

Department of Biology Course Outline

SC/BIOL 4305 3.00 Controversies in the Modern Life Sciences
Fall 2022

Course Description

This course is designed to give students the skills to analyze controversies at the interface of the life sciences and society. Emphasis is placed on study of the methods, theory, as well as socio-political and ethical issues underlying such controversies. 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.
Office hours: Course delivered remotely

Schedule

Class time: Tuesdays 2:30-5:30
Location: CB 129
For outside class time questions, please contact me at biol4305@yorku.ca.

Evaluation

ASSESSMENT:

Tests and assignments are necessary; no marks can be transferred for missed work.

ALL WORK FOR THIS CLASS IS TO BE SUBMITTED AS A WORD FILE ONLY. Pdfs will be returned and considered late and graded as such.

10% of the value of the assignment will be deducted for work that is submitted late. After one week work will not be received.

Test: Oct 25, value: 25% -on the lectures and text, *What is Natural? Coral Reef Crisis*

Student presentations (20%). Students will give 10-minute PowerPoint presentations of their individual work. Each student will be assessed **only on their own presentation.** Students will work in groups on a topic and will be responsible for coordinating their projects such that they are partitioned so as to form a coherent series, with little overlap. Students will give 10-minute powerpoint presentations of their work, and lead class discussion. One member of the group will compile all slides together, and group members will speak on their parts.

Class participation: *All students will submit by email written evaluations of all student presentations (see evaluation form on eclass), and you must use York University's grading system as posted on eclass. Note 10% of the final mark will be deducted for more than two student-presentation days missed.*

Essay proposal: 15%, due Oct 4, (introducing the topic and its significance and what you will do in your essay. One page, double-spaced, 12 pt font. plus a bibliography indicating the literature you intend to study. **To be submitted through turnitin on the eclass site for the course, as a WORD FILE ONLY (PDFs will not be accepted), and points will be deducted for formatting that conflicts with instructions.**

Essays: 40%, due Dec 8 , -Eight pages, double-spaced, 12 pt font (4000 words), plus references with scholarly formatting (e.g. as per *What is Natural?*). **NOTE:** *At least 8 journal articles and/or scholarly books must be used and properly referenced in the essay.*

Final essays will be submitted through turnitin on the eclass site for the course as a WORD FILE ONLY (PDFs will not be accepted), and points will be deducted for formatting that conflicts with instructions. Please note: *10 percent of its mark will be deducted for every day it is late. The essay will not be accepted after 5 days beyond due date.*

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

Important Dates

First class: Sept 13
Final Class Dec 6
Research proposals due: Oct 4
Midterm test: Oct 25
Final term paper due: December 8

Resources

Jan Sapp, *What is Natural? Coral Reef Crisis*. New York; Oxford University Press, 2003

Course site: PowerPoint slides will be made available on eclass. *These slides are not a substitute for 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 at the interface of biology and society and the 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

Sept 13 Introduction
Sept 20 *What is Natural?* xi-49
Sept 27 *What is Natural?* 49-115
Oct 4 *What is Natural?* 115-163
Oct 11 Reading week
Oct 18 *What is Natural?* 163-216

Oct 25 Test

Nov 1 Class Presentations
Nov 8 Class Presentations
Nov 15 Class Presentations
Nov 22 Class Presentations
Nov 29 Class Presentations
Dec 6 workshop

See suggested topics, and some references below

Suggested Essay Topics

1. 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 rDNA research. Who, what where when, why?

Student 3 What policies came out of it- e.g. Where, when, NIH guidelines?

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 Krinsky, *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.

2. CRISPR technology.

Student 1 What is it? How was it discovered? When, how, who, what, where? (W5)

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

Student 3 What are the ethical issues around it? When, how, who, what, where? (W5)

3. STEM CELL RESEARCH

Student 1 how did stem cell research originate When, how, who, what, where? (W5)

Student 2 Aims and promises

Student 3 Regulations : When, how, who, what, where? (W5)

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.

4. THE HUMAN GENOME PROJECT

Student 1 when did it begin? When, how, who, what, where? (W5)

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.

5. GENE PATENTING

When did gene patenting begin? When, how, who, what, where? (W5)

What genes are patented? When, how, who, what, where? (W5)

Ethics and regulations? When, how, who, what, where? (W5)

[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.

6. GENE THERAPY

1. Research on the origins of gene therapy When, how, who, what, where? (W5)

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., Rippberger, 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.

7. GENETIC SCREENING When, how, who, what, where? (W5)

2. Ethical issues and regulations?

- 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.

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?

Barbara Forrest and Paul Gross, *Creationism's Trojan horse : the wedge of intelligent design* OUP, 2004.

