured to distribute your workload over the term. There are no alternative assignments that can be completed for you to increase your mark, and the value of any missed assignment cannot be transferred to another.

20% of the value will be deducted for any assignment not completed on the due date.

Recording Lectures:

Images and material presented are subject to Canadian copyright law.

Audio-visual recordings are used **ONLY** as a personal study aid, **and are NOT sold, passed on to others, or posted online**. The lectures are the intellectual property of the professor and cannot be distributed without his expressed permission.

University Policies

Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - <http://www.yorku.ca/academicintegrity/>

Access/Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disability services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counseling & Disability Services - <http://cds.info.yorku.ca/>

Ethics Review Process

York students are subject to the York University *Policy for the Ethics Review Process for Research Involving Human Participants*. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an *Application for Ethical Approval of Research Involving Human Participants* at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

Religious Observance Accommodation

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf (PDF)

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized

by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/>

Suggested Essay Topics

Your aim to write an historical narrative required, Tell a story not a textbook or Wikipedia entry: What? Where? When? Who? Why? How?. Avoid passive tense such as "it was found" etc. Who reported something: When? Where? Why? Based on what data?

1. THE HUMAN GENOME PROJECT

Student 1 when did it begin? What where when why?

Student 2 Aims and claims

Student 3 Ethical issues raised

History, ethical, legal, and social issues. See also various books on the human genome project

Durfy, S.J. 1993, "Ethics and the Human Genome Project", *Archives of Pathology & Laboratory Medicine*, vol. 117, no. 5, pp. 466-469.

Modell, B. 1992, "Ethical Aspects of Genetic Screening", *Annals of Medicine*, vol. 24, no. 6, pp. 549-555.

Murray, T.H. 1991, "Ethical Issues in Human Genome Research", *Faseb Journal*, vol. 5, no. 1, pp. 55-60.

Schotsmans, P. 1993, "Genetics, Ethics and Human-Values - Human Genome Mapping, Genetic Screening and Gene-Therapy - Bankowski,z, Capron,a", *Health Policy*, vol. 23, no. 3, pp. 270-271.

Wertz, D.C. 1992, "Ethical and Legal Implications of the New Genetics - Issues for Discussion", *Social science & medicine*, vol. 35, no. 4, pp. 495-505.

Whittaker, L.A. 1992, "The Implications of the Human Genome Project for Family-Practice", *Journal of Family Practice*, vol. 35, no. 3, pp. 294-301.

2. GENE PATENTING

When did gene patenting begin?

What genes are patented? Where, who?

Ethics and regulations?

[Anon] 2003, "Patents, medicine, and the interests of patients: Applying general principles to gene patenting", *International Journal of Gynecology & Obstetrics*, vol. 80, no. 1, pp. 93-98.

Gold, E.R. & Caulfield, T.A. 2002, "The moral tollbooth: a method that makes use of the patent system to address ethical concerns in biotechnology", *Lancet*, vol. 359, no. 9325, pp. 2268-2270.

Kluge, E.H.W. 2003, "Patenting human genes: When economic interests trump logic and ethics", *Health Care Analysis*, vol. 11, no. 2, pp. 119-130.

Pompidou, A. 1995, "Research on the Human Genome and Patentability - the Ethical Consequences", *Journal of medical ethics*, vol. 21, no. 2, pp. 69-71.

Warner, K.D. 2001, "Are life patents ethical? Conflict between catholic social teaching and agricultural biotechnology's patent regime", *Journal of Agricultural & Environmental Ethics*, vol. 14, no. 3, pp. 301-319.

3. GENE THERAPY

1. Research on the origins of gene therapy, how what where when?

2 Ethics and policy

Billings, P.R. 2003, "Ethics and gene therapy", *Journal of Gene Medicine*, vol. 5, pp. S3-S3.

Chan, S. & Harris, J. 2006, "The ethics of gene therapy", *Current opinion in molecular therapeutics*, vol. 8, no. 5, pp. 377-383.

Coutelle, C. & Rodeck, C. 2002, "On the scientific and ethical issues of fetal somatic gene therapy", *Gene therapy*, vol. 9, no. 11, pp. 670-673.

