

Confronting a Nuclear Age

University College, Winter term 2013

This class will meet weekly at 3-5pm in Room 044 of University College at the University of Toronto ([15 King's College Circle, Toronto, ON, M5S 3H7](http://www.utoronto.ca/15king)). On two occasions instead of meeting at the regular hour, students will attend a public lecture on Thursday evening 7-9 pm in room 144 of University College. There are 20 spaces available for this free public non-credit course – register now by emailing Bryan Eelhart at sfp@physics.utoronto.ca.

Week 1, Jan 10. Risk Assessment in Technology, the Environment, Economics, and Security. (Metta Spencer)

Planning in the nuclear age requires us to choose among various technological options that may threaten (or instead may benefit) the biosphere on which human health and security depend. We will consider the controversial assessment of risks and benefits—the direct biological impacts of nuclear weapons and nuclear energy and their indirect economic impacts on our high-energy civilization.

- Mary Douglas and Aaron Wildavsky, *Risk and Culture* (Berkeley: University of California Press, 1983), Ch1
- Charles Perrow, *Normal Accidents*. (New York: Basic Books, 1984). Available online as a Princeton E-book: <http://books.google.ca/books>
- Lee Clarke: “Politics and Bias in Risk Assessment,” *The Social Science Journal*, Volume 25, Issue 2, 1988, Pages 155–165.
- Beth Gardiner, “We’re All Climate-Change Idiots Now,” *New York Times Sunday (Review)*, July 22, 2012, p. 12. http://www.nytimes.com/2012/07/22/opinion/sunday/were-all-climate-change-idiots.html?_r=1
- Martin Daly and Margo Wilson, “Carpe Diem: Adaptation and Devaluing the Future,” *The Quarterly Review of Biology*, Vol. 80, No. 1, March 2005 <http://psych.mcmaster.ca/dalywilson/d&w%20qrb%202005.pdf>

Week 2, Jan 17: The Atom and the Bomb: The Discovery of Fission and the Development of Nuclear Weapons. (Anna Jaikaran and Martha Goodings)

Scientists who invented the atomic bomb under the Manhattan Project included Robert Oppenheimer, Leo Szilard, James Franck, Enrico Fermi, Klaus Fuchs and Edward Teller. The medical effects of nuclear weapon blasts, firestorms, radiation

- Wikipedia, “History of Nuclear Weapons.”
- Outline History of Nuclear Energy, <http://www.world-nuclear.org/info/inf54.html>
- Nuclear science time line http://www.aboutnuclear.org/view.cgi?fC=History,Time_Line
- The Manhattan Project <http://nuclearweaponarchive.org/Usa/Med/Med.html>
- Nuclear Age Peace Foundation, “History of Nuclear Weapons,” <http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/history/pre-cold-war/manhattan-project/>

Week 3, Jan 24: Cuban Missile Crisis: A UN-Mediated Settlement (Walter Dorn)

Before, during, and after the Cuban Missile Crisis: Weapons testing. Nuclear warfare. Strategies. MAD. Ballistic missile defence.

- *Cuban Missile Crisis*. Harvard University's Belfer Center created this web site to commemorate the fiftieth anniversary of the Cuban Missile Crisis. <http://www.cubanmissilecrisis.org/>
- Nick Thorp, "Radioactive Fallout to Iron County," <http://toxipedia.org/display/wanmec/Radioactive+Fallout+to+Iron+County.+UT>
- Geoffrey Forden, Pavel Podvig, And Theodore A. Postol, Colonel Petrov's Good Judgment. *Peace Magazine*, April-June 2001, p. 16. <http://peacemagazine.org/archive/v17n2p16.htm/> Also, see <http://peacemagazine.org/archive/v18n3p04.htm>
- "Mutual Assured Destruction," Nuclear Age Peace Foundation <http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/history/cold-war/strategy/strategy-mutual-assured-destruction.htm>
- Steven Starr, "Climatic Effects of Nuclear War," *Peace Magazine* July 2009, p. 6. <http://peacemagazine.org/archive/v25n3p06.htm>