Ayala, F.J. 2006, "Evolution vs. creationism. An introduction", *History and philosophy of the life sciences*, vol. 28, no. 1, pp. 71-82.

Bleckmann, C.A. 2006, "Evolution and creationism in Science: 1880-2000", *Bioscience*, vol. 56, no. 2, pp. 151-158.

Catley, K.M. 2006, "Evolution vs. creationism. An introduction", *Science Education*, vol. 90, no. 4, pp. 764-766.

Cornish-Bowden, A. & Cardenas, M.L. 2007, "The threat from creationism to the rational teaching of biology", *Biological research*, vol. 40, no. 2, pp. 113-122.

Culotta, E. 2006, "Is ID on the way out?", *Science*, vol. 311, no. 5762, pp. 770-770.

Donnelly, L.A. & Boone, W.J. 2007, "Biology teachers' attitudes toward and use of Indiana's evolution standards", *Journal of Research in Science Teaching*, vol. 44, no. 2, pp. 236-257.

Gewin, V. 2005, "Scientists attack Bush over intelligent design", *Nature*, vol. 436, no. 7052, pp. 761-761.

Giertych, M. 2006, "Creationism, evolution: nothing has been proved", *Nature*, vol. 444, no. 7117, pp. 265-265.

Holden, C. 2006, "Evolution - Darwin's place on campus is secure - But not supreme", *Science*, vol. 311, no. 5762, pp. 769-771.

Moore, R. 2007, "The differing perceptions of teachers & students regarding teachers' emphasis on evolution in high school biology classrooms", *American Biology Teacher*, vol. 69, no. 5, pp. 268-271.

Numbers, R.L. 2006, "Kansas schools challenge Darwinism: The history and future of the creationism-evolution controversy in American public education (vol 41, pg 661, 1999)", *Journal of Church and State*, vol. 48, no. 2, pp. 277-277.

Plavcan, J.M. 2007, "Evolution vs. creationism: An introduction.", *American Journal of Physical Anthropology*, vol. 132, no. 2, pp. 321-322.

Roberts, M. 2005, "From genesis to genetics: The case of evolution and creationism." *British Journal for the History of Science*, vol. 38, no. 139, pp. 494-495.

Scott, E.C. 2006, "Creationism and evolution: It's the American way", *Cell*, vol. 124, no. 3, pp. 449-451.

Scott, E.C. & Matzke, N.J. 2007, "Biological design in science classrooms", *Proceedings of the National Academy of Sciences of the United States of America*, vol. 104, pp. 8669-8676.

Sequeiros, L. 2007, "Evolution versus creationism", *Pensamiento*, vol. 63, no. 238, pp. 841-841.

Trifonov, E.N. 2006, "Self-inflicted fear of evolution", *Origins of Life and Evolution of the Biosphere*, vol. 36, no. 5-6, pp. 557-558.

Williams, N. 2006, "Darwin's champions fight back", *Current Biology*, vol. 16, no. 13, pp. R479-R480.

Wilson, E.K. 2006, "What's next in the evolution debate?", *Chemical & Engineering News*, vol. 84, no. 5, pp. 43-43.

Wint, D., Haught, J.F., Low, S. & Becker, G. 2005, "Creationism vs. evolution - Origins of a controversy", *Museum News*, vol. 84, no. 4, pp. 38-45

9. ON HUMAN Evolution

1. Multiregional versus "Out of AFRICA," theories When, how, who, what, where? (W5)

2. Hybridization theories etc. When, how, who, what, where? (W5)

Varki, A. & Nelson, D.L. 2007, "Genomic comparisons of humans and chimpanzees", *Annual Review of Anthropology*, vol. 36, pp. 191-209.

C Stringer (2002) Modern human origins: progress and prospects. *Philos Trans R Soc Lond B Biol Sci* 357:563–579

Tattersall I, Schwartz J (2000) *Extinct humans*. Westview Press, New York.

Garrigan D, Hammer MF (2006) Reconstructing human origins in the genomic era. *Nat Rev Genet* 7:669–680.

R.L. Cann, "Mitochondrial-DNA and Human Evolution," *Nature* 325 (1987): 31

M Ingham, "Mitochondrial genome variation and the origin of modern humans"

Nature 408 (2000): 708.

D.R. Maddison, "African Origin of Human mitochondrial DNA Reexamined,"

Systematic Zoology 40 (1991): 355

E. Aguirre, "Early human expansions into Eurasia: The Atapuerca evidence

Quaternary International 75 (2001): 11

MH, Wolpoff J Hawks, R Caspari, "Multiregional, not multiple origins

American Journal of Physical Anthropology," 112 (2000): 129-136.