Dawson, L., Bateman-House, A.S., Agnew, D.M., Bok, H., Brock, D.W., Chakravarti, A., Greene, M., King, P.A., O'Brien, S.J., Sachs, D.H., Schill, K.E., Siegel, A., Solter, D., Suter, S.M., Verfaillie, C.M., Walters, L.B., Gearhart, J.D. & Faden, R.R. 2003, "Safety issues in cell-based intervention trials", *Fertility and sterility*, vol. 80, no. 5, pp. 1077-1085.

Evans, M.D.R., Kelley, J. & Zanjani, E.D. 2005, "The ethics of gene therapy and abortion: Public opinion", *Fetal diagnosis and therapy*, vol. 20, no. 3, pp. 223-234.

Foddy, B. 2006, "The ethics of genetic testing in sport", *International Sportmed Journal*, vol. 7, no. 3, pp. 216-224.

Jaffe, A., Prasad, S.A., Larcher, V. & Hart, S. 2006, "Gene therapy for children with cystic fibrosis - who has the right to choose?", *Journal of medical ethics*, vol. 32, no. 6, pp. 361-364.

Kimmelman, J. 2005, "Recent developments in gene transfer: risk and ethics", *British medical journal*, vol. 330, no. 7482, pp. 79-82.

Lippert-Rasmussen, K. 2002, "Gene therapy and ethics", *Journal of medical ethics*, vol. 28, no. 1, pp. 58-58.

Modell, S.M. 2007, "Approaching religious guidelines for chimera policymaking", *Zygon*, vol. 42, no. 3, pp. 629-641.

Rabino, I. 2003, "Gene therapy: Ethical issues", *Theoretical medicine and bioethics*, vol. 24, no. 1, pp. 31-58.

Billings, P.R. 2003, "Ethics and gene therapy", *Journal of Gene Medicine*, vol. 5, no. 3, pp. S3-S3.

Scully, J.L., Ripberger, C. & Rehmann-Sutter, C. 2004, "Non-professionals' evaluations of gene therapy ethics", *Social science & medicine*, vol. 58, no. 7, pp. 1415-1425.

Simon, E.J. 2002, "Human gene therapy: Genes without frontiers?", *American Biology Teacher*, vol. 64, no. 4, pp. 264-270.

Spink, J. & Geddes, D. 2004, "Gene Therapy Progress and Prospects: Bringing gene therapy into medical practice: the evolution of international ethics and the regulatory environment", *Gene therapy*, vol. 11, no. 22, pp. 1611-1616.

Swazo, N.K. 2006, "Calculating risk", *Journal of Medicine and Philosophy*, vol. 31, pp. 533-564.

4. GENETIC SCREENING

A. Ethical issues and regulations in medicine, health and insurance?

B. Social control and policing- China

C. **23 and me and Ancestry.com**

Borkenhagen, A., Meister, U., Finck, C., Stobel-Richter, Y., Brahler, E. & Kentenich, H. 2005, "Attitudes, acceptability, concerns and expectations towards preimplantation diagnosis, embryo screening, social sexing by infertile couples and couples at risk", *Geburtshilfe und Frauenheilkunde*, vol. 65, no. 1, pp. 30-38.

Botkin, J.R. 2005, "Research for newborn screening: Developing a national framework", *Pediatrics*, vol. 116, no. 4, pp. 862-871.

Briard, M.L. 2002, "Genetic screening in children.", *Archives De Pediatrie*, vol. 9, pp. 3S-7S.

Chan, S. & Harris, J. 2006, "The ethics of gene therapy", *Current opinion in molecular therapeutics*, vol. 8, no. 5, pp. 377-383.

Cook, E.D. 1999, "Genetics and the British insurance industry", *Journal of medical ethics*, vol. 25, no. 2, pp. 157-162.

Coutelle, C. & Rodeck, C. 2002, "On the scientific and ethical issues of fetal somatic gene therapy", *Gene therapy*, vol. 9, no. 11, pp. 670-673.