Week 4, Jan 31: The Nuclear Disarmament and Non-proliferation Regime (Cesar Jaramillo)

Historical account of the NPT, the three 'pillars' of the NPT, anomalies and criticisms of the Treaty, NPT holdouts, the disarmament/non-proliferation nexus, nuclear trade with non-NPT states parties, Nuclear Deterrence Doctrine, Nuclear 'umbrellas'

- Jonathan Schell, *The Seventh Decade* (New York: Henry Holt, 2007).
- Commander Robert Green. *Security Without Nuclear Deterrence* . Astron Media, New Zealand, 2010.
- Olli Heinonen: Reporting from the front lines of nuclear proliferation. *Bulletin of the Atomic Scientists*, Mar 2011, Vol. 67 Issue 2, p1-99p, 1 Color Photograph; DOI: 10.1177/0096340211399721
- "Treaty on the Non-Proliferation of Nuclear Weapons." Wikipedia.

Week 5, Feb 7: Toward Nuclear Disarmament (Vinay Jindal and Barbara Birkett)

History of efforts and campaigns to eliminate the threat of nuclear war.

- Jonathan Granoff, International humanitarian law and nuclear weapons: Irreconcilable differences. *Bulletin of the Atomic Scientists*, Nov2011, Vol. 67 Issue 6, p53-6210p; DOI: 10.1177/0096340211426360
- Lawrence J. Korb.; Rothman, Alexander, No first use: The way to contain nuclear war in South Asia. *Bulletin of the Atomic Scientists*, Mar2012, Vol. 68 Issue 2, p34-429p; DOI: 10.1177/0096340212438385

- Metta Spencer, *The Russian Quest for Peace and Democracy* (Lanham, Maryland: Lexington, 2010) Ch 6 and 7.
- Lawrence Wittner, *Confronting the Bomb: A Short History of the World Disarmament Movement* (Stanford: Stanford University Press, 2009).
- Douglas Roche, *How We Stopped Loving the Bomb* (Toronto: Lorimer, 2011).
- International Committee of the Red Cross and Red Crescent, "Working towards the elimination of nuclear weapons," <http://www.icrc.org/eng/resources/documents/report/nuclear-background-document-2011-11-26.htm>

Week 6, Feb 14: Concerns About Fukushima and Clandestine Nuclear Activities (Shawn-Patrick Stensil)

The Fukushima disaster. Dirty bombs. Nuclear contraband. A.Q. Khan.

- Greenpeace, "Fukushima Nuclear Crisis Timeline," <http://www.greenpeace.org/usa/en/media-center/reports/Fukushima-Nuclear-Crisis-Timeline/>
- Greenpeace, "Nuclear Disaster in Japan," <http://www.greenpeace.org/usa/en/campaigns/nuclear/Fukushima-nuclear-disaster/>
- Johannis Noggerath et al, Fukushima: The myth of safety, the reality of geoscience. *Bulletin of the Atomic Scientists* , Sep2011, Vol. 67 Issue 5, p37-4610p, 1 Color Photograph, 1 Chart; DOI: 10.1177/0096340211421607
- Frank von Hippel, The radiological and psychological consequences of the Fukushima Daiichi accident. *Bulletin of the Atomic Scientists* , Sep2011, Vol. 67 Issue 5, p27-3610p, 2 Charts, 1 Graph; DOI: 10.1177/0096340211421588
- Maj. Gen. Bruce Lawlor (ret.) "The Black Sea: Center of the nuclear black market" *The Bulletin of the Atomic Scientists* 15 December 2011
- William Langewiesche, "The Wrath of Khan," *Atlantic Magazine*, November 2005.

Week 7, Feb. 28: Nuclear Energy: The Safety Issue (J.C. Luxat and Richard Denton)

Note: This lecture will be held in Room 144 from 7-9pm.

Uranium mining. processing and reprocessing. Tritium. Thorium. Types of reactors. Energy production. Waste storage.