A Varki, and DL Nelson , "Genomic comparisons of humans and chimpanzees,"

Annual Review of Anthropology 36 (2007): 191-209.

Anton SC, "Climatic influences on the evolution of early Homo?"

Folia Primatologica 78 (2007): 365-388.

10. On Human Races

Montagu A. *Man's most dangerous myth: the fallacy of race*. New York: Meridian; 1942.

Haldane JBS. *The argument from animals to men: an examination of its validity for anthropology*. *J R Anthropol Inst G B Irel.* 1956;86(2):1–14.

Livingstone FB. *On the nonexistence of human races*. *Curr Anthropol.* 1962;3:279–81.

Lewontin RC. *The apportionment of human diversity*. *Evol Biol.* 1972;6:381–98.

Heather Norton, et.al., *Human Races are Not like Dog Breeds: Refuting a Racist Analogy*," *Evolution: Education and Outreach* 12 no. 17, 2019. Open Access

Rosenberg NA, Pritchard JK, Weber JL, Cann HM, Kidd KK, Zhivotovsky LA, Feldman MW. Genetic structure of human populations. *Science.* 2002;298:2381–5.

Relethford J. Race and global patterns of phenotypic variation. *Am J Phys Anthropol.* 2009;39(1):16–22.

Hardimon MO. The idea of a scientific concept of race. *J Philos Res* 2012;37:249–82

Adhikari K, et al. A GWAS in Latin Americans highlights the convergent evolution of lighter skin
American Society of Human Genetics. ASHG denounces attempts to link genetics and racial
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11. TRANSGENIC ORGANISMS

When, how, who, what, where? (W5)

A. When did it began, how and what has been achieved.

B. What are the risks according to critics.

C. What is the policy in different countries?

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11, pp. 1095-1103.

12. THE SOCIOBIOLOGY DEBATE

When, how, who, what, where? (W5)

A. What is sociobiology? What are its aims and claims?

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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13. GLOBAL WARMING AND CLIMATE CHANGE

A. What is the greenhouse effect? When was it coined how did the concept evolve and based on what evidence?. When, how, who, what, where? (W5)

B. When did evidence of global warming begin, what is the evidence, how was it gained? When, how, who, what, where? (W5)

C What arguments do opponents provide against it? When, how, who, what, where? (W5)

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C. What arguments to opponents make?, pp. 406-409.

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13. C Political barriers to slowing down climate change, and impeding environmental research

Case study on the controversies over the environmental policy Government of Canadian Prime Minister Stephen Harper -2006-2015

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<https://www.vice.com/en/article/4w578d/the-harper-government-has-trashed-and-burned-environmental-books-and-documents>

<https://academicmatters.ca/harpers-attack-on-science-no-science-no-evidence-no-truth-no-democracy/>

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B. B. Natural.

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B. What was the relationship of Neanderthals to humans

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17. Emerging Infectious Disease

1. What caused the influenza Pandemic of 1918? What research is done on it, what evidence? What remains debated?

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

3. HIV

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A. Origin,

Market:

Biowarfare laboratory leak?

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B. The politics of naming, propaganda:

“Wuhan Virus,” “American virus”

<https://www.bbc.com/future/article/20200214-coronavirus-swine-flu-and-sars-how-viruses-get-their-names>

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<https://www.theguardian.com/world/2020/mar/12/conspiracy-theory-that-coronavirus-originated-in-us-gaining-traction-in-china>

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

D. Vaccine research

[https://www.newyorker.com/magazine/2020/04/13/the-quest-for-a-pandemic-](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=au)

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dev&utm_medium=email&bxid=5c92b00c24c17c329bedd39c&cndid=36192583&hasha=f0cd9291f641e29bec9d5656cf5c577a&hashb=a79b04be1aa845dbfb726f44560980030ffa56ed&hashc=e13bae7af3ca03038b6b5b5d05683ca9644038372418aec9275dc62bb7890f06&esrc=Auto_Sub&utm_term=TNY_Daily](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=au)

19. 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

D. MMR Vaccine and Autism

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20. Life on other planets:

A. Panspermia hypotheses? Who what where why when?

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Joshua Lederberg, “Signs of Life: Criterion System of Exobiology.” *Nature* 207 (3 July): 9–13

B. Controversies over risk in planetary exploration of space exploration

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Charles R, Phillips and Robert Hoffman, “Sterilization of Interplanetary Vehicles,” *Science* 132 (1960): 991-995

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B. Evidence today for cosmic evolution in interstellar space

D. Search for Life on Mars?

When did it begin? How as it investigated? What institutions and leading scientists involved

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

Evidence today

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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/>