Dawson, L., Bateman-House, A.S., Agnew, D.M., Bok, H., Brock, D.W., Chakravarti, A., Greene, M., King, P.A., O'Brien, S.J., Sachs, D.H., Schill, K.E., Siegel, A., Solter, D., Suter, S.M., Verfaillie, C.M., Walters, L.B., Gearhart, J.D. & Faden, R.R. 2003, "Safety issues in cell-based intervention trials", *Fertility and sterility*, vol. 80, no. 5, pp. 1077-1085.

Doukas, D.J., Fetters, M.D., Coyne, J.C. & McCullough, L.B. 2000, "How men view genetic testing for prostate cancer risk: findings from focus groups", *Clinical genetics*, vol. 58, no. 3, pp. 169-176.

El-Hazmi, M.A.F. 2004, "Ethics of genetic counseling - basic concepts and relevance to Islamic communities", *Annals of Saudi Medicine*, vol. 24, no. 2, pp. 84-92.

Evans, M.D.R., Kelley, J. & Zanjani, E.D. 2005, "The ethics of gene therapy and abortion: Public opinion", *Fetal diagnosis and therapy*, vol. 20, no. 3, pp. 223-234.

Foddy, B. 2006, "The ethics of genetic testing in sport", *International Sportmed Journal*, vol. 7, no. 3, pp. 216-224.

Geppert, C.M.A. & Roberts, L.W. 2005, "Ethical issues in the use of genetic information in the workplace: a review of recent developments", *Current Opinion in Psychiatry*, vol. 18, no. 5, pp. 518-524.

Godard, B., ten Kate, L., Evers-Kiebooms, G. & Ayme, S. 2003, "Population genetic screening programmes: principles, techniques, practices, and policies", *European Journal of Human Genetics*, vol. 11, pp. S49-S87.

Gruen, L. & Grabel, L. 2006, "Concise review: Scientific and ethical roadblocks to human embryonic stem cell therapy", *Stem cells*, vol. 24, no. 10, pp. 2162-2169.

Hodge, J.G. 2004, "Ethical issues concerning genetic testing and screening in public health", *American Journal of Medical Genetics Part C-Seminars in Medical Genetics*, vol. 125C, no. 1, pp. 66-70.

Jaffe, A., Prasad, S.A., Larcher, V. & Hart, S. 2006, "Gene therapy for children with cystic fibrosis - who has the right to choose?", *Journal of medical ethics*, vol. 32, no. 6, pp. 361-364.