- Mycle Schneider et al : 2010–2011 world nuclear industry status report. *Bulletin of the Atomic Scientists* , Jul2011, Vol. 67 Issue 4, p60-7718p, 3 Graphs; DOI: 10.1177/0096340211413539
- Robert Peter Gale, Alexander Baranov, If the unlikely becomes likely: Medical response to nuclear accidents. *Bulletin of the Atomic Scientists* , Mar2011, Vol. 67 Issue 2, p10-189p; DOI:

10.1177/0096340211399849

- Duyeon Kim, Jungmin Kang, Where nuclear safety and security meet. *Bulletin of the Atomic Scientists*, Jan2012, Vol. 68 Issue 1, p86-938p; DOI: 10.1177/0096340211433021
- Sonja D. Schmid, When safe enough is not good enough: Organizing safety at Chernobyl. *Bulletin of the Atomic Scientists*, Mar2011, Vol. 67 Issue 2, p19-2911p; DOI: 10.1177/0096340211399404
- Allison Macfarlane, It's 2050: Do you know where your nuclear waste is? *Bulletin of the Atomic Scientists*, Jul2011, Vol. 67 Issue 4, p30-367p; DOI: 10.1177/0096340211413357
- Jan Beyea, The scientific jigsaw puzzle: Fitting the pieces of the low-level radiation debate. *Bulletin of the Atomic Scientists*, May2012, Vol. 68 Issue 3, p13-2816p; DOI: 10.1177/0096340212445025
- Colin K. Hill, The low-dose phenomenon: How bystander effects, genomic instability, and adaptive responses could transform cancer-risk models. *Bulletin of the Atomic Scientists*, May2012, Vol. 68 Issue 3, p51-588p; DOI: 10.1177/0096340212444874
- Paul Slovic, The perception gap: Radiation and risk. *Bulletin of the Atomic Scientists*, May2012, Vol. 68 Issue 3, p67-759p; DOI: 10.1177/0096340212444870
- Sander Greenland, Underestimating effects: Why causation probabilities need to be replaced in regulation, policy, and the law. *Bulletin of the Atomic Scientists*, May2012, Vol. 68 Issue 3, p76-838p; DOI: 10.1177/0096340212444873
- World Health Organization: Chernobyl: The true scale of the accident. (summary): <http://www.who.int/mediacentre/news/releases/2005/pr38/en/index.html>
- American Nuclear Society: What happened and what didn't in the TMI-2 accident. (Summary) <http://www.new.ans.org/pi/resources/sptopics/tmi/whathappened.php>
- Rolf Mowatt-Larssen, The Armageddon test: Preventing nuclear terrorism. *Bulletin of the Atomic Scientists*, Sep2009, Vol. 65 Issue 5, p60-7011p

Week 8, Mar. 7: Nuclear Power and Nuclear Weapons (Gordon Edwards)

Note: This lecture will be held in Room 144 from 7-9pm.

Can We Have a World Free of Nuclear Weapons and Still Have Nuclear Power?

- Gordon Edwards, "Fueling the Nuclear Arms Race and How to Stop It." http://www.ccnr.org/non_prolif.html
- Gordon Edwards, "The Peaceful Atom Goes to War" http://www.ccnr.org/Peaceful_Atom.html
- iCAN, "Nuclear weapons and nuclear power," http://www.icanw.org/weapons_power
- Melanie Kirkpatrick, "Why we don't want a nuclear-free world: The Former defense secretary on the U.S. deterrent and the terrorist threat." *Wall Street Journal* <http://online.wsj.com/article/SB124726489588925407.html>
- Nuclear Power and Nuclear Weapons: What's the Connection?" http://www.boell.org/downloads/PPT-Slides_Sokolski_Nuclear_Weapons_Proliferation-Energy_Security-and_Carbon_Emission_Reduction.pdf

- Theodore B. Taylor, "Nuclear Power and Nuclear Weapons," Nuclear Age Peace Foundation.
http://www.wagingpeace.org/articles/1996/07/00_taylor_nuclear-power.htm

Week 9, Mar 14: Choosing Energy Sources and Incentivizing Conservation (???)

The pros and cons of various energy sources. Energy pricing. Wind power and bird population. Harmful effects of high dams. Methane fracking. Health effects of coal use. Underwater turbine as alternative to damming rivers for power. Earthquakes and fracking.

- Stanford Ovshinsky: Pursuing solar electricity at a cost equal to or lower than that of coal electricity. *Bulletin of the Atomic Scientists*, May 2011, Vol. 67 Issue 3, p1-77p; DOI: 10.1177/0096340211406877
- IEA (29 May 2012) (PDF). Golden Rules for a Golden Age of Gas. *World Energy Outlook Special Report on Unconventional Gas*. OECD. pp. 18–27.
- Robert W. Howarth, and Anthony Ingraffea, (15 September 2011). "Should Fracking Stop? Extracting gas from shale increases the availability of this resource, but the health and environmental risks may be too high. Point: Yes, it's too high risk". *Nature* (477): 271–275. DOI:10.1038/477271a.
- Eja Pedersen, Kerstin Persson Wayne, "Wind turbine noise, annoyance and self-reported health and well-being in different living environments," *Occup Environ Med* 2007;64:480-486
doi:10.1136/oem.2006.031039
- Peter A. Bradford, The nuclear renaissance meets economic reality. *Bulletin of the Atomic Scientists*, Nov 2009, Vol. 65 Issue 6, p60-645p
- Len Ackland, Can Germany survive without nuclear power? *Bulletin of the Atomic Scientists*, Jul 2009, Vol. 65 Issue 4, p41-5212p, 1

Week 10, Mar. 21: Stress (Frank Sommers)

The psychological, physiological, and emotional consequences of living in a "nuclear age."

- Adriana Petryna, Chernobyl's survivors: Paralyzed by fatalism or overlooked by science? *Bulletin of the Atomic Scientists*, Mar 2011, Vol. 67 Issue 2, p30-378p; DOI:
- Martin E. Hellman, How risky is nuclear optimism? *Bulletin of the Atomic Scientists*, Mar 2011, Vol. 67 Issue 2, p47-5610p, 2 Color Photographs; DOI: 10.1177/0096340211399873
- F.G. Sommers, S. Goldberg, D. Levinson, et al. The Nuclear Threat and Canadian Children. *Canadian Journal of Public Health*. 1985 May-Jun; 76(3):154-156.
- F.G. Sommers, Psychological Aspects of the Nuclear Arms Race. *Canadian Journal of Public Health*. 1983 Jan-Feb; 74(1):26-28.

- F.G. Sommers, T. Dineen, *Curing Nuclear Madness*. Methuen, Toronto, 1984.
- S. Farrow, A. Chown, *The Human Cost of Nuclear War*. Medical Campaign Against Nuclear Weapons, 1983.

What one nuclear bomb would do to Toronto. You Decide. Pamphlet, City of Toronto, Nov 1982.

- F.G. Sommers, *Lose Weight, Stop Stress and Make Better Love in 5 Easy Steps by Training Your Brain*. Pathway Health, 2012. The chapter on stress is a tool for modifying stress responses.

Week 11, Mar. 28: Peace Through Health (Neil Arya)

The ideal way to prevent any war is by resolving conflict. The medical profession plays a part in that work.

- Neil Arya and Joanna Santa Barbara. eds. *Peace Through Health: How Health Professionals Can Work for Less Violent World* (Bloomfield, Conn: Kumarian Press, 2008).

Week 12, April 4: Necessary Changes in the Human Future (Derek Paul)

Economics, energy, speed, and technology.

- Ikka Taipale. *War or Health, a Reader*. (Zed Books Limited, London and New York)
- Indur M. Goklany, *The Improving State of the World: Why We're Living Longer, Healthier, More Comfortable Lives on a Cleaner Planet* (Washington, D.C. Cato Institute, 2007).
- Lester R. Brown, *World on the Edge: How to Prevent Environmental and Economic Collapse*. (New York: Norton, 2011).
- Alvin and Heidi Toffler, *Revolutionary Wealth* (New York: Doubleday Currency, 2006).
- iCan, "A Nuclear Weapons Convention" <http://icanw.org/nuclear-weapons-convention>