- Kim, S.Y.H., Frank, S., Holloway, R., Zimmerman, C., Wilson, R. & Kiebertz, K. 2005, "Science and ethics of sham surgery - A survey of Parkinson disease clinical researchers", *Archives of Neurology*, vol. 62, no. 9, pp. 1357-1360.
- Kimmelman, J. 2005, "Recent developments in gene transfer: risk and ethics", *British medical journal*, vol. 330, no. 7482, pp. 79-82.
- Lea, D.H., Williams, J. & Donahue, M.P. 2005, "Ethical issues in genetic testing", *Journal of Midwifery & Womens Health*, vol. 50, no. 3, pp. 234-240.
- Lippert-Rasmussen, K. 2002, "Gene therapy and ethics", *Journal of medical ethics*, vol. 28, no. 1, pp. 58-58.
- Ludlam, C.A., Pasi, K.J., Collins, P.W., Maggs, P.H.B.B., Cumming, A.M., Dolan, G., Fryer, A., Hill, F.G.H., Peake, I.R., Perry, D., Smith, M. & UKHCD Working Party 2004, "Gene therapy trials in the UK: is haemophilia a suitable 'model'?", *Clinical Medicine*, vol. 4, no. 1, pp. 54-56.
- MacDonald, C. & Williams-Jones, B. 2002, "Ethics and genetics: Susceptibility testing in the workplace", *Journal of Business Ethics*, vol. 35, no. 3, pp. 235-241.
- McQueen, M.J. 2002, "Some ethical and design challenges of screening programs and screening tests", *Clinica Chimica Acta*, vol. 315, no. 1-2, pp. 41-48.
- Modell, S.M. 2007, "Approaching religious guidelines for chimera policymaking", *Zygon*, vol. 42, no. 3, pp. 629-641.
- Murry, W.D., Wimbush, J.C. & Dalton, D.R. 2001, "Genetic screening in the workplace: Legislative and ethical implications", *Journal of Business Ethics*, vol. 29, no. 4, pp. 365-378.
- Rabino, I. 2003, "Gene therapy: Ethical issues", *Theoretical medicine and bioethics*, vol. 24, no. 1, pp. 31-58.
- Reynolds, T.M. 2003, "Down's syndrome screening is unethical: views of today's research ethics committees", *Journal of clinical pathology*, vol. 56, no. 4, pp. 268-270.
- Riis, P. 1999, "Ethical, legal and health economic aspects of neonatal screening", *Acta Paediatrica*, vol. 88, pp. 96-98.
- Ross, L.F. 2002, "Predictive genetic testing for conditions that present in childhood", *Kennedy Institute of Ethics journal*, vol. 12, no. 3, pp. 225-244.
- Scully, J.L., Rippberger, C. & Rehmann-Sutter, C. 2004, "Non-professionals' evaluations of gene therapy ethics", *Social science & medicine*, vol. 58, no. 7, pp. 1415-1425.
- Stolt, U.G., Helgesson, G., Liss, P.E., Svensson, T. & Ludvigsson, J. 2005, "Information and informed consent in a longitudinal screening involving children: a questionnaire survey", *European Journal of Human Genetics*, vol. 13, no. 3, pp. 376-383.
- Swazo, N.K. 2006, "Calculating risk", *Journal of Medicine and Philosophy*, vol. 31, no. 5, pp. 533-564.
- Takala, T. & Gylling, H.A. 2000, "Who should know about our genetic makeup and why?", *Journal of medical ethics*, vol. 26, no. 3, pp. 171-174.
- Ustun, C. & Ceber, E. 2004, "Ethical issues for cancer screenings - Five countries - four types of cancer", *Preventive medicine*, vol. 39, no. 2, pp. 223-229.
- Valenzuela, C.Y. 2003, "Scientific ethics of gene therapy for individuals. The urgency for DNA gene surgery", *Revista medica de Chile*, vol. 131, no. 10, pp. 1208-1214.
- Van Steendam, G., Dinnyes, A., Mallet, J., Meloni, R., Casabona, C.R., Gonzalez, J.G., Kure, J., Szathmary, E., Vorstenbosch, J., Molnar, P., Edbrooke, D., Sandor, J., Oberfrank, F., Cole-Turner, R., Hargittai, I., Littig, B., Ladikas, M., Mordini, E., Roosendaal, H.E., Salvi, M., Gulyas, B. & Malpede, D. 2006, "Summary: The Budapest Meeting 2005 Intensified Networking on Ethics of Science - The case of reproductive cloning, germline gene therapy

and human dignity", *Science and engineering ethics*, vol. 12, no. 3, pp. 415-420.

Verlinsky, Y. 2005, "Designing babies: What the future holds", *Reproductive Biomedicine Online*, vol. 10, pp. 24-26.

Wertz, D.C. & Knoppers, B.M. 2002, "Serious genetic disorders: Can or should they be defined?", *American Journal of Medical Genetics*, vol. 108, no. 1, pp. 29-35.

Williams, E.D. 2001, "Informed consent in genetic research", *Croatian medical journal*, vol. 42, no. 4, pp. 451-457.

Yeh, M., Morley, K.I. & Hall, W.D. 2004, "The policy and ethical implications of genetic research on attention deficit hyperactivity disorder", *Australian and New Zealand Journal of Psychiatry*, vol. 38, no. 1-2, pp. 10-19.

5. TRANSGENIC ORGANISMS

a. The Recombinant DNA Controversy

Student 1 What started it? When how, who what where? (W5)

Student 2 What was the controversy about, what arguments made for and against it. Who

Student 3 What was policies came out of it- e.g. NIH guidelines? What occurred later with biomedical applications.

Susan Wright, "Molecular Biology or Molecular Politics? The Production of Scientific Consensus on the Hazards of Recombinant DNA Technology," *Social Studies of Science* 16 (1986): 593-620.

Susan Wright, *Molecular Politics: Developing American and British Regulatory Policy for Genetic Engineering, 1972-1982*, Chicago University of Chicago Press, 1994. John Lear, *Recombinant DNA: The Untold Story* (New York: Crown, 1978); Nicholas Wade, *The Ultimate Experiment: Man-made Evolution* (New York: Walker, 1979); and Sheldon Krimsky, *Genetic Alchemy* (Cambridge, Mass.: MIT Press, 1982)

See, for example, Raymond A. Zilinskas and Burke K. Zimmerman eds., *Gene-Splicing Wars: Reflections On the Recombinant DNA Controversy* New York: Macmillan Publishing Company, 1986

Paul Berg, "Meetings that Changed the World: Asilomar 1975: DNA Modification Secured," *Nature* 455 (2008): 290-291.

Joshua Lederberg, "DNA Splicing. Will Fear Rob us of its Benefits?" *PRISM Magazine*, November 1975, p. 33-37.

Erwin Chargaff, "On the Dangers of Genetic Meddling," *Science* 192 (1976): 938.

Francine Robinson Simring, *Recombinant DNA Risks and Benefits*, *Science* 192 (1976): 940.

R. A. Zilinskas, editor; and B. K. Zimmerman, eds. *The Gene-Splicing Wars: Reflections on the Recombinant DNA Controversy*, New York: MacMillan

Paul Berg, "Meetings that Changed the World: Asilomar 1975: DNA Modification Secured," *Nature* 455 (2008): p. 290-291.

B.GMOs in agricultural production. The Monsanto controversy

Hilbeck, A. 2001, "Implications of transgenic, insecticidal plants for insect and plant biodiversity", *Perspectives in Plant Ecology Evolution and Systematics*, vol. 4, no. 1, pp. 43-61.

Malik, V.S. & Saroha, M.K. 1999, "Marker gene controversy in transgenic plants", *Journal of Plant Biochemistry and Biotechnology*, vol. 8, no. 1, pp. 1-13.

Michaud, D. 2005, "Environmental impact of transgenic crops. II. Impact of recombinant traits", *Phytoprotection*, vol. 86, no. 2, pp. 107-124.

Natarajan, S., Renczesova, V., Kukuckova, M., Stuchlik, S. & Turna, J. 2005, "Genetically modified organisms from the point of view of horizontal gene transfer", *Biologia*, vol. 60, no. 6, pp. 633-639.

Scott, D. 2003, "Science and the consequences of mistrust: Lessons from recent GM controversies", *Journal of Agricultural & Environmental Ethics*, vol. 16, no. 6, pp. 569-582.

Strand, R. 2001, "The role of risk assessments in the governance of genetically modified organisms in agriculture", *Journal of hazardous materials*, vol. 86, no. 1-3, pp. 187-204.

Wisniewski, J.P., Frangne, N., Massonneau, A. & Dumas, C. 2002, "Between myth and reality: genetically modified maize, an example of a sizeable scientific controversy", *Biochimie*, vol. 84, no. 11, pp. 1095-1103.

C.GMOs labelling controversy

Huffman, W.E. 2004. Production, identity preservation, and labeling in a marketplace with genetically modified and non-genetically modified foods. *Editor's Choice Series on Agricultural Ethics*. 134(1): 3-10

Marchant, G.E. & Cardineau, G.A. 2013. The labelling debate in the United States. *GM Crops & Foods: Biotechnology in Agriculture and the Food Chain*. 4(3): 134- 36.

De Giovanni, M. 2017. The future of GMO labeling: how a new federal labeling scheme will alter public disclosure. *Washington University Law Review*. 95(3): 705-726/134.

Bawa, A.S. & Anilakumar, K.R. 2013. Genetically modified foods: safety, risks, and public concerns – a review. *Journal of Food Science and Technology*. 50(6): 1035-1046.

Borges, B.J.P., Arantes, O.M.N., Fernandes, A.A.R., Broach, J.R., & Fernandes, P.M.B. 2018. Genetically Modified Labeling Policies: Moving Forward or Backward? *Frontiers in Bioengineering and Biotechnology*. 6(181): 1-10.

6. STEM CELL RESEARCH

Student 1 How did stem cell research originate W5?

Student 2 Aims and promises

Student 3 Regulations : what, when, where, why, how?

Check, E. 2005, "Where now for stem-cell cloners?", *Nature*, vol. 438, no. 7071, pp. 1058-1059.

Childress, J.F. 2004, "Sources of stem cells: Ethical controversies and policy developments in the United States", *Fetal diagnosis and therapy*, vol. 19, no. 2, pp. 119-123.

Cobbe, N. 2007, "Cross-species chimeras: Exploring a possible christian perspective", *Zygon*, vol. 42, no. 3, pp. 599-628.

Cyranoski, D. 2006, "No end in sight for stem-cell odyssey", *Nature*, vol. 439, no. 7077, pp. 658-659.

Daar, A.S., Bhatt, A., Court, E. & Singer, P.A. 2004, "Stem cell research and transplantation: Science leading ethics", *Transplantation proceedings*, vol. 36, no. 8, pp. 2504-2506.

Horst, M. 2005, "Cloning sensations: mass mediated articulation of social responses to controversial biotechnology", *Public Understanding of Science*, vol. 14, no. 2, pp. 185-200.

Hurlbut, W.B. 2007, "Ethics and embryonic stem cell research - Altered nuclear transfer as a way forward", *Biodrugs*, vol. 21, no. 2, pp. 79-83.

Lepinay, V.A. 2006, "The promises of the stem cells. Scientists, families and public health in the debate, about stem cells in the USA", *Sociologie Du Travail*, vol. 48, no. 3, pp. 350-366.

Nisbet, M.C. & Goidel, R.K. 2007, "Understanding citizen perceptions of science controversy: bridging the ethnographic-survey research divide", *Public Understanding of Science*, vol. 16, no. 4, pp. 421-440.

Parker, C. 2007, "Perspectives on ethics", *Journal of medical ethics*, vol. 33, no. 1, pp. 21-23.

Pulman, B. 2007, "The issues involved in cloning: Sociology and Bioethics", *Revue Francaise de Sociologie*, vol. 48, pp. 129-156.

Wong, J.F. 2004, "Heated controversy continues over human cloning (vol 24, pg 42, 2004)", *Genetic Engineering News*, vol. 24, no. 10, pp. 25-25.

7. CRISPR technology.

Student 1 What is it? How was it discovered? W5

Student 2 What does it promise? How has it developed since its discovery?

Student 3 Controversy over patents

8. The EVOLUTION-CREATIONISM DEBATE

1. When and where did the Creationism movement against evolutionary biology begin?

Who are they? What religious groups?

2 What do they argue, and on what basis? What do they aim for? What do they hope to achieve? What is intelligent Design? When and where did it originate? Who what where when?

3. How do evolutionists respond? Who what when?

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Who what when where?

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How does it relate to social Darwinism?

What are the arguments that sociobiologists make about the genetics and evolution of human behavior and culture?

2. What arguments do it critics make? Who, what, when, where?

3. How do sociobiologists respond to critics. What is evolutionary psychology? Who what when where?

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B. What was the relationship of Neanderthals to humans

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What were the arguments against the search for extra-terrestrials life

Evidence today

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2. Why were there warnings about plagues to come 50 years ago?

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Biowarfare laboratory leak?

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<https://www.express.co.uk/news/world/1265224/coronavirus-china-original-wuhan-laboratory-leak-bioweapon-military-grade-china-scientist>

B. How and when were governments notified? How did they take action? The Role of the WHO

C. Vaccine research

https://www.newyorker.com/magazine/2020/04/13/the-quest-for-a-pandemic-pill?utm_source=nl&utm_brand=tny&utm_mailing=TNY_Daily_040620&utm_campaign=aud-dev&utm_medium=email&bxid=5c92b00c24c17c329bedd39c&cndid=36192583&ha

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D. Hydroxychloroquine

E. T cells versus antibodies

18. Vaccination controversies:

A . History of vaccination: who invented it, when where and how?

B. Use and legislation by governments. What when where why?

C How did the anti-vaccination movements begin. Origins and ideology. Reasoning, and response

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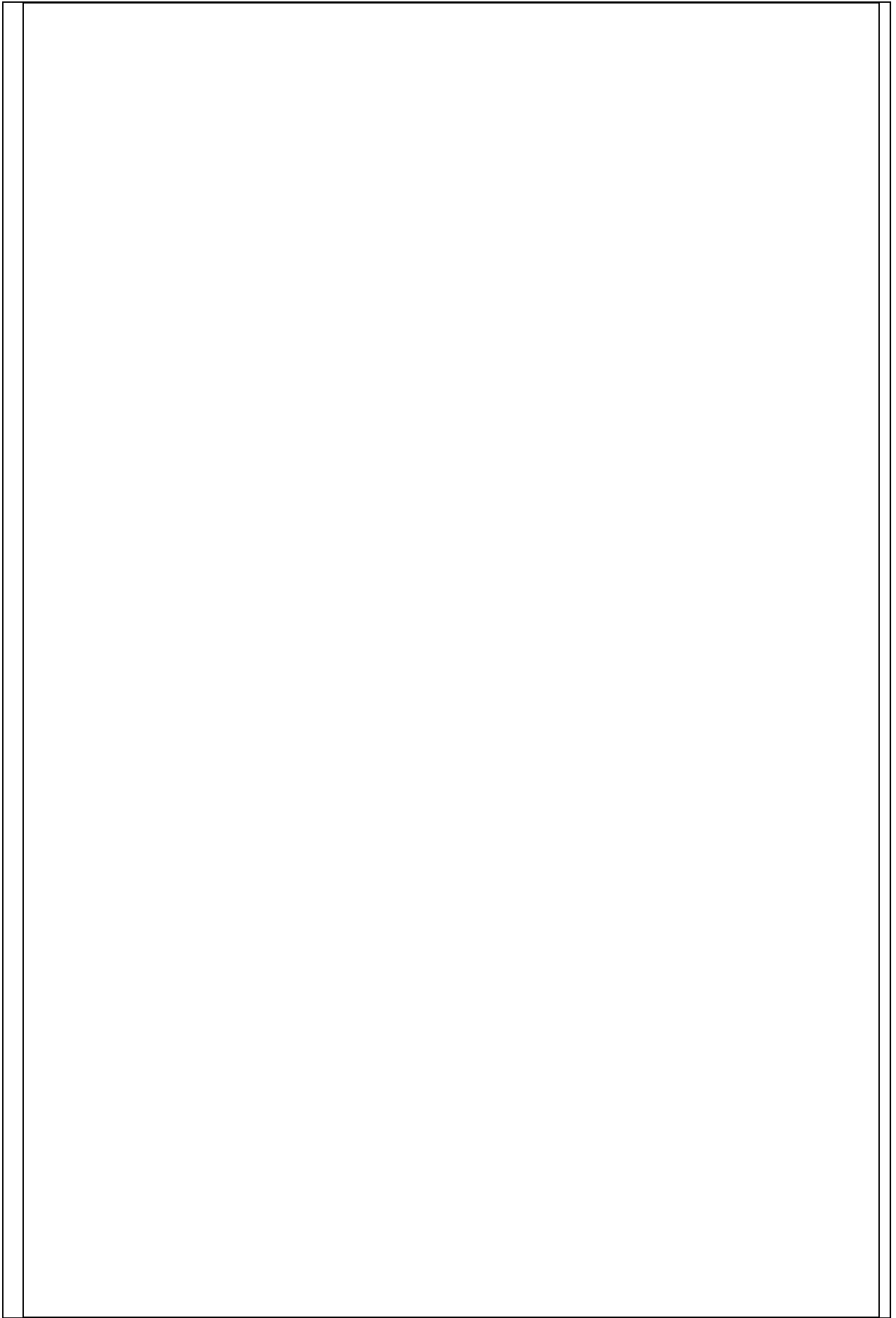
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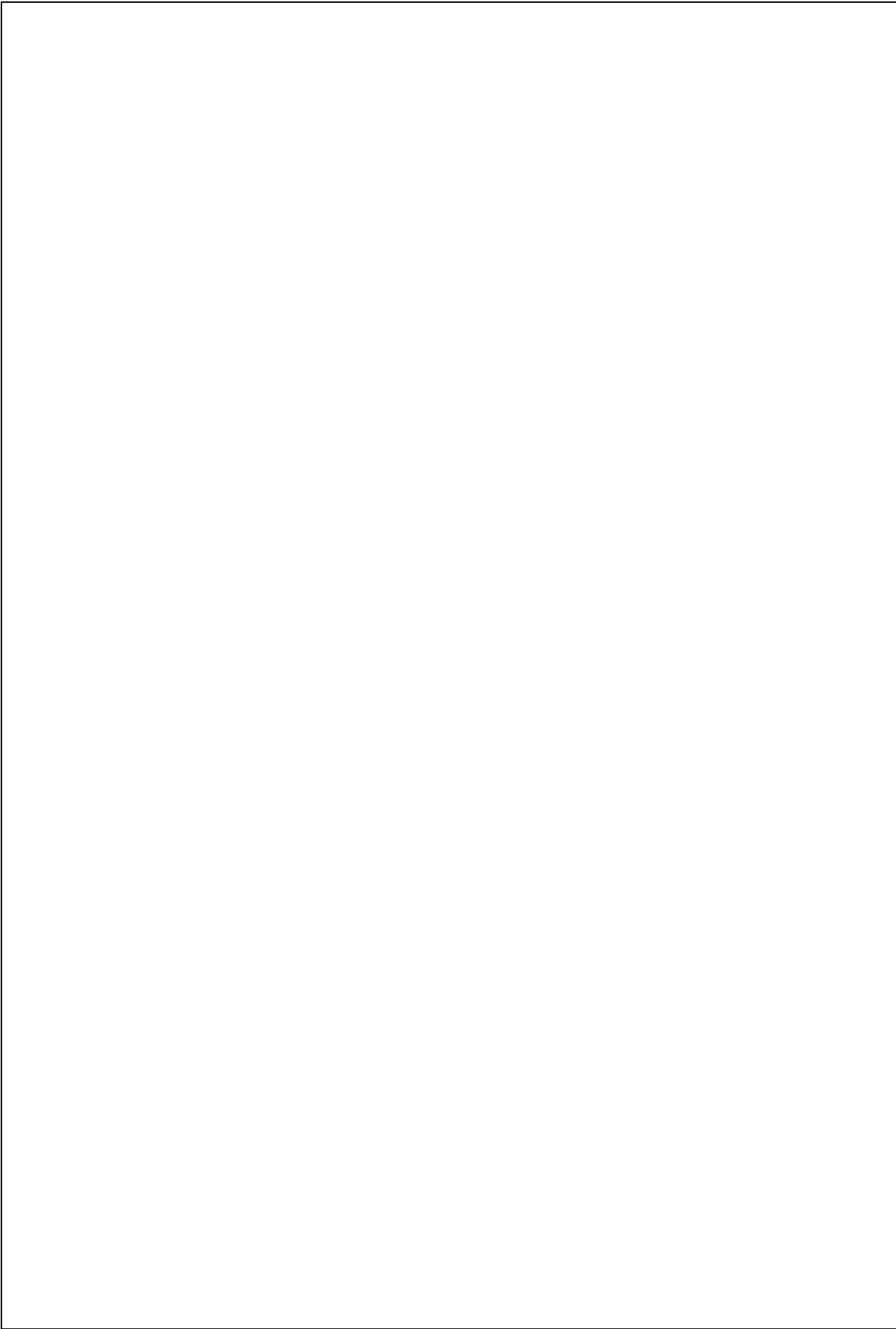
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York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf (PDF)

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-and-or-harassing-behaviour-in-academic-situations-senate-policy/>